Title

An Ethnographic Study of Electronic Health Record (EHR) Use in Solo/Small Group Primary Care Practices in the United States

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An Ethnographic Study of Electronic Health Record (EHR) Use in Solo/Small Group Primary Care Practices in the United States

by

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DISSERTATION

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ABSTRACT

Electronic health records (EHRs) are described as one strategy to: 1) improve health care quality; 2) prevent medical errors; 3) reduce health care costs; 4) increase administrative efficiencies; 5) decrease paperwork; 6) expand access to affordable care; and 7) bring public health benefits through tracking and early detection of disease (Health and Human Services, n.d.). This dissertation uses sociological inquiry to address most of these perceived benefits.

Objective: To better understand the impact EHRs have on the structures, institutions, and practice of primary care as it relates to cost, quality of care, workflow, time, and provider-patient interactions using a grounded approach from both theoretical and practical standpoints. The human factor of this nonhuman technology is explored as is relates to the practice of health care, specifically as it relates to cost and quality and efficiency.

Research Methods: Ethnographic analysis of 11 Case studies of early-adopter solo and small group primary care practices using an EHR (including ethnographic observations, semi-structured interviews, surveys, and review of practice financial and productivity records) funded by the Commonwealth Foundation and unfunded 5 supplemental in-depth interviews of primary care providers using an EHR in various practice settings.

Findings: The macro-level findings are, when using an EHR: 1) the biomedical paradigm is reproduced and formalized; 2) provider power and autonomy are reproduced and formalized; and 3) the reimbursement structure is exploited. The mezzo-level findings are, when using an EHR: 1) health care providers' work remains relatively unchanged in type and content; 2) *how* the EHR is used is more important than *that* it is used; 3) all members of a practice are critical in the use of the EHR; 4) the EHR is used primarily for profit; 5) the EHR is secondarily used for efficiency; 5) quality-oriented features are often unused. The micro-level findings are, when using an EHR: 1) using the computer during an encounter strains interaction with patients; 2) management of information is the basic use of the EHR; 3) workflow patterns change; and 4) there are increased stages of the medical encounter. Policy implications are discussed.

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CHAPTER 1

INTRODUCTION

This dissertation examines the impact electronic health records (EHRs) have on solo and small group primary care practices in the United States. Providers, office administrators and managers, policy-makers, patients, insurers, and social scientists, among other interested parties are concerned with quality of care, the cost of health care, time, the provider-patient relationship, and the power, dominance, and autonomy of providers, especially as changes occur in the way health care in the United States is structured and practiced. The increasing and broad adoption of EHR technology has the potential to impact each of these concerns.

Significance of the Research

Ideas of how EHRs *should* be used and are *intended* to be used are present in the national discussion on EHRs. However, there do not seem to be systematic ideas or understandings of *how* EHRs *are* actually used. This dissertation addresses both theoretical issues related to the historical structure and organization of the U.S. health care system and styles of provision of care, while also paying specific attention to the practical effects of EHR use on the cost and quality of primary health care in the United States. I explore the changes being made at the ground level from the provision of primary health care at the practice and provider levels. This includes analysis of the components of provider work and workflow, the structure and utilization of time, quality improvement efforts, costs due to EHR use and revenue generated by EHR use, and the

impact these changes have on the health care system generally, specifically in relation to professional power, dominance, and autonomy.

Sociological Significance

Social scientists are interested in the changes occurring to the institution of and structures surrounding medicine, including the role and status of providers in society, the way medical care is provided, and how care is reimbursed, to name a few. At the theoretical level, this study re-evaluates traditional sociological theories of how health care and the provision of care are structured including theories of: professional power, dominance, and autonomy; proletarianization and McDonaldization; medical knowledge, medical uncertainty, and medical error; the Biomedical and Psychosocial paradigms; as well as provider-patient interactions. Specific attention is paid to the way the EHR reflects, reinforces and restructures the institution of medicine. These issues will be viewed at three levels: the structure of the institution of medicine, the practice of primary care medicine generally, and the medical encounter, specifically. I utilize conceptualizations of the roles of providers used in the current literature (as professionals, entrepreneurs, and care providers) to discuss the theories and results.

Practical Significance

Providers, office administrators and managers, and policy-makers are concerned with financial, quality, time, and human costs and benefits derived from EHRs. The U.S

health care system is frequently described as being in a state of crisis. Discussions using this terminology are highly focused on cost and quality issues, and specifically claim that quality is not being improved despite high health care expenditures. Studies and reports indicate over-utilization of services, medical errors, and poor ranking in comparisons made between the U.S. and other industrialized nations evidencing quality of care problems (Institute of Medicine [IOM], 1999; IOM, 2001). One proposed way to achieve both goals of improved quality and cost reduction is through use of an EHR. Increasing use of such technologies calls for both theoretical and practical re-examination of how health care is organized and practiced in the United States. In addition to cost and quality, providers are highly concerned about time and efficiency, specifically related to whether using an EHR takes more time or creates more efficiency. Further, there is concern that the relationship between the provider and their patient, patient satisfaction, and provider-patient interaction itself might suffer or be improved because of EHR use.

Descriptions of *how* the EHR is used by practices in this study is relevant for the development of current health policies related to cost, quality, time, composition of provider work, and provider-patient interaction. The descriptive information described and discussed in this dissertation help point out examples of pitfalls and champion positives in quality-enhancement initiatives, provider-patient interaction, decreasing costs, improving individual and practice profit, and improving efficiency.

For policy-makers these results could influence where money and political power are utilized in policy-development and incentives for increased use of EHRs. For instance, the results show that having an EHR in-and-of itself is not the critical component to quality-improvement, rather, *how* the EHR is used is the critical factor; and

the results showing that costs to the system actually increase with EHR use, not decrease as proposed, and need to be understood and taken into account when developing incentives and policies. Therefore, current EHR adoption incentives and policies alone are insufficient and need to be expanded which can be aided by information contained in this dissertation.

Information contained in this dissertation will be helpful for providers and office administrators and managers as they adopt and continue to use EHRs. The EHR is seen as a way to aid in the practice of medicine and engage in the business-oriented tasks of processing paperwork to fulfill bureaucratic and legal requirements and guidelines. The descriptions and recommendations contained in this dissertation may help providers and office administrators and managers understand the impact of using and not using basic and advanced EHR features. Especially for providers and office administrators and managers particularly interested in understanding what features of an EHR may aid in quality-enhancement and revenue generation, the descriptions provided in this dissertation are beneficial in promoting better use of quality- and revenue-enhancing features embedded in the EHR software. For providers already using an EHR or those considering using an EHR, seeing some of the pitfalls can aid in taking measures to reduce the effects or opportunities for these pitfalls to occur or become problematic. For providers setting up shop with an EHR keeping quality-enhancement in mind from the set-up stage could improve overall quality of care from the start of EHR use more efficiently and productively without having to back-track and add or change processes, equipment, and information in later. EHRs have the potential to be the impetus to

overhaul health care with a quality emphasis, but it will not happen on its own. Providers need to choose to engage in behaviors which work towards that aim.

Patients should be interested in this work as it directly affects patient care through quality of care and interaction. Indirectly, the cost of care impacts patients through rising co-There appears to be covert support for this research.

Research Questions

This dissertation asks the following sociological questions to determine the impact of EHR technology on the structure and process of health care work.

To address concerns related to classical medical sociological theory related to the impact of EHRs on medicine as a profession, the following questions are posed:

- Are providers able to maintain dominance or autonomy or are these features of professionalism challenged by use of an EHR?

To address concerns related to classical sociological theory on provider-patient interactions and practical issues of medical encounter management, the following questions are posed:

- How does use of an EHR structure the medical encounter?
    - Does the medical encounter become impersonal when the EHR is used?
    - Do patients come to the medical encounter having researched medical knowledge actively on their own, without waiting for the provider to supply them with it?
        - If so, what information do they bring?
        - From what resources?
        - How is it managed by the providers?

        - How does it change the dynamics of the power in the relationship?
    - Are there observable issues related to language or cultural translations with EHR use?

To determine practical questions focusing on the specific crises of quality and cost, and providers concern over efficiency are:

- Is the EHR used to improve quality?
    - If so, how? / If not, why not?
        - Are standards of care in the EHR used?
    - Is the use of standards of care in the EHR problematic or beneficial?
        - Do providers override system standards of care. If so, when?
        - How do providers manage and use the information stored in the EHR?
            - What information is utilized in decision-making?
            - What information is ignored?
            - Who has access to the electronic medical record?
                - Of those that have access, for what parts of the EHR do they have access?
            - What type of access do they have (just viewing or can they add information or change information)?
    - Is the EHR used as a proxy for monitoring quality?
        - If so, how? /If not, why not?

- Does EHR use impact the cost of health care?
    - If so, how? If not, why not?
        - Is the EHR used to justify reimbursement?
        - Do providers use the EHR to maximize profits
    - Do the motivations to adopt stem from a business perspective?

- Are there efficiency benefits from EHR use?
    - Do providers change their workflow patterns when using an EHR?
    - How is the EHR used by providers to complete work tasks?
    - How does the EHR impact provider time?
    - Are providers using the EHR specifically for efficiency?

It is important to note that this study does not assess or measure *actual* quality of care provided by the participants observed. The study assesses whether or not providers *use* features within their EHR that are considered to be quality-enhancing.

Methods and Analysis

To understand these features, primary care providers who use EHRs were studied. This study consists of both primary and secondary data collection. The focus of the primary data collection is on EHR use, productivity, and economics of solo and small group primary care practices in the United States. The primary research consists of eleven case studies of solo and small group practices considered early adopters and include observations of thirty-eight billing providers (Medical Doctors-MDs, Doctors of Osteopathy-DOs, nurse practitioners-NPs, and physician assistants-PAs) and, subsequently, on their administrative and nursing staff; semistructured interviews of seventeen billing providers and administrators or office managers; structured surveys of seventeen billing providers; and review of practice financial and productivity records.

Secondary data collection consists of five supplemental in-depth interviews with primary care billing providers in multiple practice settings. This data collection focused on provider-patient interactions.

Overview of Dissertation

Chapters Two, Three, and Four discuss the literature surrounding EHRs, the health care system, and the provision of care, and are intended to set up a basic understanding of what EHRs are, the factors related to the general U.S. health care system which may affect or be affected by EHRs, and the sociological theories which may relate to EHR use. Chapter Two discusses the literature surrounding EHRs and describes what EHRs are, who some of the major players are in the national discussion on health information technology, and the arguments those players are making as they push for widespread EHR adoption. Chapter Three lays out the characteristics of the U.S. health care system generally, and primary care medicine, specifically. There is a description of how the primary care specialty fits into the overall landscape of the U.S. health care system. Chapter Four explains classical theories in general and medical sociology which relate to the structures and institutions of U.S. health care, as well as provision of care, including theories of professional power, dominance, and autonomy, and provider-patient interaction.

Chapter Five describes research methods, data collection, and analysis procedures. Classic qualitative analyses are utilized in this dissertation, utilizing the methods of Charmaz (2003), Denzin and Lincoln (2000), Emerson (2001), Emerson, Fretz, and Shaw (1995), and Hammersley and Atkinson (2003).

Chapters Six, Seven, Eight, and Nine describe the results of the analysis. Specifically, Chapter Six describes the work of primary care health care providers, which includes types of work conducted and how work is organized. Chapter Seven specifically

describes primary care providers' basic *use* of the EHR. Chapter Eight assesses how more advanced use of the EHR can be and is used for quality improvement as well as discusses barriers to quality-improvement efforts. Chapter Nine describes the advanced use of the EHR for revenue enhancement as well as other revenue enhancements as a consequence of general EHR use. Chapter 10 presents an overview of the results and conclusions. In the conclusion, I discuss how use of an EHR may reflect, reinforce, and restructure classical sociological concepts of the structure of medicine. I present future research needed related to EHRs. Additionally, I discuss the implications this research has for policy related to EHRs.

Basic Findings

The basic findings suggest that providers use the EHR much in the same way that they use paper records, with little change to their overall work tasks. The major change when using an EHR is in the sequence of task completion. It appears that the medical encounter is the preferred format of the provision of care, as the sequence of provider task completion revolves around and is structured by the medical encounter. It also appears that the majority of providers' work revolves around documentation activities.

The results also demonstrate that some features of the structures identified in historical medical sociology literature are reflected, reproduced, and replicated when EHRs are used in primary care practices. However, sometimes historical descriptions of practices are no longer in tact as described, as they have been challenged and subsequently revised when an EHR is used. This chapter describes how provider power

and autonomy are reproduced and formalized and how the biomedical paradigm is reproduced and formalized with EHR use.

Therefore, this dissertation evidences the result that *how* the EHR is used is more important than *that* it is used. The primary use of the EHR is for profit. The EHR features used and strategies practices employ to generate increased revenue are described. The secondary use of the EHR is for efficiency. Many providers saw significant efficiency benefits by using basic features of the EHR. The strategies used to achieve efficiency benefits are described. However, despite the prominent assumption that EHRs will improve quality, the results demonstrate that use of quality-enhancing features in the EHR is inconsistent across practices and few practices engage in significant intentional quality-enhancement. A description of how providers use, minimize, and ignore quality-enhancing features built into the EHR software and a discussion of the potential reasons for non-use of quality-enhancing features is provided.

Even though many benefits are described by basic and advanced use of EHR features, unintended consequence of provider practice patterns when using the EHR are exposed. In particular, using the computer during an encounter puts a strain on interactions between the provider and the patient.

Objective

To better understand the impact EHRs have on the structures, institutions, and practice of primary care as it relates to cost, quality of care, workflow, time, and

provider-patient interactions using a grounded approach from both theoretical and practical standpoints.

Definition of Terms

A *medical chart (medical record, health record)* is the compilation of additive information documented about a specific individual patient during face-to-face individual medical encounters. Sometimes the chart includes information gathered between face-to-face encounters. The working application of the chart translates into the individual provider's personal record indicating work the provider and clinical support staff engage in during individual face-to-face encounters with individual patients.

The term *electronic health record (EHR)* is used in two ways in this dissertation. The first use of *EHR* is the general term indicating the software system housing all the electronic charts of individual patients currently seen in a particular practice. The second use of the term *EHR* describes a specific patient's record.

The term *provider* refers to individual primary care practitioners who are able to bill for services, which includes physicians (Medical Doctors-MDs and Doctors of Oseopathy-DOs), Nurse Practitioners (NPs), and Physician Assistants (PAs).

Documentation refers to the process of entering information into an individual patient's EHR.

The term *medical encounter* is used to describe the time frame designated to engaging on patient care work associated with appointments scheduled by patients to manage a specific health issue.

Workflow refers to the combined activities providers engage in, which include care provision and billing tasks.

The term *go-live* refers to the date when providers started using the EHR while in the encounter with patients.

EHR adoption refers to the process of purchasing and implementing the EHR.

Populating the record refers to the process by which information is entered into the electronic chart.

Frequently Used Acronyms

EHR= Electronic Health Record (Sometimes appears as Electronic Medical Record - EMR when reporting other works.)
PM= Practice Management system
MD= Medical Doctor/physician/provider
DO=Doctor of Osteopathy/physician/provider
NP= Nurse Practitioner/provider who can prescribe medications, diagnostic tests, and procedures, can bill for services, but who has legal oversight by physicians, thus cannot practice independently, and has lower status than physicians
PA=Physicians Assistant/provider who can prescribe medications, diagnostic tests, and procedures, can bill for services, but who has legal oversight by physicians, thus cannot practice independently, and has lower status than physicians
HIT= Health Information Technology
CMS= Centers for Medicare and Medicaid
NIH= National Institutes for Health
AHRQ= Agency for Healthcare Research and Quality
ONCHIT= Office of the National Coordinator of Health Information Technology
HHS= Department of Health and Human Services, which oversees ONCHIT

CHAPTER 2

BACKGROUND ON EHRs

What are EHRs?

Electronic health records, usually referred to as EHRs, are patient health records which are computerized and are built and maintained by medical practices. (EHRs may also be referred to as electronic medical records or EMRs[1].) EHRs and EMRs are accessed by the health care provider and not the patient. The record is typically accessed at the practice during medical encounters, but may also be accessed in other areas as well, such as at the hospital or at the physician's home . This is a distinction from the health record in an electronic form which is produced and maintained by patients, usually referred to as Personal Health Records (PHRs). PHRs are not included in the scope of this dissertation.

EHR systems have clinical decision support, such as templates with symptom checklists and medication and allergy warnings, built into the software for purposes of aiding the medical provider in decision-making. EHRs usually work in tandem with a computerized Practice Management (PM) system which manages some of the office staff tasks, such as scheduling appointments and maintaining demographic information on patients. The PM typically sends information to the EHR, which then "populates" the EHR indicating that a patient has arrived, thus links to sending the electronic chart for that specific patient in the EHR. In some cases, electronic billing information is sent

[1] Note that in this document the term EHR will be applied in recognition of a political distinction between use of the terms medical versus health, where health is more encompassing of provision of care other than from the medical model.

from the EHR to the PM system and in other cases, the EHR builds the electronic bill. There are other health information technologies, such as the computerized physician order entry (CPOE) and personal digital assistant (PDA) which aid in health care and are commonly grouped with discussions of EHRs. However, for the purpose of this dissertation, CPOEs and PDAs are excluded from the scope of analysis.

What is the Role of an EHR?

There are multiple roles of an EHR. For purposes of this dissertation, the role of the EHR focuses on the use of the EHR to aid in and manage primary care-related work, including the provision of primary care services, documentation, and billing for services rendered. Specific attention is paid to the use of the EHR for documentation of the medical encounter and processing work outside of the medical encounter. Use of the EHR is proposed as an aid for providers to document medical information provided in a medical encounter, access information seen as useful in decision-making at the point of care, reduce medical errors, save time, and enhance provider-patient relationships (Health and Human Services [HHS], 2007). This dissertation assesses whether the EHR acts as an aid as proposed or instead hinders documentation, decision-making, time, and provider-patient interaction.

Why the Push for EHRs?

Health Information Technology (HIT) has been promoted as a way to improve quality of medical care while reducing medical costs. However, the push has come

slowly. The U.S. Department of Health and Human Services (HHS) website designated for Health Information Technology states that, "Health information technology (Health IT) allows comprehensive management of medical information and its secure exchange between health care consumers and providers" (HHS, n.d.). The authors of the website go on to assert,

> Broad use of health IT *will*:
>
> - Improve health care quality;
> - Prevent medical errors;
> - Reduce health care costs;
> - Increase administrative efficiencies;
> - Decrease paperwork; and
> - Expand access to affordable care.
>
> Interoperable health IT will improve individual patient care, but it *will* also bring many public health benefits including:
>
> - Early detection of infectious disease outbreaks around the country;
> - Improved tracking of chronic disease management; and
> - Evaluation of health care based on value enabled by the collection of de-identified price and quality information that can be compared.

My addition of italics is used to emphasize the belief that use of EHRs *will necessarily* make these changes, rather than *may* aid in making these changes. This language creates the belief that the EHR is the solution to these issues without taking into account the user of the EHR in this process. This dissertation is intended to take the human users using the nonhuman technology of the EHR into account when assessing issues of cost and quality.

Cost

One reason why EHRs are proposed as way to reduce costs is because there is a labeled "cost crisis" in health care as medical costs have been documented to be rising at a rate beyond inflation (Anderson, Reinhardt, & Hussey, 2003; Coddington, Clarke, & Moore, 1990; Haase, 2005; Pulley, 2007; Smith, Cowan, & Sesnig, 2005). But, health information technology may be one factor impacting this rate of inflation, rather than initially improving it. The health care industry spent between $12 billion and $16 billion on health information technology in 1996 (Raghupathi, 1997), which has probably increased drastically as EHR adoption has increased. At a hospital level, it is estimated that installation costs $1.9 million (Berger & Kichak, 2004). Specific to solo/small group practices, on average, it costs $42,000 to implement an EHR (Miller, West, & Brown, 2005).[2] Although the cost of adopting health information technology, specifically electronic health records (EHRs), has been shown to be costly upfront, most solo/small group primary care practices reported by Miller, West, and Brown (2005) were able to pay for their system and start seeing financial benefits on average of $28,000 per provider per year within two years of start-up. On average solo/small group primary care practices in this study reduce their costs on average $15,615 per provider, due to cutting out transcription, reducing staff, particularly front office staff and medical records personnel, as well as supplies, such as paper. Significant cost reduction is seen at the practice-level. This finding is also supported in another study by Berger and Kichak (2004), in which the CPOE, showed a direct savings of $480,000. When other costs are added in, this same study adds an additional $5-$10 million in savings from use of computerized health information technology. An Indiana University study, cited in Berger and Kichak (1994),

[2] The Miller et al. (2005) reports data from the Commonwealth Fund study analyzed for this dissertation.

shows a 12.7% decrease in total hospital charges in a single internal medicine inpatient unit through use of a computerized system.

Taking adoption costs out of the argument, it is estimated that using health information technology will improve costs by reducing medical error, eliminating office staff, creating more efficiency, and eliminating duplication of services. Additionally, downstream costs are seen to be decreased due to less hospital and emergency room visits through better coordination of care, chronic care management, and primary care screenings (Miller et al., 2005; Pulley, 2007). In the 1980's, research showed that reminders incorporated into EHRs could decrease health care costs by reducing overlooked patient information and improved access to medical knowledge (Berner, Detmer, & Simborg, 2005). A current RAND research brief estimates a savings of $77 billon if most hospitals and doctors used health information technologies, such as EHRs (2006).

One way we could see future savings from EHR use is through decreases in medical errors. Recently, the Institute of Medicine (IOM, 1999) estimates that between *$17 billion to $29 billion* are paid out annually due to medical errors, which includes the expense of additional care necessitated by the error(s), lost income and household productivity, as well as disability. James (2004) notes that half of this estimated amount is due to actual health care dollars, and the other half represents lost productivity. James breaks this down further into an estimate of *$500 per person per year* spent on medical errors. It is important to note that though these estimates are widely used in the literature, but the source of this estimate is not provided in the IOM report. Coile (2001) also reports that the Joint Commission on Healthcare Accreditation estimates that as much as

$1 million are spent annually on "sentinel events". Within an inpatient setting, the Institute of Medicine estimates increased hospital costs due to preventable medication errors cost *$2 billion* in the United States annually (Berger & Kichak, 2004; Coile, 2001). Coile (2001) also reports that medication error costs are estimated at $2,500-$3,500 per bed per year, adding up to $1.6 million a year for a 450-bed hospital. In addition, they cite Classen, Pestonik, and Evans (1997) for attributing an additional $2,000 per adverse drug event. Not including medical malpractice or costs due to patient injuries, in the Bates et al. (1997) study of a 700-bed hospital setting, the estimated preventable costs due to *any* adverse drug event is $2,595 per patient and due to *preventable* adverse drug events are estimated at $5,857 per patient. They estimate a *yearly* cost of preventable adverse drug events in the U.S. to be $2.8 million.

In addition to projected health care savings directly due to use of health information technology, the indirect costs associated with medical malpractice are proposed to decrease, as use of EHRs can be seen as a legal buffer because they have decision-support and error-reduction features. Logic may indicate that if quality of care is improved by the structure of documenting in an EHR, in which errors are reduced and decision-making is improved through use of templates built on standard protocols. Errors and illnesses may be caught before they become more costly in an emergency or chronic state. This form of documentation could more systematically indicate what was done during an encounter, providing protection against lawsuits when the templated protocols are followed. This suggests that there will be fewer malpractice suits because there will be less error. Then, "[t]he medical malpractice cost implications of such systems (pro or con) have yet to be determined because the electronic tracking and storage of physician

'overrides' of alerts that CPOE [EHR] systems provide will be a legal conundrum" (Berger & Kichak, 2004, p. 102). If this argument is carried through, the savings to the health care system would be tremendous. The savings can be envisioned by using the median verdict in 2000 of about *$1 million per case* (Danzon, Epstein, & Johnson, 2003), or the *median* claim payments of *$175,000 in 2001*, for both through jury verdicts and out-of-court settlements (Danzon, et al., 2003), or the *mean* payment of *$315,000* in 2001. If we estimate these figures by the known number of 692 medical malpractice trials in the U.S. in 1992, based on data from the Inter-University Consortium for Political and Social Research (ICPSR), the health care system would save somewhere between $692 million at the high-end and $121 million on the low-end.

Quality

Since the Institute of Medicine's article *To Err Is Human: Building a Safer Health System* exposed the magnitude of medical errors in 1999, there has been a major push to improve quality of care in both the medical and political arenas. The report both admitted a high prevalence of medical errors and framed medical error as a major health problem. The exposure and warnings of this report led to proposals strategizing ways to improve quality by managing and improving medical error. Policy-makers quickly proposed improvements in documentation and decision-making through use of health information technology.

One physician prominently involved in the movement promoting EHR adoption demonstrates use of the biomedical framework when he states, "[m]uch of clinical

practice involves gathering, synthesizing, and acting on information" (Hersh, 2002, p. 1955). Health information technologies are proposed as a way to gather, synthesize and act on knowable information. A new discipline, medical informatics, developed which specifically focuses on managing health care information in an electronic format. Medical informatics is "the field concerned with the management and use of information in health and biomedicine" (Hersch, 2002, p. 1955). This definition emphasizes the *management* of health information. When using a Biomedical paradigm, the health information needing management relates to biological sources of health problems labeled as diagnoses.[3] The biomedical paradigm views sickness as a disease which can be reduced to biological sources and classified into diagnostic categories (Cohen, 1998). Because of its reductionistic and causal logical, the EHR can be viewed within this model as helpful because of its ability to standardize care through coded symptomology. Technical errors can be seen as stemming from a biomedical perspective. According to Woolf, Kuzel, & Dovey (2004), 43% of the technical medical error incidents studied are deemed "harmful" to the patient. If the EHR reduces technical medical errors, then harm to patients is projected to decrease significantly as technical medical errors are better able to be managed. The report estimated that between 44,000 and 98,000 patients in U.S. hospitals die each year due to "medical error". This does not include the number for inpatients whose treatment had errors from which they did not die. Nor do these numbers take into account the number of outpatients who endure medical errors in their treatment.

Historically, computers were used in health care for administrative and fiscal purposes in the hospital setting began in the 1960's. The goal was, "to improve clinical decisions and reduce medical errors through electronic access to procedure results, faster

[3] The Biomedical paradigm will be discussed in more detail in Chapters 3 and 4.

access to relevant medical information in the literature, and, from the beginning, decision support functions such as reminders and alerts" (Berner, et al., 2005). This led to the prediction of system-wide computer use in medicine by Schwartz in the 1970s (Berner, et al., 2005). However, even when providers started using electronic forms of documenting their medical encounters, they were private notes for the provider to use himself or herself (Frankel, personal communication, 2006). These notes varied among providers. The use of systematic protocols in EHRs (beyond a provider's personal documentation) did not occur until recently.

The assumption that not only will medical errors be reduced, but also coordination of care will improve through the use of health information technologies have persisted. This illustrated by the public information provided by the U.S. Department of Health and Human Services as being "automatic" by virtue of using health information technologies, such as an EHR, through improved documentation, accessibility of information and guidelines, and legibility (HHS, n.d.; Miller, et al., 2005), which specifically work to reduce medical errors, improve decision-making, and improve health maintenance. Improvements in the quality of care are proposed as being accomplished through ensuring appropriate information to guide medical decisions, improving medical care, and, relatedly, reduce(s) medical errors through automated reminders, eliminating illegible orders, improving communication, improving the tracking of orders, checking for inappropriate orders, and reminding professionals of actions to be undertaken (Ash, et al., 2004).

On the technical side, medical error is seen as anything from a lack of information to a specific mistake, such as a dosage prescription error. The American Hospital

Association considers each the following to be sources of common medical errors: incomplete patient information (not knowing about patients allergies, other medicines they are taking, previous diagnoses, and lab results, etc.), unavailable drug information (such as lack of up-to-date warnings), miscommunication of drug orders (which can involve poor handwriting, confusion between drugs with similar names, misuse of zeros and decimal points, confusion of metric and other dosing units, and appropriate abbreviations, lack of appropriate labeling as a drug is prepared and repackaged into small units), and environmental factors, such as lighting, heat, noise, and interruptions, that distract health professionals from their medical tasks" (Nordenberg, 2000).

According to the November 1999 Institute of Medicine (IOM, 1999) report *To Err Is Human: Building a Safer Health System,* medical error can consist of errors in four categories. The first category, *diagnostic*, can consist of the following errors: error or delay in diagnosis, failure to employ indicated tests, use of outmoded tests or therapy, or failure to act on results of monitoring or testing. Sandars and Esmail (2003) report that the most common and harmful errors are diagnostic mistakes, including delays in diagnosis and missed diagnoses. The EHR can be proposed as a way to reduce diagnostic errors through decision-support accessible in the EHR.

The second category is *treatment* error, which consists of: errors in the performance of an operation, procedure, or test, error in administering the treatment, errors in the dose or method of using a drug, avoidable delay in treatment or in responding to an abnormal test, and inappropriate care. Examining previous studies of medical errors, many of these errors have the potential to be reduced through use of EHRs. Ash, et al. (2004) cite the Institute of Medicine's estimates that medical errors

may cause up to 98,000 deaths in hospitals per year. Sandars and Esmail (2003) estimate that errors occur between 5 and 80 out of 100,000 consultations within primary care. Of the errors reported, between 60-83% are considered preventable. Elder, Vonder Meulen, and Cassedy (2004) report when physicians self-report errors in the outpatient family practice setting, errors and preventable adverse events occurred in about a quarter (24%) of the visits in their study. These studies suggest that use of an EHR could minimize errors generally, and can minimize medical errors and other preventable adverse events in primary care settings through improved accuracy of information.

The third category is *preventive* errors which include: failure to provide preventive treatment and inadequate monitoring or follow-up of current treatment. Woolf et al. (2004) report that 83% percent of errors were attributed to mistakes in treatment or diagnosis. In addition, they (2004) report, 5% of errors in their study were attributed to an inadequate reminder system. Delayed and inappropriate treatments are estimated to make up between 11-42% of identified errors (Sandars & Esmail, 2003). They are less likely than diagnostic errors to result in major harm. Specific to medication errors, Sandars and Esmail (2003) report that 11% of prescriptions contain errors, mostly with errors in dosage. Hohl, et al. (2005) have reported other studies demonstrating that clinicians taking care of inpatients do not detect drug-related adverse events in hospital settings very well. Only 5-15% of drug-related errors are detected without systematic use of surveillance systems. Lesar, Briceland, and Stein (1997) found five major factors in medication errors with serious side effects, where they found a 39.9% rate of error. The first factor was a decline in a patient's physical functioning requiring a change in the therapy. This error could be detected in lab values indicating a physical functioning

difference, but in and of itself the EHR is not helpful for this first type of error because the user must have a way of indicating and catching this change in a patient's functioning. The second factor is a patient's history of an allergy to a drug within the same medication class as the one prescribed, which accounted for 12.1% of the errors. The third factor was using the wrong drug name, dosage form, or abbreviation, which accounted for 11.4% of the errors. The fourth factor was incorrect dosage calculations, which accounted for 11.1% of the errors. The final factor indicated in the Lesar, et al. (1997) article is atypical or critical dosage frequency, which accounted for 10.8% of errors. This article demonstrated the potential for EHR warnings and protocol checks to decrease medication errors significantly, thus improving quality.

The final category is *other* errors. Other consists of the following errors: failure of communication, equipment failure, and other system failure. According to Woolf, et al. (2004) 80% of errors involved informational or personal miscommunication and of the errors reported in their study, 44% were between colleagues or patients; 21% were due to misinformation within the medical record; and 12% were due to mishandling of patient requests and messages. Hersh (2002) indicates some of the problems with paper medical records. One problem is that handwritten medical records can be illegible. Paper medical records can also be incomplete. It is also difficult to access a paper medical record in more than one place. In addition, security of the information is as there is concern over both unauthorized use and unauthorized users. Hersh reports "a growing concern over information not being used as effectively as possible" (2002, p. 1955). Self-reported tiredness or rushing by physicians is estimated to be responsible for 10% of errors (Sandars & Esmail, 2003). It has been "widely hypothesized that physician errors

of omission and commission were at least as frequently related to their lack of information about the patient as they were to lack of medical knowledge" (Berner, et al., 2005, p. 3). This would support the assumption that use of an EHR will improve quality as more information is available and accessible in clinical decision-making.

The conceptualizations of error by the Institute of Medicine are relatively concrete, but there are more expansive definitions as well. Woolf, et al. (2004) broaden the definition of error from a discrete event and shows that errors are typically not discrete events, but rather a cascading chain. They report the chain of errors to make up 77% of error incidents. Further, the authors propose that these errors may be avoided through use of computers. Woolf, et al. (2004) point out that most efforts to quantify errors focus on downstream events, mostly made up of diagnosis and treatment errors, without focusing on underlying issues of misjudgment of the quality of the data the providers are using to make their judgments. Additionally, I propose that the actual *use* of the EHR may be less related to error reduction and decision-enhancement, than is the *way* the EHR is used.

More and more evidence support the claim that there are improvements in quality of care and patient outcomes when health information technologies are used, particularly when standardized protocols and medication warnings are used. Hamilton, Jacob, & Koch (2004) describe a case study of automating best practices using an EHR in the Florida Hospital System. There was a goal of a complete overhaul of the system, which had to be tempered and implemented in stages based on practicality. The system implemented standardized care on different levels. Before the point of care, they implemented consultation triggers during the admissions process and adhered to the Joint

Commission on Accreditation of Healthcare Organizations (JCAHO) requirement of charting pain medication impact on patients. The nurse receives a report indicating patients who have not yet had their pain medication effects checked at certain intervals, so they are able to manage the JCAHO requirement. Respiratory therapists chart medication administrations and print back-up copies daily. There is also a complete real-time interconnection between pharmacy orders and the healthcare staff. Also, necessary consultation orders are updated automatically within the system. In this inpatient setting, evidence showed that because of the EHR checks, "patients are getting their antibiotics started within four hours" (Hamilton, et al., 2004, p. 40F).

There is also evidence of decreases in medication errors due to other computerize health systems. The Leapfrog Group estimates that 55% reduction in medical errors is possible through use of health information technologies (Berger & Kichak, 2004) and would avert an estimated 522,000 adverse drug events (ADEs) a year (Berger & Kichak, 2004). Research by Bates, et al. (1998) demonstrate a decrease in nonintercepted serious medication errors by 55% (from 10.7 events to 4.86 events per 1000 patient days) within a hospital setting while using CPOE. Preventable ADEs declined 17% (from 4.69 to 3.88). Nonintercepted potential ADEs declined 84% (from 5.99 to 0.98 per 1000 patient days). Another study conducted by King, Paica, and Rangraj (2003) reports that they observed a 40% decrease in medication errors with the introduction of a computerized physician order entry (CPOE) system within an inpatient setting. These studies were not specific to EHRs, but rather to CPOEs, and were conducted in inpatient settings, not outpatient primary care settings, but these results are still significant in understanding that

medication errors decrease when a form of computerized health information technology is used.

However, there is also evidence that chronic care and primary care through use of the EHR do not improve with use of an EHR (Crosson, Scott, & Crabtree, 2005). Furthermore, there is evidence to suggest that EHRs can cause more medical errors, at least for a period of time, as the kinks are worked out of a computerized health information system and the users learn to use the system correctly. "(A)n inferior CPOE system could even upset the workflow of clinicians to such a degree that it endangers patients" (Ash & Bates, 2005, p. 9). In addition, Ash, Berg, and Coiera point out that "professionals could trust the decision support suggested by the seemingly objective computer more than is actually called for" (2004, p. 105). Additional errors may occur in multiple realms through the process of entering and retrieving information. There may also be errors in the communication and coordination process.

Based on the mixed results in the literature, I propose that quality is *assumed* to improve through use of the EHR. Current EHRs have features specifically designed to improve quality of care including: decision support, automation of information, access to information, reminders, and warnings. In addition to the features which can be used for episodic treatment, EHRs have additional Health Maintenance and Chronic Care features which include: flowsheets tracking lab values, screenings needed, follow-ups needed, and charts plotting health indicators over time, among others. As primary care is said to focus on both the reduction of current episodes of illness, as well as the overall health of the patient, the EHR *may* be seen as a logical tool to aid in the provision of primary care services and improve quality through use of those features. This dissertation challenges

the assumption that quality will necessarily result by virtue of EHR use. Instead, it is suggested that the user is the critical factor in using the EHR to improve or hinder quality of care. Therefore, the focus of this dissertation is on *how* EHRs are used and understood by primary care providers in solo/small group practices.

Who Is Pushing EHR Adoption?

Many different entities are pushing for adoption of health information technology, and EHRs in particular, as a strategy to manage quality and cost issues. Two major entities influencing the practice of medicine in the United States, medical associations and the State (governmental agencies), promote the use of EHRs. Additionally, there are domestic market and international pressures as well.

Pressure from Medical Associations

Major medical associations, such as the major non-specialized medical association, the American Medical Association (AMA), and the major general medicine specialization medical association, American Academy of Family physicians (AAFP) have ideologically supported EHR adoption and have negotiated options to provide incentives for providers and practices who adopt EHRs. As medical associations represent the interests of physicians it is suggested that physicians are starting to buy into the idea that health information technologies, such as EHRs, may provide significant benefits. The emphasis of association efforts has primarily been to ideologically support

EHR adoption. "The AMA and 13 other medical organizations, representing more than 500,000 physicians, on July 22, (2001) announced the creation of a coalition to help physicians select and use electronic health record systems (EHRs)" (American Medical Association [AMA], 2007). Specific to primary care, the American Academy of Family Physicians (AAFP) has publicly announced the following policy advocating for use of EHRs in the March board of 2001, "The American Academy of Family Physicians supports the following one voice vision statement from the Primary Care Medical Informatics Summit Group: Every primary care provider will use information technology that includes electronic health records with the ability to access and communicate needed clinical information to achieve high quality, safe and affordable health care" (American Academy of Family Physicians [AAFP], 2004; American Medical Informatics Association, 2001).

The American Academy of Family Physicians (AAFP) has additionally created a Center for Health Information Technology, which has a user list of AAFP physician members to access comments and ratings of EHRs specifically used by general medicine practitioners. (AAFP, 2007). Currently, the American College of Physicians and the DHHS are pushing for drastic changes in reimbursement, which would include financial incentives for using EHRs (Landro, 2006).

Pressure from the State

The State, particularly at the federal level, has also taken an interest in the adoption of health information technologies, usually referred to HIT or Health IT. EHRs

are one type of health information technology. As mentioned earlier, electronic technology has been available for a few decades, but physicians did not readily adopt EHRs. One potential reason provided for nonadoption by Berner, et al. is that "[t]he government largely paid the bills and did not require changes in practice…" (2005, p. 4). Currently, governmental agencies are focusing specifically on reducing costs and improving quality through use of EHRs.

In the late 1980's, governmental and quasi-governmental initiatives began to foster dissemination of EHRs through policy (Berner, et al, 2005). In 1991, an Institute of Medicine report entitled, *The Computer-based Patient Record: An Essential Technology for Health Care,* reporting summary findings of an "expert panel" regarding who uses computerized patient records, what technology is available, and what the government, medical organizations, and others should do to make the transition to computerized patient records.

The first major political push for widespread movement to revamp medicine and reduce medical errors occurred when the Institute of Medicine (IOM) exposed the magnitude of medical errors in 1999 in the *To Err Is Human: Building a Safer Health System*. Stemming from the recommendations outlined in those reports, the federal government has attempted to work on quality issues facilitated by the use of health information technologies through proposal of legislation, the formation of infrastructure to facilitate quality improvement efforts, and funding of research and adoption grants. The House and the Senate appear to be producing multiple versions of similar legislations. These pieces of legislative proposals have primarily used the rationale of quality improvements, and some have used the rationale of cost, as the basis for proposed

bills. One overarching goal for the future is the development of an interoperable national health information system and an office specified to oversee this transition. However, very few are making it all the way through the legislative process as health information technology-specific legislation. Most activity stems from budgetary allowance, presidential executive orders, and legislation is embedded in a bill not focusing on HIT.

The first official policy related to EHRs is the formation of the Office of the Coordination for Health Information Technology (referred to as either ONCHIT or ONC) in 2004 through the orders of President George W. Bush to push forward health information technology, with a specific goal of developing a nationwide medical records database by 2014 (HHS, 2004). Since then, there has been a steady build up of proposed health information technology legislation. The following is a brief description of federal governmental activities related to health information technology between 2003 and May 2007. A budgetary allowance was approved to form ONCHIT in fiscal year 2005 by President Bush. This was followed by a by a budgetary allowance for fiscal year 2006 to develop and implement health information technology legislation. To fulfill Bush's goal of "promoting a more effective marketplace, greater competition, and increased choice through the wider availability of accurate information on health care costs, quality, and outcomes", ONCHIT is focusing attention and resources on widespread EHR adoption, with an ultimate goal of creating a national interoperable health care record system which can be accessed by any health care provider anywhere in the United States.

The Department of Health and Human Services (HHS) oversees ONCHIT. Mike Leavitt, the former secretary of HHS, who was acting secretary during the creation on ONCHIT, is a vocal supporter of the adoption of EHRs. In his confirmation speech for

his position as Secretary of the Department of Health and Human Services, he mentioned the importance of health information technology, "I believe that information technology is challenging old institutions, bridging great distances, and giving people more control over their own lives" (Leavitt, 2005a). The stated belief of ONCHIT and others in the healthcare and the medical technical field is that EHRs *can* improve quality, with a strong assertion that they *will* improve quality, which is reflected in the claims made on the ONCHIT website reported earlier (HHS, n.d.). There are different positions in the multiple literatures describing what encompasses quality within health care. There may be both technical and social aspects to the issue of quality. The arguments made for the importance of EHRs in improving the quality of care take on a technical nature of reducing medical errors.

One major legislation containing health information technology goals is the passage of the Medicare Prescription Drug, Improvement and Modernization Act, mostly known for introducing Medicare Part D (the prescription drug benefit) more than for the safety and health information technology legislation included in it. Embedded in this legislation are the establishment of a standardized e-prescribing program for those providers and pharmacies serving Medicare beneficiaries with Part D prescription benefits, grants to providers with high Medicare patient populations to aid in minimizing the cost of adoption and maintenance of health information technology, including EHRs, and plans to develop a structure for interoperable information transfer, and plans for development of a chronic care program for Medicare beneficiaries, for which EHRs could help evaluate and create improvements in chronic care quality.

Even though legislation is slow to adopt health information technology standards,

governmental agencies are actively utilizing nonlegislative strategies to increase adoption and develop standards for health information technology. The main strategies being implemented relate to economic incentives for adoption.

Much of the movement in regards to actual use of EHRs comes from the Department of Health and Human Services (HHS). The current HHS public statement regarding health information describes foreseen improvements to medicine due to health information technology.

> "Health information technology (Health IT) allows comprehensive management of medical information and its secure exchange between health care consumers and providers. Broad use of health IT will: improve health care quality; prevent medical errors; reduce health care costs; increase administrative efficiencies; decrease paperwork; and expand access to affordable care. Interoperable health IT will improve individual patient care, but it will also bring many public health benefits including: early detection of infectious disease outbreaks around the country; improved tracking of chronic disease management; and evaluation of health care based on value enabled by the collection of de-identified price and quality information that can be compared." (HHS, n.d.).

One branch of the Department of Health and Human Services relates to departments overseeing the health of current and veteran military personnel, the Department of Defense and the Veteran's Administration. The Department of Defense (DoD) uses AHLTA, which is an interoperable EHR utilized by the military to document and transport health information across providers and locations. The health records from AHLTA are transferable to the Veteran's Health Administration's (VHA) EHR, VistA.

The Department of Health and Human Services also oversees the Centers for Medicare and Medicaid (CMS). Before leaving his position as head of CMS last year, Mark McClellan, proposed using the State's buying power of reimbursement (through the VA, Department of Defense (DOD), Medicare, Medicaid, and governmental employees),

to spur the adoption of interoperable EHRs. This plan acts to provide incentives providers with Medicare, Medicaid, Department of Defense, and Veteran's Administration patients to adopt and use EHRs, through mandatory reporting of quality indicators. In this proposal, providers would be motivated to adopt EHRs because they would not receive as high of reimbursement for providing care to patients whose insurer is the State of they do not report the quality indicators. The reporting of quality indicators is assumed to be better when using an EHR.

Beyond verbal and written support of the widespread adoption of health information technologies, such as the EHR, the Department of Health and Human Services is developing programs to foster the adoption of EHRs through financial incentives, program development, and research with the goal of having interoperable EHRs within 10 years (Leavitt, 2005a; 2005b). One major stated goal of the Department of Health and Human Services is the vision of an *interoperable* system in which information collected in one place by a single provider can be utilized by another provider at a different time and place. Interoperability is the term used to indicate the accessibility and transportability of information from one individual's provider's EHR to another provider's EHR, so that information about a single patient could be understood and added to by multiple providers across geographical locations regardless of which EHR software is used.

Currently, the government is funding entities to help defray some of the initial implementation costs to facilitate adoption. Newer plans are designed to encourage providers and health care entities to quickly adopt EHRs so they can more easily collect

and organize the patient data necessary to fulfill quality indicator requirements needed to be reimbursed at a higher rate for the provision of services.

In an effort to attain these goals, the Center for Medicare and Medicaid Services (CMS) has been working to tweak VistA and develop a low-cost non-military version, VistA-Office EHR. The initial plan was to make the software free to providers, but has since increased to a minimal charge which reduces the financial barriers of EHR adoption (HHS, 2004; Terry, 2005; WorldVista, n.d.).

Some of the efforts of the Department of Health and Human Services are realized through the development and activities of other governmental entities working on health information technology issues as well. Fifty million dollars has already been put towards Agency for Healthcare Research and Quality (AHRQ) grants and another $4 million was allocated to the U.S. Department of Health Resources and Services Administration (HRSA) and the Foundation for eHealth Initiatives (eHI) by HHS specifically geared toward adoption of EHRs and other health information technologies. The American Health Information Community (AHIC) is a federal advisory board which makes recommendations to the Secretary of the Department of Health and Human Services regarding how to increase adoption of health information technologies, such as EHRs. The Federal Health Architecture (FHA) was created in response to President Bush's (2001) agenda of increased efficiency and effectiveness in governmental operations including a move toward electronic transmission of governmental information and works to help in compiling expert information on the development of health information technology development, adoption, and standards. The Agency for Healthcare Research and Quality (AHRQ) houses the National Resource Center for Health Information

Technology and funds health information technology research and development, as well as programs that support the adoption and use of health information technology in underserved areas with a budget of $166 million for grants and contracts. The Health Resources and Services Adminstration (HRSA) promotes the adoption and aids in the use of health information technology for providers working with patients who are uninsured and have special needs. They work with the Department of Health and Human Services to coordinate components of health information technology policies with other Department of Health and Human Services policies. The National Institutes of Health (NIH) in conjunction with the National Library of Medicine (NLM) offer a free online database, Medline Plus, which provides up-to-date medical information to consumers and providers. The Indian Health Services (HIS) provides care for American Indians and Alaskan Natives and has utilized an EHR called the Resource and Patient Management System (RPMS) to manage patient care and public health data electronically. Furthermore, Medicare and Medicaid (CMS) are both giving money to Quality Improvement Organizations to help practices adopt EHRs (Landro, 2006).

This dissertation adds to this literature in bringing the social aspects of quality into the discussion as well. Within the technical realm, there are arguments of increasing quality by reducing errors. There are also arguments of increasing access to information for providers to be able to utilize their medical knowledge to make more quality decisions about a patient's line of treatment. In addition, EHRs may an aid in the coordination of care. "The electronic record has several virtues. It is available when paper is not, can help coordinate multiple providers and reduce errors…" (Lerner, 2005, p. D5). In addition, there are arguments for automating best practices and developing more

standardized protocols. On the social side, there are arguments of patient satisfaction and adherence as being representative of quality. Both recent Institute of Medicine reports, *To Err is Human (1999)* and *Crossing the Quality Chasm* (2001), point out the importance of relationship-based emphasis on improving quality. Safran, et al. (2006) measured patient experience in primary care and indicated that we need to look beyond health care plans, where most research has been done, to individual providers to improve health care quality. This study does just that and focuses on the behavior of individual providers.

Pressure from the Market

Health and technology companies are also creating more pressure for EHR adoption than in the past. Coile (2001) argues that the health care industry is not spending as much on (medical) informatics as the banking industry spends on automating their service, where the health care fields are estimated to spend only 3.9% of their budgets on health information technology, as opposed to the 10% that the banking industry spends. Another article also compared the use of information technology in the health care industry with that of the banking industry noting that traditionally health care has been 10-15 years behind the banking industry in information technology usage (Raghupathi, 1997). Therefore, the health care industry can be seen as lagging behind other more traditional markets.

Even though there is a lag, more and more companies are developing health information technology products, including a plethora of EHR software products. In the

1980s, research came out linking reduced costs through improved quality by using EHRs in conjunction with the change in reimbursement practices to diagnosis-related groups (DRGs), which relies on documentation of what was done during an encounter, as well as what diagnoses were used for each medical encounter. Physicians and administrators started taking more of an interest in the potential for EHRs to easily link documentation and financial reimbursement records together. However, as the pressures to reduce costs increased and initial investment in EHRs was high, again, widespread adoption of EHRs did not occur.

Market influences are demonstrated by the number and specialization of EHR softwares in existence currently. EHR software companies, referred to as vendors, specialize their software products and market to specific provider audiences based on the functionalities included which meet the needs of the specific specialization. Due to the market forces and attempts by EHR vendors to create niche markets for their individual software, softwares are highly individualized and do not easily communicate with each other.

International Pressure

Just as the Institute of Medicine's report on computer-based patient records came out in the United States, other countries were also adopting this technology as major features of their healthcare systems (Berner, et al., 2005). Europe, Canada, Australia, and New Zealand all developed healthcare systems with EHRs at their core (Berneret al., 2005).

Who Is (Not) Implementing and Why?

Who Is Implementing

Overall, there appears to be supportive attitudes towards EHRs. Loomis, Ries, and Saywell (2002) report that most physicians agree that "physicians should computerize their medical records" and that "currently available EHRs are a useful tool for physicians". But, although over 90% of physicians in the Loomis et al. study saw the benefits, actual adoption of EHRs is significantly lower. When looking at EHR use overall, a 2006 Robert Wood Johnson Foundation (RWJF) press release reports that only about a quarter of physicians are using an EHR (RWJF). When investigating actual use more closely, only about ten percent use a "fully operational" EHR. When breaking EHR use down by primary care specialties and solo and small group practices, the estimates shift, where more primary care providers are using EHRs, but less solo and small group practices are using EHRs. The 2005 American Academy of Family Physicians (AAFP) EHR Survey reported by the Center for Health Information Technology ([CHIT], 2005) states that 46% of family physicians who are members of the AAFP and participated in the survey, "use an EHR in their practice," which is up from 24% reported for 2003.[4] Additionally, the report indicates that 9% intend to implement an EHR "within the next

[4] The sample size in 2003 had 5517 respondents. The sample size in 2005 was 2569.

six months", 17% in less than six months, 32% in six to twelve months, 35% in one to two years, and 8% of respondents intend to implement an EHR in more than two years.[5]

According to a poster presentation at Indiana University which was later published in 2002, Loomis and colleagues suggest that EHR users have three qualities. First, they tend to practice in urban areas or are affiliated with hospital-based care and they see fewer patients.[6] Second, those providers affiliated with hospitals likely did not have to make the financial investment on an individual level to implement the EHR. Third, there may be a side-effect of using the EHR and seeing fewer patients.

Who Is Not Implementing

There have been multiple factors provided explaining why providers are not implementing EHRs. Previous research indicates providers have concerns about using an EHR which are categorized below.

- Environmental (Ash & Bates, 2005)
  - Cost (Ash & Bates, 2005; CHIT, 2006; Hersh, 2004)
  - Laws and regulations (RWJF, 2006)
  - Risk associated with a vendor going out of business

- Organizational (Ash & Bates, 2005)
  - Culture of support (Ash & Bates, 2005)
  - Readiness to adopt (Ash & Bates, 2005)
  - Fear over partner's acceptance (CHIT, 2006)
  - Mistrust of Vendors (CHIT, 2006)
  - Don't see value in an EHR (CHIT, 2006)

[5] The question asked, "When do you think you will implement an EHR in your practice?" I want to indicate that the wording of this question is leading and assumes that a non-using provider first, *wants* to use and EHR, and secondly that the provider *intends* to use an EHR. Some providers may not want to use an EHR and others that want to use one, may have no actual intention of adopting and using one.

[6] There are potential distinctions between these groups if you look between the lines. Those in urban areas might be more likely to have a population of patients who are more comfortable with computers.

- Personal – from the provider's side (Ash & Bates, 2005)
  - Ease of use (specifically ease of data entry) (Loomis, et al., 2002)
  - Training (Loomis, et al., 2002)
  - Lack skills /Technology too burdensome (CHIT, 2006; Hersh, 2004).
  - Lack of expertise and time in making a good (software) decision/ Complexity of contracts and pricing (CHIT, 2006)
  - Decreased productivity (CHIT, 2006)

- Technical (Ash & Bates, 2005)
  - Data confidentiality and privacy (Hersh, 2004; Loomis, et al., 2002)
  - Data sharing/System Interoperability (Hersh, 2004; Loomis, et al., 2002)
  - Technical Issues/Lack of clinical informatics workforce (Hersh, 2004; Oppenheimer, 1973).

Hersh (2006) points out that a disadvantage for early adopters is that as they have already fronted the cost of adoption, they would also be fronting the cost of the system set-up for others through the resources needed to adapt current technology to future interoperable technology, for which later providers will not have to make the same investment.

Cost is a major financial barrier indicated across multiple studies and reports. In the Massachusetts Medical Society study reported by Ash and Bates (2005) physicians report that EHRs are too costly to implement. In relation to start-up costs, the majority of physicians (70%) reported not being willing to spend as much as $10,000 on an EHR system. In addition, it is seen that they are too expensive to maintain once implemented (Ash & Bates, 2005). The majority of providers (63%) reported unwillingness to spend $150 or more on maintenance costs of an EHR per month. The implementation costs go beyond just purchasing or leasing the equipment and software. It also involves training and potential staff reorganization. Furthermore, there may be misaligned incentives by the developers of the software, providers, administrators, and politicians. For example, it is not necessarily business savvy to be interoperable with other systems. However, as

there are increased mergers in medicine, there is more ability to negotiate in purchasing EHRs.

As cost is a strong factor of non-adoption, practices who see patients with lower reimbursement rates are also less likely to adopt EHRs unless there is a funding source supplementing the adoption. The Robert Wood Johnson Foundation (RWJF, 2006) reported that "physicians who treat more Medicaid beneficiaries are half as likely to have EHRs". This is further evidence that providers who adopt may likely be motivated by monetary gains or are in an initial better financial position to take on the financial burden of adoption than are providers whose profit margins are smaller due to a smaller reimbursement rate for the services provided to their patient populations.

Implementing EHRs is still perceived as risky (Ash & Bates, 2005). It involves changes in organization and workflow. There is a large capital investment with an unclear return on the investment. Hersh (2004) points out that as the investment is high the investors only make back about 11% on their return. Beyond practice and bank investments, many other stakeholders, such as insurance companies, laboratory companies, and technology companies benefit from EHRs even though they did not make the financial investment.

Socially, there needs to be a culture of support (Ash & Bates, 2005). Where the idea to adopt came from, providers or administration, needs to be taken into account. There needs to be a readiness to adopt. In addition, the organizational culture needs to be ready to support adoption on many fronts. There needs to be trust between the clinicians and administration. Sufficiently skilled implementation, training, and support coordinators who understand both clinical and technical issues are needed in the adoption

process. These factors indicate a network of team players necessary for successful implementation.

Physicians are reluctant to adopt new ways of doing things that interfere with their workflow and that they perceive take time away from their patient care work (Ash & Bates, 2005). In a phone conversation with Dr. Rich Frankel (2006), co-author of *Effects of exam-room computing on clinician-patient communication* it was noted that, "unless doctors find it in their self-interest to do it (adopt EHRs), they won't". However, when clinicians have access to larger amounts of information with which to make decisions and when the system fits the workflow- they tend to use it." (Ash & Bates, 2005, p. 9).

According to Loomis, et al. (2002) there are specific distinctions between users and nonusers. Nonusers are less likely than users to believe that 1) physicians should computerize their medical records; 2) EHRs are a useful tool for physicians; 3) EHRs improve quality of records or that they decrease errors; 4) it is easier to enter data into current EHRs; and 5) paper records are more confidential and more secure than EHRs.

There are technical issues involved in adoption as well. Providers and administrators not only need to have a grasp of medical knowledge, but computer and networking knowledge as well. There are also issues of interoperability. This can occur is different ways. One is the interaction between an EHR and a practice management (PM) system used by the office staff which interacts with the EHR primarily used by the clinical staff. Another issue is the link between EHR input and output. Additionally, new jargon must be learned. Standards must be agreed upon. Issues surrounding unique identifiers for patients that take into account patient privacy, confidentiality and security of information. Furthermore, there are technical issues surrounding remote access.

CHAPTER 3
OVERVIEW OF THE U.S. HEALTH CARE SYSTEM

Players

The provision of health care in the United States is typically referred to as a "health care system," even though it is less a system than a fragmented conglomerate of specialized services.[7] The complexity of a multitude of players in the health care system (education, research, suppliers, insurers, payers, providers, advocates, patients, among others) is acknowledged, however, this dissertation focuses on the scope of the health care system relating to the direct provision of health care services to patients. Some discussion does include the links between actual providers' behaviors as it relates to these other players, particularly payers, such as insurance companies. There are noted discrepancies in access to care within the system, although recognized, will not be discussed in detail here.[8]

External Forces

Shi and Singh (2001) present a model of external forces affecting health care delivery which includes the following broad categories: 1) social values and culture; 2) population characteristics; 3) physical environment; 4) technology development; 5) economic conditions; and 6) political climate. I propose that these are not separate forces, but actually influence each other, in that social values and culture influence

[7] Leiyu Shi and Douglas Singh (2001) provide an overview of health care delivery in the United States.
[8] See Shi & Singh, 2001, for an overview of access disparities.

technology development. For example, as the previous chapter reports that an early version of the EHR was available but providers were not yet willing to adopt it. Now that an economic condition in which EHR has been demonstrated to create profit and political entities are supporting adoption of EHRs, providers are more willing to adopt EHRs. This chapter explores the relationships of these factors on adoption and use of EHRs.

Values

American Ideologies

The traditional beliefs and values of American society relate to the structure and ideologies associated with the U.S. health care system. One is a belief in science (Shi & Singh, 2001). The model of health care delivery is stated to stem from advances in science and technology. U.S. society values capitalism, which has resulted in the U.S. health care system being viewed as an economic good, whereby money is made, and effort is expended to make that money (Shi & Singh, 2001). Third, the U.S. is described as favoring an entrepreneurial spirit (Shi & Singh, 2001). Fourth, American society is characterized as believing in principles of free enterprise in conjunction with a distrust of "big government" (Shi & Singh, 2001).

Disciplinary Beliefs

One of the first medical sociologists, Freidson (1970), describes the concept of physicians as "professionals". His description can be interpreted to indicate the dominant

values held by physicians in the 1960s which persist today. The first is medical responsibility, where the patient's life is in the hands of the provider. The second is clinical experience, where physicians have first-hand contact with the patients and disease. Therefore, face-to-face contact in decision-making is seen as paramount, which limits the theoretical belief in technologies that allow clinical decision-making through modes other than face-to-face encounters, thus the necessity for the formal medical encounter.

Although there is this value of individual responsibility, there is also a collective acceptance and reliance on information of insiders. "Cultural authority refers to the general acceptance of and reliance on the judgment of the members of a profession" (Shi & Singh, 2001). The opinions of medical providers, and specifically, physicians, are seen to be more legitimate than those of laypersons. Advances in technology may be seen to legitimate this authority even further (Shi & Singh, 2001). Therefore, EHRs may be seen as a legitimating force for physician's to retain their cultural and societal power and prestige through use of an EHR.

Pressure to develop quality standards and to demonstrate compliance with those standards is increasing (HHS, n.d; Shi & Singh, 2001). At the national level an agenda has been set in *Healthy People 2010* to work towards comprehensive health promotion and disease prevention (HHS, 2005). One strategy proposed to accomplish this task is through widespread EHR adoption. This move includes the minimization of health disparities through the inclusion of social issues by utilizing a new framework in which to see the whole patient rather than the patient's specific symptoms. This change has been encouraged through the work of sociologists, who have provided critiques of the medical

model and have provided evidence of social issues related to medicine, from the macro level down to the micro level. One health movement which has pushed for the *Healthy People 2010* agenda is the holistic medicine movement where the whole patient is taken into consideration, not merely the parts of patients as separate entities to be fixed, as is carried out through the medical model (Ventegodt, Morad, & Huam, 2004).[9] There are consequences of these beliefs. The expectation of finding a cure and being able to be treated in this system is high, which has led to overutiliztion of services (Axt-Adam, van der Wouden, & van der Does, 1993; Eisenberg, Williams, & Garner, 1977; Shi and Singh, 2001). Health care providers are trained to focus on physical, rather than social, symptoms, thus they tend to utilize clinical interventions, and thus, alternative therapies are deemphasized. Until recently, little had been done to integrate services of diagnosis, treatments, health education, and disease prevention. Medical providers are working downstream once people are sick, rather than concentrating on keeping people healthy (McKinlay, 2005). Therefore, there tends to be a focus on non-health rather than health. Patients in the U.S. use more specialty care than other countries (Bindman, Forrest, & Britt, 2007). Specialists tend to utilize higher rates of pharmaceuticals (Glowacki, et al., 2003) and other interventions and treatments (Couch, 1997).

Types of Care

Physicians make up the highest ranking occupation in the health care delivery system. They received the highest level of reimbursement and have the most legal rights in terms of diagnosing and treatment provision. All states require licensure of physicians

[9] See Shi & Singh, 2001, for an overview of this perspective.

in order to legally practice medicine. Licensure includes three steps: graduation from an accredited medical school, completion of supervised internship and residency programs, and successful completion of a licensing examination. There are two types of medical schools in the United States, those granting degrees as a Medical Doctors (MDs) or Doctors of Osteopathic Medicine (DOs). The licensure examinations are governed by the National Board of Medical Examiners or the National Board of Osteopathic Medical Examiners. The difference between an MD and a DO is that osteopathic medicine emphasizes the musculoskeletal system and takes a more holistic approach, stressing lifestyle (such as diet) and environmental factors, whereas the medical approach actively treats health problems with treatment intended to fix the immediate symptom of the disease (Klaiss, 1998; National Institutes of Health, 2007; Shi & Singh, 2001; Strong Health, n.d.; The Princeton Review, n.d.).

Provision of care in the United States can be categorized as either primary care or specialist care. Primary care physicians are either Doctors of Osteopathic Medicine (D.O.s, considered generalists, or Medical Doctors (MDs), in the specialties of family physicians, internists, and general practitioners (NIH, 2007).

This dissertation is limited to primary care. Much of the provision of health care takes place within the primary care realm (Kuzel, et al., 2004; National Center for Health Statistics [NCHS], 2006). Primary care providers, including general medicine, family medicine, internal medicine, pediatrics, and Obstetrician/Gynecologists (OB/GYNs), make up 58.5% of physician visits (NCHS, 2006). When including viewing only general and internal medicine, which is the focus of this study, and excluding pediatrics and

OB/GYN, 40.1% of physician visits are those conducted by primary care physicians. Therefore the provision of primary care is a critical area for research.

Based on time sequence, researching primary care specialists is also significant because primary care providers are typically the first line of contact for patients to receive care, especially when a patient's health plan, requires a gatekeeper to access other specialties, as is typical with most managed care plans. Primary care providers (PCPs) also maintain more consistent contact with patients over extended periods of time than with providers in other specialties. Usually patients refer to their primary care provider as "my doctor," for which status and responsibility is given to manage the overall care of the patient. Structurally, as described earlier, managed care placed primary care as the central place to receive care, and structurally thrust primary care providers into a gatekeeping function in, which specialist care could not be accessed without first going to a primary care provider. The gatekeeping function was that the primary care provider acted as a gate holding back the flood of services patients were requesting and obtaining from specialists in the fee-for-service system, where specialist services were presumed unnecessary and costly when decided upon by patient choice to see a specialist over a generalist. The care rationale was that much of the treatments specialists were providing could be done by generalists for cheaper. The financial rational was that primary care providers charge less for similar treatment activities than do specialists. Although some insurances still maintain a gatekeeping function by primary care providers, some insurance corporations have loosened these standards and allow more flexibility. Even in the situations in which patients are allowed more freedom of choice, the socialization process of the gatekeeping function, whether still utilized or not, remains, and most

patients seek treatment from a generalist (primary care provider) than from a specialist. Therefore, using primary care as the scope in this study is critical in understanding overall patient care.

Primary Care Practice Settings

Primary care is provided in many settings, but most typically in office-based settings, rather than in in-patient settings such as hospitals. According to National Center for Health Statistics (2006) data, 81.3% of all physician visits occur in the office setting. Office-based outpatient treatment can be provided in community health centers, large group practices, organization-based practices, or in solo and small group practices.

Community Health Centers, Large Group Practices, and Organization-Based Care

Community health centers (CHCs), large group practices, and organization-based primary care (such as the Department of Veteran's Administration or Kaiser Permanente) have distinct characteristics. Typically, the individual providers are not owners of the practice setting; thus, their financial incentives and financial burdens are less likely to be based directly on productivity. Some providers in these settings are paid a salary or a capitated rate for provision of care, regardless of the type of care provided. Their individual work typically does not make or break the practice in the same way that an individual provider in a small practice is impacted, as the individual behaviors are diffused over more numbers of providers, thus the impact of one provider is less severe.

Additionally, motivations impacting practice style may differ between non-owner providers and providers who own their practice. The shift from solo and small group practices where the providers own or co-own the practice to a large group practice in which the providers may not be owners, rather are employees has been described in the medical sociology literature as deprofessionalization, bureaucratization, and proletarianization (Brown 1996; Light, 1979; 1988; 1989; 1991; Light and Hafferty, 1993; Hafferty & Light, 1995; McKinlay & Marceau, 2002; Oppenheimer, 1973; Ritzer, 1993; Ritzer & Walczak, 1988; Turner, 1987)

Solo and Small Group Practices

Solo and small group practices are conceptualized and categorized distinct from the other practice types mentioned. Due to their smaller nature and legal status, in which physicians are typically co-owners of a small group practice, the level of autonomy in this setting is much higher than in the other settings. As two-thirds of U.S physicians are estimated to have worked in solo or small group primary care practices in 2003, they year this study began (AMA, 2001). Although it may sound as if solo providers practice alone, for the most part, this is untrue. They typically rely on the help of others to manage the work of the practice.[10]

Solo/small group primary care practices may be seen as being similar to the "small, owner-operated shop" Freidson describes in 1970, whereby they are distinctly

[10] This dissertation includes only one true solo practice, where this is only one billing provider, but even this practice has other players involved in the management of care. He has a nurse and his wife helps him with some of the business and computer aspects of the practice. Additionally, he relies on the work of outside entities, namely insurance companies, to be able to provide care. Therefore, even in solo practices, I argue that other players are involved and critical to the structure and practice of health care.

separated from oversight by other providers (other than self-selected partners). Freidson indicates that particularly in this practice setting, attention to patient demands are more obvious as they are the informal measure of oversight in this setting.

> "[T]he organization of solo fee-for-service private practice insulates him from colleagues who might otherwise stiffen his resistance to 'giving in' to the patient. Furthermore, colleagues are not there to question his self-deceptions. It is doubtful that the average physician knowingly employs questionable practices. Isolated from others, he simply comes to believe that his poor records, shortcuts, and readiness to prescribe are all harmless and insignificant practices. Insulated from day-to-day face-to-face interaction with colleagues, he meets no important pressure of opinion opposed to that of his patients, and none to warn of danger or impropriety. In a situation like this, how sensible it is to believe that he will practice the way he was taught in medical school, let alone learn and use the new knowledge and techniques discovered subsequently?" (Freidson, 1970, p. 71).

The structure of isolation and little oversight except by patients has changed somewhat in that insurance companies oversee some aspects of patterned provider behaviors, (such as consistently prescribing a certain high cost medication), especially with the growth of managed care where cost is the typical incentive of oversight. However, many solo and small group providers still enjoy much autonomy with little official external oversight of interaction level behavior. The lack of systematic and structured oversight of provider behavior may allow for more individual freedom on the part of the individual provider in a solo or small group to work in their own way picking and choosing what parts of their training and socialization to utilize and which ones to ignore. The EHR may be a way to move beyond oversight based on patient satisfaction and engage in more systematic oversight of solo and small group who are their own "bosses" by entities, such as the government, without forcing direct in-person oversight by administrator "bosses" in a hierarchical structure such as that in large group practices. Thus, as more practices in the past were solo and small group practices where the

physicians were owners, the past resistance to adoption of EHRs may actually be a symptom of resistance to *oversight*, rather than an actual resistance to the technology itself.

Primary Care Provision of Care

There are different levels of medical care, namely primary, secondary, and tertiary. According to Fielding, "primary care involves routine diagnositic and therapeutic procedures related to illness prevention and treatment of common health problems" (1999, p. 49-50). He further proposes, "primary care poses relatively little risk to the patient" (1999, p. 50). This assertion can be contested and it may be argued that for many patients, primary care is the first step in health or illness of individuals and of the wider society.

The majority of medical care in the U.S. is provided by primary care providers as indicated earlier (NCHS, 2006). General practitioners engage in more medical encounters and working more hours per week, but earn less than specialist physicians. In 1998, the mean number of patient visits to all physicians was 107.6 patients per week. When categorized by primary care specialties, general and family practice specialists engaged in more medical encounters a week, with a mean of 133.7 encounters per week, and less by internal medicine specialists at 99.7 encounters per week (Shi & Singh, 2001, p. 122). As compared to all physicians, general and family practitioners spent 52.9 mean hours per week on patient care and internal medicine practitioners spent 53.9 mean hours per week on patient care, which is a little more than the 51.3 mean hours on patient care

spent by all providers (Shi & Singh, 200, p. 122). General practitioners make significantly less on average ($131,200/year), than do physicians in general ($195,500).

Style of Practice

Both the biomedical, biopsychosocial, and psychosocial paradigms are utilized in medicine currently. This is demonstrated by Roter, Stewart, and Lipkin (1997) using biomedical and psychosocial paradigms as a frame for understanding physician practice styles. The first model, seen in 32% of encounters, is described as "narrowly biomedical" where closed-ended questions are used along with biomedical talk. The second model, seen in 33% of encounters, is described as "expanded biomedical", where the restricted pattern of the narrowly biomedical model are used, but with the addition of some psychosocial discussion. The third model, seen in 20% of encounters, is described as "biopsychosocial" in which there is a psychosocial interaction with the addition of biomedical exchange. The fourth model, seen in 8% of encounters, is described as "psychosocial" in which there is primarily a psychosocial exchange. The fifth model, seen in 8% of encounters, is described as "consumerist" in which the patient's questions are the main focus with the addition of physician information giving.

As early as 1970, Freidson indicates, "improving communication within and across the division of labor would settle difficulties of operation… and sort out contradictory lines of authority" (p. 23). Therefore, recognition is made of the importance of others in the provision of care by an individual provider. The clinical support can come from co-owners, who are also providers, nursing staff, lab and

radiology staff, and physical therapy staff, among others. Business support comes from office administrators or managers, receptionists, medical records specialists, billing specialists, and transcriptionists, among others.[11] One major feature of the EHR is an internal communication mailing capability. If utilized, communications and actual care and workflow and provision of care might be improved.

Providers spend very little face-to-face time engaged in the medical encounter with a patient. According to the National Ambulatory Medical Care Survey, a self-reported estimate by physicians, the average time spent on direct patient care was 16.3 minutes per encounter, averaging studies between 18.8 minutes and 10 minutes (Gilchrist et al., 2005). Gottschalk and Flocke (2005) demonstrate the basic breakdown of physician's office time. They report that in an average workday of 8.6 hours, physicians only spend about half (55%) of their time face-to-face with their patients. The rest of the time is spent completing administrative and documentation tasks. Fourteen percent is spent outside the medical encounter on a patient currently at the office and 25% is spent on work related to patients not in the office. One could argue that with the aid of the EHR, some of these tasks can be performed remotely without a physician physically needing to be in the office. In addition, there is an argument that some administrative tasks may take less time with an EHR, leaving the potential for more time spent with patient. In addition, the EHR may allow for documentation to occur in the exam room with the patient, providing more face time with the patient than with paper records in which a provider spends significant time documenting outside the encounter.

[11] A body of literature, exists which explores the position, rank, and status of others in the health care setting (See Turner 1987; Freidson, 1970).

Subsequent to the Gottschalk and Flocke article (2005), Gilchrest et al. (2005) also examined physician time. Although the average workday varied slightly, 8 hours and 8 minutes per day, which would be 8.1 hours rather than 8.6 hours reported by Gottschalk and Flocke, they are similar enough for comparison. Sixty-one percent of the workday was spent on activities related to medical care. Of the 8.1 hour workday, 32.9% was spent charting and 23.4 % was spent dictating. Use of the EHR could limit or eliminate this documentation time. Specific to the actual medical encounter, on average, Gilchrist et al. found that physicians spent an average of 17.8 minutes in direct patient contact. (Note that the discussion of time here does not include time spent on a patient's behalf by other staff, such as receptionists, nursing staff, and lab staff.)

However, a study focusing on a quality-focused style of medicine is demonstrated as being more time consuming. Epstein, et al. (2005) shows those providers with the lowest levels of patient-centered communication spent less time with their patients, spending an average of 18,8 minutes with each patient; whereas the middle level spent an average of 19.6 minutes with each patient; and those providers with the highest levels of patient-centered communication spent 22.8 minutes on average with each patient.

Current research on electronic data management is mixed with regard to the impact on time. On the one hand, electronic data management systems are said to be more time consuming than utilizing paper records (Berger & Kichak, 2004). Just data entry related to lab and prescription order-entry is estimated to take up 5% of hospital housestaffs' total work week hours, which is equivalent to four hours per week (Berger & Kichak, 2004). However, evidence also shows that using the EHR can be time-saving. One study evidences that utilizing an electronic system saved an assistant manager nurse

of a surgical PCU "approximately thirty minutes per patient per shift with an additional 50% decrease in the follow-up needed with the pharmacy department regarding patient medications" (Hamilton, et al., 2004, p. 40F). In addition, using the EHR could potentially lessen time for certain tasks, such as retrieving information, gaining access to up-to-date expert medical advice, and providing patient education materials for patients. *How does the EHR affect provider time?* McDonaldization is also said to bring about depersonalization and irrationality. *Does the medical encounter become impersonal when the EHR is used?*

CHAPTER 4

CLASSICAL MEDICAL SOCIOLOGY THEORIES

Multiple players in solo and small group primary care practice settings play immediate roles in direct patient care including caregivers who can bill (physicians –DOs and MDs, nurse practitioners- NPs and physician assistants- PAs), care-giving support staff (registered nurses- RNs, licensed practical nurses- LPNs, and medical assistants- MAs), as well as patients and people accompanying patients (family members and caregivers). Additionally, care providers receive business support from office administrators and managers, receptionists, medical records specialists, and billing specialists. The main focus of this chapter and this dissertation are on enactment of the roles of billing providers (physicians, nurse practitioners, and physician assistants). The literature traditionally associated with billing providers focuses on physicians, thus much of what is presented is in reference to physicians specifically, but to some extent can be related to nurse practitioners and physician assistants. This chapter presents traditional sociological theories associated with the structure and practice of health care in the United States and provides an overview of the major discussions and ideas stemming from medical sociology literature whereby health care providers can be seen as acting within the roles of professional, entrepreneur, and care provider. Use of EHRs challenge the traditional ways these roles have been enacted and perpetuated. As a professional the EHR may be used to replicate the structures of power and authority, it may also impinge on providers' autonomy. As an entrepreneur, the provider can be seen as a business person in on the newest technologies of the market. As a care provider, the EHR can be

perceived and used as an aid in the provision of care, which includes documentation and decision-support.

Physician Role as Professional

One role health care providers take is the role of a professional, which can be seen as a vocation, process, or structure. Parsons (1951) describes a profession as a vocation based on 1) universalism, 2) disinterested service, and 3) affective neutrality in which all physicians are meant to treat patients without bias or personal attachment. However, other theorists have moved beyond this description of values into a description of professionalism as both a process and a structure. William Goode (1957, 1960) indicated two processual aspects of professionalism. First, the socialization in professions is more stringent than other occupations. Socialization refers to the process of learning a culture. Here the culture medical students learn is the specialized discipline of medicine. The second is the provision of services. Here physicians go to medical school and engage in internships and residencies where they are socialized into their roles. Then, they act out the profession of medicine through the provision of services.

Profession can also be viewed as a structure. Structural features of professionalism are described in the works of Goode (1960), Freidson (1970), and Turner (1987). The first feature is the determination of educational and training standards as being set from within the profession. Entrance into the profession is competitive and limited. Training is based on theoretical knowledge, which is used as the basis of a skill. Once through training, Freidson suggests that being in the medical profession is an

identity, based on the sharing of a particular position in the social hierarchy and the common participation in a specific place in the division of labor (1970). This can be seen as a master status for the professionals (Macionis, 2006). High prestige is associated with the profession. Freidson (1970) indicates, "[t]he physician is the symbol of healing whose authority takes precedence over all others...," and, "…is the prototype of professionalism upon which all would-be healing professions model themselves" (p. 15-16). Further, professionals are legally bound and protected through licensure which maintains this prestige and limits those who can be considered colleagues. The State, thus, creates and enables legitimacy of physician power. This licensure is protected from outsiders and is conducted in-house by colleagues of the same profession. Further, legislation impacting the professionals is shaped by the professionals themselves. There is the development of professional associations, which can be seen as specifically enacted for the purpose of representing providers as a stakeholder in legislation. However, oversight of work is limited and external evaluation and non-peer control of professionals is relatively nonexistent. When evaluation is present, it is conducted informally by colleagues in the same profession, usually without formal consequences, but with a few providers who may be cited or stopped from medical practice. Instead, a professional code is developed and assumed to be adhered to. Finally, through all of the socialization process and legal protections, there is development of an altruistic service (Freidson, 1970).

Stemming from, perpetuated by, and maintained through these structures, physicians are given unprecedented power. One of Freidson's described strengths of the profession of medicine is the "legally supported monopoly over practice" which is

granted and backed by the State (1970, p. 83). Power is embedded in the structure of medicine through the ability to prescribe, order lab tests, and conduct treatments, which lies within the structural legal monopoly of health care professionals. Applying Giddens concept of power (1984) taking the structural constraints of provider power over diagnosis and treatment, clients would not have the power to enact specific treatments on their own because of the power embedded within the actual interaction of the medical encounter itself. Patients have little control over the structure of an interaction with their medical provider because they do not traditionally have the power to change a medical interaction. Therefore patients are dependent on health care providers, as providers have both the knowledge and means to treat them. Turner defines this "a set of strategies requiring control over the work situation, the institutional features of occupational autonomy within the wider medical division of labour, and finally occupational sovereignty over related occupational groupings" as medical dominance which include three modes of domination: subordination of other professions and paraprofessions, limitation by method of treatment, and exclusion through legitimation by insurance reimbursement and the state (1987, p. 141).

Arguments made by Light, Hafferty, McKinlay, Marceau, Mechanic, and Rochefort (Hafferty and Light, 1995; Light, 2000; Light and Hafferty, 1993; McKinlay & Marceau, 2002; Mechanic, 1996; 2000; Mechanic & Rochefort, 1996) contend that professional dominance is declining. Part of this is described as due to countervailing powers (including the State, employers, other providers, insurance companies, patients, medical-industrial complex), whereby physicians are one of many powers that work in conjunction and against each other to maneuver within the healthcare system. The

monopoly described by Freidson was lessened, which led to the described attack on physician, autonomy (McKinlay, 2002; Ritzer & Walczak, 1988).

Further, Oppenheimer (1973) describes a four-step process of proletarianization, in which the ideas of professional dominance as described by Goode (1960) and Freidson (1970) are called into question. Oppenheimer's first step is the increased and extensive division of labor, which is seen to minimize the role of the physician. The second step is the nature or work being determined by a higher ranking entity, which is seen in large-group and hospital-based settings, where an administrator oversees the work of the health care provider, and the provider's autonomy is lessened. The third step is the wage being determined by the market, whereby patients "doctor shop" and employers choose insurance plans, which are associated with discounted networks of providers. The fourth is the worker who has an association working on their behalf to bargain for collective improvements, thus the entity representing the provider may not have the same interests or agenda of the individual provider, thus may not be accurately representing them. However, it can be argued, that for solo and small group practice providers, these factors play less of a role for their provision of care, as structurally, they are buffered from the affects within their practice, where they maintain control and are not overseen by an entity higher than themselves.

Therefore, as Turner suggests, the intellectual dichotomies presented are neither professionalism nor proletarianization, rather, "we can conceptualize professions and occupations subject to contradictory forces which simultaneously push them towards proletarianism and professionalism" (1987, p. 138). Health care providers are seen to specifically work to maintain their occupational monopoly. Turner suggests three ways

in which occupational monopoly works to be maintained given the aforementioned societal pressures of change. First, knowledge must continue to be produced and maintained, and I add protected, for this knowledge to continue requiring considerable interpretation on the part of the provider, thus the functional necessity of the provider. To be qualified to interpret this information, formal training, such as a Medical Degree and Board Certification, must be maintained as required. Secondly, a profession works towards monopoly over services by maintaining extensive clientele and by subordinating or removing services they do not provide. Third, professional groups work to maintain autonomy over the delivery of services. *Do EHRs help providers maintain these three features?*

Historical enactment of physician dominance and autonomy has the possibility of being disrupted through the use of EHRs. As decision-making becomes more automated, the necessity for individual critical thinking skills of the physician may be called into question. The major question concerning the impact of EHRs on the status of physicians as professionals stems from Turner's claim that, "where this knowledge can be codified and developed by computer systems, the profession becomes vulnerable to the rationalization of knowledge" (1987). *Are providers able to maintain dominance or autonomy when using standards of care provided by others in an EHR or are these features of professionalism challenged by use of an EHR?*

Physician Role as Entrepreneur

Bryan Turner describes professions (such as physicians), as representing "the institutionalization of altruistic values" where the professions were "officially committed

to personal service and community welfare," and the social role of medicine as a profession, was therefore "meant to embody a disinterested commitment to community values" (1987, p. 131). Therefore, the professional (physician) was seen as *not* being motivated by personal interests or by economic rewards. This position is contrasted with his earlier assertion that, "professions are largely dominated by the monopolistic interests and bureaucratic forces of contemporary capitalism (Turner 1987, p. 134). "Medicine has thus become more like a business" (Fielding, 1999, p. 84).

A physician, "depends upon their ability to maintain a market situation and access to appropriate clients" (Turner, 1987, p. 140). The maintenance of the market and clientele is evidenced by physicians increasing investment in ancillary services that are financially beneficial to them individually, such as lab and physical therapy (Fielding, 1999). Additionally, health care providers can be seen to be entrepreneurs in that they participated in the managed care movement, which assured payment regardless of actual provision of care. As described in the previous chapter, law suits and other evidence of prior overutilization of services, with a fee-for-service reimbursement system, which shifted to the other extreme of underutilization of services, with managed care. Given this history and demonstration of contemporary efforts to shape practice around economic gain, the EHR can be seen as an entrepreneurial endeavor by providers used specifically to maximize profits. Particularly for solo and small group practitioners who are owners of their practice, the role of entrepreneur is added. A mode of inquiry can be the stated reasons for adoption of an EHR. *Do the motivations to adopt stem from a business perspective, specifically for reasons of financial gain? Do providers use the EHR to maximize profits?*

In addition to financial gain, other business goals may spur adopting an EHR, such as efficiency and standardization. Related to According to Ritzer's (1993) basic principles of rationalization of work, referred to as McDonaldization, society and specifically work processes, are shifting to a bureaucratized model. Thus rationalization in this sense works to achieve efficiency, standardization, uniformity and predictability, and control through automation. If we believe in the McDonaldization of society to the extreme degree, health care will also follow this general societal shift towards automation. If this is true, primary care practices and providers would use the EHR for efficiency and standardization. *Are providers using the EHR for efficiency? Are providers using the EHR for standardization?*

Providers report time as being an important commodity, and efficiency therefore, critical. Howard Becker and colleagues' classical work on medical training (1977), demonstrates providers' conscious awareness of issues related to time and developed strategies to manage time during medical school, internships, and residencies, which they balance with life generally. Patient care activities include not only face-to-face time with the patient, but also include diagnostic, interpretation, chart writing, and other administrative tasks, many of these tasks directly take time away from face-to-face interactions with patients. The way medical encounters and outpatient medicine is generally set up, there is little time with each patient; thus, efficiency is of utmost importance within this environment. Primary care physicians have been concerned over their increased time in administrative tasks leaving decreased time face-to-face with their patients, thus lessening the time of a provider-patient interaction (Gottschalk & Flocke,

2005). This sentiment may be seen in the following quotes presented in the work of Fielding.

> "'A lot of my time has to do with answering to the bureaucracy.'
>
> 'I write much longer notes. It's a pain in the neck.'
>
> 'We weren't documenting the way we do now. Now we document every call that comes in. We document every call that's made. Even then, you can't fully document the full context of every call and everything that you do or every conversation with a physician. I mean you would spend the entire day chained to a Dictaphone.'
>
> 'Where there's anything questionable I document. I go the extra mile to get records to document a telephone conversation, things that I may not have done in the past.'
>
> 'Physicians feel compelled to document. It thus becomes a vicious circle: less patient contact because of more paperwork; less communication between physician and patient, which leads to more distrust'" (Fielding, 1999, p. 93-4).

These statements are critical in understanding both the motivation to document beyond patient care reasons, as well as the unintended consequence of creating a problem with the actual provider-patient interaction, which is central to patient care. Further, the current system is described by Dr. Michelle Eads, an internist as, "…the typical hamster wheel—15 minutes with a patient and then kick them out the door as fast as you can" (Landro, 2006, p. D1).

Role as Care Provider

The most visible role of the physician is as a care provider. Physicians report wanting to be needed by their patients (Schwenk & Romano, 1992) and wanting "to help people" (Becker, et al., 1977). They feel an enthusiasm for dealing with important

biomedical problems and challenges (Schwenk & Romano 1992). Becker, et al. indicates that medical students report that "Medicine is the best of all professions. When we are beginning to practice we want to help people, have enjoyable, satisfying work while upholding medical ideas. We want to earn enough money to lead comfortable lives, but this is not our primary concern" (1977, p. 72). Therefore, there is a demonstrated altruistic component to patient care beyond the status and economics discussed earlier.

Within the care provider role, providers are seen to be allowed a high level of autonomy. Stemming from this autonomy, the "profession appears to be fairly free to develop its special area of knowledge and to determine what are 'scientifically acceptable' practices" (Freidson, 1970, p. 83) and "while the profession may not everywhere be free to control the terms of its work, it is free to control the content of its work… and free to control the technical instruction of its recruits" (p. 84). Even with this specified freedom, come serious expectations and consequences which shape provider work. They are expected to be an expert, documentarian, and communicator, each of which have real consequences in terms of patient health, patient satisfaction, and legalities.

Role as Expert

As mentioned earlier, patients are structurally dependent on health care providers as providers have both the knowledge and legal means to diagnose and treat them, thus are deemed "experts". Therefore, the responsibility of improvement of a patient's health and patient's satisfaction stems from provider's actions. This is especially true if one is

taking on the perspective that the medical provider is an expert and that the patient is not an expert, and thus the patient does not know what indicators to look for.[12]

Within the overarching role of the health care provider as expert, are subsidary obligations of, decision-maker (information translator and protector, diagnoser), and treatment provider (episodic care treater, chronic care manager, health maintainer). Turner proposes the idea that specialized knowledge creates prestige and social distance, which is based on the idea that medicine is "grounded in a scientific discipline" (1987, p. 135). Reflecting the notions of science, "medical" language is developed and understood only by those selected few deemed "experts" who are specifically trained to know and understand this language. Michel Foucault (1969) asserts that knowledge and power are linked by those in power using knowledge to subordinate those without power. An argument is made that health care providers further structure the power of the interaction through use of language. The health care field has had vast ability to keep knowledge secret through the use of medical terminology and limit access and understanding of this knowledge by others. Providers, therefore, act as translators between "secret" medical terminology and lay explanations and applications. The continual process of translation allows this information to remain protected and secret.

However, social movements, including health social movements (Brown & Zavestosk, 2006) and societal changes have started to question the limited access of information and have developed methods through which medical jargon is demystefied. Through the recent consumers' rights and patients' rights movements, patients and lay caregivers have gained access to medical knowledge, taking it upon themselves to

[12] Note that there is ongoing literature disputing the ideology that medical providers, not the lay person/patient, are experts

become familiar with and understand medical literatures, specifically as they pertain to their specific ailment. Additionally, general access to information through the public nature of the internet has allowed lay persons (patients and lay caregivers) new access to medical knowledge.[13] As patients take the management of their personal health information into their own hands, personal health records (PHRs) are being developed and utilized in many different formats, as simple as Word documents in which medical history and medication lists are typed or as intricate EHR-like softwares and devices. A mode of inquiry is *if patients bring information into the medical encounter, is the EHR used by the provider to manage the information? If so how?* Additionally, the adoption of EHRs by providers allows an additional opportunity for a shift in paradigm to be engendered by providers in which medical jargon is limited and access by non-providers increases. A mode of inquiry is seeing if EHRs are used by providers in a manner which makes information more accessible to others, both in terminology and physical access. *Who has access to the electronic medical record? Of those who have access, to what parts of the EHR do they have access? What type of access do they have (just viewing or can they add information or change information)?*

Beyond providers having the legal and structural access to knowledge, there is an issue of access to information. Providers need information to be able to make decisions. However, there is another assumption in medicine, particularly in primary care medicine, that "the more information a physician has about the patient, the better informed his or her judgment will be" (Fielding, 1999, p. 51). Fielding explains, "this, of course, assumes that more information will provide a clearer understanding" (1999, p. 51). Based on this assumption providers have been shown to overuse diagnostic procedures to gain

[13]See Brown & Zavestosk, 2006 andShi & Shigh, 2001 for more information on these movements.

more knowledge. Fielding explains that "sometimes more information makes it more difficult to establish a clear course of treatment" (1999, p. 51). Having the information is not as crucial as being able to use and interpret the information. The EHR is seen as a device to store and manage information. Although the EHR may be able to provide more information to the provider, this information may not actually be helpful in the decision-making process. One mode of inquiry, then, is *how do providers manage and use the information stored in the EHR? What information is utilized in decision-making? What information is ignored?*

Decision-making can be seen as the most visible behavior providers engage in as it relates to the role of care provider. To be a decision-maker the provider has to have gained knowledge. But, it is impossible for providers to learn and take into account *all* medical knowledge available, thus there is always a level of uncertainty. Physicians learn during their first year as medical students that it is impossible to "know" all medical information available (Becker et al., 1977). They develop strategies for managing the mass of medical information by informally talking with others, including faculty and other students, and reviewing past exams, to figure out what information is most important for the exams. Although this strategy worked in medical school, it is not sufficient in practice, so physicians find other ways to manage uncertainty.

Renee' Fox (1957) asserts that medical students describe two types of uncertainty they have to manage. The first is uncertainty related to a personal lack of knowledge, for which they can control by studying and practicing. The second is uncertainty related to lack of knowledge of medicine as a whole, for which they were helpless, thus blameless. EHRs are designed as a way to manage the personally known information, by presenting

access to information known by the discipline of medicine. Fielding adds a third aspect of uncertainty by expressing that there is also uncertainty revolving diagnostic interpretation and possible treatments which leads to an overutilization of procedures as a strategy to manage uncertainty. "The technological imperative of medical training teaches physicians that it is better to do something, than to do nothing" (Fielding, 1999, p. 74). The EHR is presented as a way to manage uncertainty related to lack of knowledge in diagnosing and decision-making.

Freidson suggests, "the capacity to cope with basic uncertainty in clinical practice," is by, "absorbing the knowledge he needs to be secure enough to deal with patients without too much anxiety" (1970, p. 84). However, what is learned in medical school is questioned as being applied in entirety in practice. Freidson states that, "skill is not necessarily retained or used after graduation from medical school" (1970, 88). This statement could be used as a powerful rationale for utilization of an EHR in which if utilized, the newest "best practices" are embedded and less skill and memory are needed in the provision of care. A strategy employed to manage uncertainty is to use formal standards of care. These standards of care are observed to constitute both in-house agreed upon standards among the providers or they could be formalized standards from an outside entity.

Historically, insurance companies or other third parties have had very little to do with setting the standard of care. "Physicians have had sole control over all aspects of medical care; thus the standards of care developed informally among physicians, much as in any form of craft work… However, such a system lacks uniformity and scientific assessment." (Fielding, 1999, p. 70). "Typically, one or more physicians would develop

a technique and, after performing it several times, would conclude on an empirical basis whether the procedure worked. This simply means that they observed their patients and decided for themselves whether their patients improved. If 'enough' of them did, then the innovating physician would teach the treatment to other physicians who would teach it to others. If a consensus emerged among enough influential physicians that the new technique was effective, it would become part of the standard of generally accepted medical practice; subsequently the new procedure would be formalized by inclusion in the medical textbooks" (Fielding, 1999, p. 70). This process for developing standards of care can be argued as unscientific, but is the process by which medicine has become seen as "scientific". Thus, a paradox surrounding the concept of standards of care ensues. Therefore, if we take the standards of care for granted as being scientific, which I cannot qualify as accurate one way or the other, and providers use the standards embedded in an EHR, over their personal standards of care, care provision can be, at minimum, more systematic. But, as Fielding argues though a process may be a standard, it does not mean it is "effective" (1999, p. 70). Therefore, even as there is a push for use of standards, through use of EHRs, a system by which provision of care is actually any better may not develop, as those standards may not be effective. (Just as the word states, they are just standard, without as much variation as is seen currently.) The EHR can be useful in promoting use of scientific standards and provide access to standards as they are developed. These standards can be embedded into the processes necessary to document using the EHR. The process of filtering new standards to the level of provision of care in actual practices, can be done quicker and more systematically, through the widespread adoption of EHRs. For example, as more people use Windows computer systems, they

become aware of new features as updates arise. As most people use scheduled updates, the new information spreads widely and is utilized relatively quickly because of this standardized operating software's widespread use. Therefore, with widespread use of EHRs, newly developed techniques and practices can be spread through systematic updates facilitated by having an EHR and using it with updated features, not by the EHR itself.

Even when utilizing what a provider has learned in school, the processing of information may not present a clear diagnosis or course of treatment. We sometimes create more uncertainty in the process of trying to create certainty (Fielding, 1999). The decision-making process becomes more convoluted as the volume of information and narrower margins for error in treatment greatly increase the chance of harm. "The notion that medicine often does not have clear-cut objectives, or that the treatment options can vary widely in a given scenario, runs counter to the beliefs that many of us hold about medicine. We do not understand how these uncertainties can exist" (Fielding, 1999, p. 73).

A gray area of uncertainty exists, where there are unclear objectives, symptoms, and standards of care. Providers develop methods to manage these uncertainties, specifically as it relates to symptom definition. Greer and Halgin (2006) report that physicians and patients tend not agree on symptom etiology. When there is disagreement EHRs may be seen as a tool to reduce the discordance of symptoms between providers and patients because the EHR can be used as a legitimizing tool. The biomedical paradigm can be legitimated through the EHR and then may act as a legitimating force through use of the EHR. If a symptom is in the EHR, it could be seen as more legitimate

and real. If it is documentable, it could become "real" through definition by the EHR. Two new possibilities may result from EHR use. The patient could see the physician as listening to them less as the EHR may structure questioning based solely on biomedical symptomology and not listening to a patient's experience wholly, thus patients becomes less compliant. The patient could see the questioning and behavior being shaped by the EHR as more legitimate (and less objective), thus they become more compliant because the computer backs up what the physician thinks. Providers do tend to accept and rely on the judgment of other members of their profession, seen as cultural authority (Shi & Singh, 2001). The standards of care in an EHR may then be seen as evidence of the legitimacy and appropriateness of viewing the patient within a biomedical paradigm, the paradigm shared by providers, over and above the patient's accounting and experience beyond biomedical symptoms.

Another way of managing symptom uncertainty is to label the patient as "difficult" (Crutcher & Bass, 1980; Fineman, 1997; Schwenk et al., 1989; Slocum 1989, Stimson, 1976). When providers label their patients as difficult, it releases some of the obligation of providers to understand and interpret vague symptoms. For example, when a patient is unable to describe their symptoms using a biomedical format, the situation is labeled as the patient being difficult, rather than the difficulty of the situation or the inability of the provider to understand and interpret the patient's described experience. Therefore, according to providers, the problem lies with the patient's inability to describe their symptoms, rather than as a failure of the provider to know something. Research conducted on defining patients as difficult indicate that "difficult patients" may have chronic problems (Chandy et al., 1987; Fineman 1997; Slocum 1989) which require

many office visits and medical procedures (Chandy, Schwenk, & Roi, 1987; Crutcher & Bass, 1980; Fineman 1997). The utilization of time and resources needed to manage uncertainty over symptoms and diagnosis can be frustrating to providers (Fineman, 1997; Stimson, 1976). When using checklists in the EHR, the provider can document the presence or absence of a symptom without having to describe the symptom; thus, management of difficult symptoms may be aided by the EHR. As chronic care is a special concern on the national platform, EHRs may be used as a strategy to manage this form of "difficult patient". The suggestion in the literature is that chronic conditions can be better maintained and evaluated through the EHR. However, it is also possible for some symptoms, which do not have formal medical names or which are hard to describe, to be noted in the patient's words in a handwritten medical chart verbatim, thus more accurately capturing the patient's experience. . This could be more problematic with use of the EHR where use of symptom checklists is the intended design format, which may make vague or non-medicalized symptoms unusable in the EHR , Therefore, a mode of inquiry is, *are standards of care in the EHR used? Is the use of standards of care in the EHR problematic or beneficial?*

The prior arguments champion EHRs as beneficial because they have standardized protocols embedded and accessible in the software. But, using standards of care can be problematic. The lens through which providers see patient complaints can be analytically limited through the process of conceptualizing the patient's complaint in terms of biomedical symptoms. As described and discussed in the previous chapter regarding provider values and beliefs, health care providers are embedded in the biomedical model, which is reflected in the perspective through which they hear patient

complaints and descriptions of symptoms with a focus on physical, rather than social, symptoms. This perspective would indicate that the EHR would be used to manage current methods of provision of care through a biomedical scope. Thus the scope of documentation remains geared towards physical symptoms, and ignores the social symptoms or context of symptoms.

Additionally, "[w]hile the physician's job is to make decisions, including the decision not to do anything, the fact seems to be that the everyday practitioner feels impelled to do something when [patients] are in distress" (Freidson, 1970, p. 258). The expectation of finding a problem and treating that problem is high. Providers are seen to overutilize services, including lab tests in making their decisions. "[T]est results serve to legitimate the physician's diagnosis and judgment, but they are likely not improving the patient's condition" (Fielding, 1999, p. 96). Providers gather evidence seen as necessary to demonstrate and back-up chosen and accepted standards of care (Fielding, 1999; Shi & Singh, 2001). Decision-making which utilizies lab data could be easier with use of an EHR. For example, tasks such as managing lab values, would be aided by the EHR in determining if those values are out of the normal range, thus considered abnormal, with less individual effort in knowing all specific lab value ranges.

Even when standards of care exist, evidence shows that they are not routinely used in everyday provision of care as providers have wide variation in diagnosing and treating similarly presented symptoms and even when the condition is well-defined in the scientific literature (Greer & Halgin, 2006; Fielding, 1999). Many studies show the subjectivity involved in decision-making whereby medicine is less a science and more of an art. Fielding claims, "By art, physicians mean that practicing medicine is heavily

dependent on personal judgment. This process involves both a technical knowledge and an intuitive feel" (1999, p. 51-2). It is important to note, as Fielding does, that subjectivity does not imply inherent or intentional incompetence or negligence. It does however indicate that subjectivity is embedded and impacts human action. It is part of the social context of the provider, just as it plays a role in my reporting of the observational data, as described in the research methods chapter. Fielding's statement is a strong assertion that though medicine may be based on scientific principles and theories, as Turner (1987) states, in practice health care providers rely on knowledge other than that specified by science. The assumption that reducing subjectivity is somehow better can be challenged. However, regardless of whether subjectivity can be useful or is harmful, the EHR can be seen as a way to help health care providers minimize this subjectivity. The assumed benefit of the EHR in reducing subjectivity is through access to embedded standards of care and links to the most up-to-date protocols, which are assumed to improve the provision of care. Therefore, based on this argument, the EHR would appear to have the possibility of improving the provision of care. In 1999, Fielding pointed out "that while medical practice may be accepted by many physicians, it is not necessarily good practice" (p. 34). I want to emphasize how critical this statement is. Therefore, stemming from medical malpractice research, one concludes that providers may not actually be providing good care, even when those practices are accepted. This rationale is one of the reasons for the push for adoption of EHRs. One hypothesis is that while EHRs may improve quality of care by virtue of latent reminders, and other information, the major difference in quality of care may directly come more

from *how* the EHR is used than *that* it is used. Therefore, this dissertation assesses the question: *How is the EHR used to improve quality?*

Although these discrepancies in judgment and subjectivities in care have been documented, Millman (1977) expresses a "gentlemen's agreement" exists among providers as part of the culture of medicine whereby physicians are seen to overlook the mistakes of other providers of the same rank. Therefore, particularly in solo and small group practices where there is no formal oversight as the providers are practice owners, the correction or punishment of mistakes by colleagues is unlikely. Further, Bosk (1979) explains that physicians categorize errors and discrepancies as being inherent in medicine and that all providers make them at some point. "Technical errors" are constructed as unproblematic because they were unintentional. Colleagues forgave technical errors for which subtle changes were made where the offending physician worked "harder". "Moral errors" on the otherhand were seen as more problematic. The character of the physician was questioned resulting in informal punishments, such as writing unfavorable letters of recommendation and social isolation of the provider by other providers. But, for the most part, nothing formal is done either to the individual or to the structure of care provision to minimize these errors. The EHR is one proposed system-wide change to reduce errors without formal intimate involvement in oversight by colleagues.

Substantial literature shows that physician diagnosis and treatment are influenced by the social characteristics of the patient (Epstein, et al., 1985; Hall, Epstein, & DeCiantis, 1993; Ross, Mirowsky and Duff 1982). Theoretical explanations of this pattern have focused primarily on the personal biases of physicians. The agentic role of personal values, seen here as individual-level beliefs, within the medical encounter has

been primarily limited to assessing how personal characteristics of a client influence physician behavior (Epstein, et al., 1985; Hall, et al., 1993; Ross, et al., 1982). Smaje argues that "health is not affected by ethnic or racial identity so much as by the consequences entailed in these identities" (2000:114). Thus, the identity or characteristic of a client in and of itself is not the impetus for biased behavior by providers. It is argued that the meaning attached to those characteristics, generally viewed as deviant or negative, is the actual influence on the clinical behavior of providers.

The EHR can be employed as a way to limit biases based on race, class, gender, and other social characteristics, as symptom checklists may be seen as neutral, given that a provider may be prompted to ask a patient a symptom related question they might previously have omitted based on underlying belief systems. For example, studies of women show that they have as many cardiac problems as men, but female cardiac problems are frequently misdiagnosed as anxiety attacks (Henig, 1993). One argument for this discrepancy is that due to physicians' societal socialization that women are emotional, providers see female cardiac symptoms as emotion-related, rather than as cardiac-related. In this case, the EHR may prompt the provider to ask about cardiac-related symptoms in addition to emotion-related symptoms, not taking into consideration the cultural bias that women tend to be more emotional, thus certain symptoms are attributed to emotions rather than physiology. On the otherhand, there are measured differences in symptoms between men and women for cardiac issues and if one standard is used, misdiagnosis may occur in this situation because of the unbiased standard of care as well. Therefore the EHR may not be set up to manage culturally sensitive symptoms or language differences.

The Department of Health and Human Services (HHS) asserts, "[b]road use of health IT will: improve health care quality; prevent medical errors…" and promote "improved tracking of chronic disease management" (HHS, n.d.). If these assertions are taken as true, with the growing evidence of uncertainty, subjectivity, and bias as problematic in the provision of care, why would providers not quickly adopt and use EHRs, especially when they can access standards and templates to minimize uncertainty, subjectivity, and bias? One answer may be in providers' general resistance to change. This idea is supported by literature on the resistance of oranizations and professions, and specifically of medical providers to change current workflow practices. In the 1960's, when there was enthusiasm in medicine for technology, EHRs did not take off. The investment by physicians and administrators was deemed not worth it, especially if it impeded the physician's workflow (Berner, et al., 2005). Physicians "are reluctant to adopt new ways of doing things that interfere with their workflow and that they perceive take time away from their patient care work" (Ash & Bates, 2005, p. 9) "The installation of these systems is costly (millions of dollars) and requires major behavioral changes, not only by physicians, but also by the entire healthcare organization" (Berger & Kichak, 2004, p. 100). The intention of many electronic systems is not to get the providers to change their workflow, rather it is to integrate their current workflow into the operations of the electronic system as seamlessly as possible (Hamilton, et al., 2004). However, the bottom line is, "[u]nless doctors find it in their self-interest to do it (adopt EHRs) they won't" (Frankel, 2006, personal communication). Specific to the EHR, even though EHRs were available in the 1960's, providers consciously chose not to use them.

> "[P]hysicians continued to rely on their own autonomy and authority and may not have wanted to use decision support systems even if they were available. Often it

> appeared that those scientific advances that did not challenge physician authority and autonomy were embraced, while those that potentially diminished the doctor's independence were resisted" (Berner, et al., 2005, p. 4).

However, it has been shown that "independent decision-making often caused unacceptable variations in both health care processes and outcomes" (Berner, et al., 2005, p. 4). As the EHR necessarily creates some change, *do providers also change their workflow patterns during the EHR adoption process?*

In 1999, Feilding pointed out that, "while medical practice may be accepted by many physicians, it is not necessarily good practice" (p. 34). Based on this statement argument can be made that it might be better for a provider to use personal judgment rather than a protocol accepted by "many physicians" as a standard of care.

> "If a clinician, encountering a situation in which he normally would use a particular treatment, has the intuition, for a reason that has not yet become clear, that treatment might not be the best for this particular patient, we suggest, rather than considering it a feeling from nowhere that might be discarded, perhaps the intuition can later be traced to a set of concrete observations about the patient that were not easy for the clinician to describe at the time" (Borrell-Carrio, Suchman, & Epstein, 2004, p. 580).

Therefore, stemming from medical malpractice research, one concludes that providers may not actually be providing good care, even when those practices are accepted. This rationale is one of the reasons for the push for adoption of EHRs. Again, I assert, that while EHRs may improve quality of care by virtue of latent reminders, etc., the major difference in quality of care will come directly from *how* the EHR is used than *that* it is used. Also, *do providers override system standards of care in the EHR and if so, when*?

Role as Documentarian

Another major task providers engage in is documenting the encounter and other actions surrounding medical decision-making, including communications between providers and patients which occur in between medical encounters. One function of the electronic medical record could be to efficiently note what bodily functions of the patient are abnormal. Historically, documentation was a private individual act meant only for the provider to use. Documenting has become a legal tool used for defense of decision making as well as a way to legitimate billing charges. The adoption of EHRs coincides with a discussion about who's record is the formal documentation of providers and who should and does have access to the record.

As early as 1975, history-taking was seen as a two-way street, rather than as an interrogation, as was seen in the 1944 Goodenough Committee report (Armstong, 1982). Armstrong (1982) notes that the Royal Commission on Medical Education (also known as the Todd Report) discussed history-taking as "simply asking a series of prescribed questions and checking the accuracy of the answers" (Armstrong, 1982, p. 109). Two structural factors led to a shift in the medical record as a personal note into a more public document of which multiple parties now have a stake.

As epidemiology came to the forefront, that electronic records were used to house data from paper medical records in an electronic format adaptable to looking at specific treatments of specific diseases and illnesses (Frankel, personal communication, 2006). At the same time, insurance companies started seeing medical records (at this time paper medical records) as a mechanism to indicate quality of care. These two structural

phenomena led to more individuals and organizations having a stake in the private medical records of providers. The medical record became a proxy for monitoring quality and activity within an encounter used to justify reimbursement. *Is the EHR used as a proxy for monitoring quality? Is the EHR used to justify reimbursement?*

The medical record is the first point of action in determining negligence or error (Fielding, 1999), thus the provider's documentation acts as a legal document, and moves beyond its use as a decision-making tool. The importance of the record as a legal document is illustrated when Fielding states, "the record clearly reveals negligence in terms of the failure to monitor the patient closely, recognize impending shock, and act accordingly on that information." Therefore, the record is used to indicate what treatments were performed as well as what symptoms are monitored and when. The legal issue of medical malpractice is the area whereby most repercussions of medical-decision-making are visible. "The increasing rate of medical malpractice claims is a symptom of systemic problems in health care…" (Fielding, 1999, p. 42). Fearing malpractice claims, many providers describe practicing "defensive medicine".

Role as Communicator

Historically, the biomedical paradigm is the most prevalent paradigm in medical practice, whereby providers dominate the interaction and analytically fit patients into symptoms attached with medical terminology. A critique of this paradigm emerged by social scientists. This critique offered an extended approach in which awareness and sensitivity to the psycho-social elements of patients' experiences are included in

diagnosing, treatment, and the interaction generally. Social scientists have documented negative outcomes of provider-patient interactions rooted in the biomedical paradigm and offer suggestions for improvements in communication with patients.

Medical encounters seen as frustrating by the patient can lead to a loss in the continuity of care and can lead to episodic medical care, which are further linked with negative health and satisfaction outcomes for patients (Epstein, et al., 2005; Epstein, Shields, & Meldrum, 2006). There is a competing paradigm, patient-centered care, which takes a more social view of a patient's symptoms and the medical encounter, which includes the interaction and social context of the patient. Patient-centered communication is a philosophy of practicing medicine which calls for providers to expand upon the biomedical approach (Epstein, et al., 2005). It is intended to help patients feel understood through inquiry into patient needs, perspectives and expectations. In addition, it calls for attention to the psychosocial context of the patient. Attention is given to helping the patient expand their own involvement in understanding their illness and decisions that affect their health.

Armstrong (1982) documents the development of this perspective, and asserts that in 1935 a position was asserted that doctors should take on a wider social work role and locate illness in its social context.[14] As an extension of the biomedical model, Engel proposed the biopsychosocial model, which is seen as

> "both a philosophy of clinical care and a practical clinical guide. Philosophically, it is a way of understanding how suffering, disease, and illness are affected by multiple levels of organization, from the societal to the molecular. Current perspectives assert that at the practice level, it is a way of understanding the patient's subjective experience as an essential contributor to accurate diagnosis, health outcomes, and humane care" (Borrell-Carrio, et al., 2004, p. 576).

[14] See Armstrong, 1982 for the development of this perspective.

Engel was critical of the mind-body separation practiced in medicine which was reductionistic , and criticized the reduction of medical problems to one illness or one symptom (Borrell-Carrio, et al., 2004).

The emphasis on efficiency and absence or presence of biomedical symptoms clashes with the suggestions presented in perspectives promoting sensitivity to the interaction and to cultural issues of patients. American doctors are socialized to dominate the doctor-patient interaction (Brown, 1996). Generally, the process is characterized by the doctor using directed questions and emphatic speech. These techniques are used to control the flow of the conversation as well as the topics discussed. Physicians also state their authority over patients in that if a patient does ask questions, they are typically ignored (Brown 1996, West 1984). When using an EHR to document an encounter, checklists may be used. Checklists are intended for efficient capture of absence or presence of symptoms. As Beckman and Frankel (1984) observe, without use of an EHR, providers interrupt patients after 18 to 23 seconds and when they interrupt they tend to ask clarifying or close-ended questions, preventing the patient's "experience" to be heard. With an EHR, the desire to complete the checklist may structure providers to interrupt patients and structure their questions in a close-ended format. The noteworthiness of symptoms is broadened with the checklist features in the EHR, which could affect the way the provider structures the information-gathering process. Steward and colleagues describe, as currently as 2003, providers continue to use a "doctor-centered" closed approach to information gathering (Dalhousie Medical School, 2004).

How does use of an EHR structure the medical encounter?

The EHR may act as an analytical structuring device (as mentioned in the prior section), from which providers use the close-ended style of information gathering. The analytical limitation of incoming information could be exacerbated by a provider's task shifting from listening to the patient to filling out a checklist. "Computer applications are best when they automate routine work, but the complexities of the health care process often make it anything but routine" (Ash, et al., 2004, p. 106). There are notions that physicians structure the visit around data-gathering, with counterarguments that it is more a matter of physician style rather than the EHR (Ventres, et al. 2006). Ventres et al. (2006) demonstrate three practice styles of physicians in their study. The first is the informationally-focused visit, in which the physician focused mainly on directing questions to enter data into the EHR. The second is an interpersonal style in which the patient led with their narrative and attention was specifically paid to the patient. The third is a managerial style in which physicians alternate their attention between the patient and the computer. In addition, Ash and colleagues point out that "professionals could trust the decision support suggested by the seemingly objective computer more than is actually called for." (2004, p. 105). Therefore, *is the way information is elicited from patients altered when using the EHR*? Is the interrupt and ask close-ended questions method typically used, or a method for which the patient's experience is heard and symptoms are derived from what is said in the patient's accounting? Interactionally, the EHR could be problematic. Frankel explains that the EHR tends to draw attention away from the interaction and "splits the attention" of the provider (Frankel, personal communication, 2006). They argue that poor interactional skills are exacerbated when using a computer. Psycho-social aspects of care may also be problematic for providers

who are using EHRs. A disconnect with the logic and systematic and symptom-based nature of the EHR might exist and the social context may not be easily documentable in the EHR format.

Therefore, EHR may be seen as both a facilitator and barrier for the reproduction and restructuring of the professional, entrepreneurial, and care giving roles. Provider status as expert may be challenged or legitimated through use of the EHR. Documentation through use of standards of care may improve quality. However, the documentation method may structure the encounter based on a biomedical paradigm replicated in the EHR symptom checklists. Providers may focus so much on the biomedical symptoms, that the psycho-social are ignored. The EHR may be used as a tool of efficiency or it may slow down the work process. Recognizing how the EHR is used can help us understand the way providers are attempting to improve and manage their work as professionals, entrepreneurs, and caregivers.

CHAPTER 5

RESEARCH METHODS

Overview

This dissertation asks the questions: How are primary care providers using or not using EHR technology to practice medicine? and How do these uses reflect, replicate, and restructure traditional sociological ideas about the roles of primary care providers? This dissertation intentionally analyzes the social realm of the EHR, moving beyond the initially intended economic focus of the funded data collection.

The sources of data used to answer these questions, as well as the procedures used to collect, code, and analyze the data, are detailed in this chapter. A multi-method approach is used that triangulate the data from various sources. My aim is to provide a broader understanding of the various issues that surround the implementation and use of EHRs, at the national and provider levels. Both qualitative and quantitative data are used. Data were collected as part of one funded study and one unfunded pilot study. Specifically, these data include the use of existing public data, observational field notes, open-ended and semistructured interview transcripts and notes, and survey data. Finally, I briefly discuss relevant methodological issues related to each aspect of this dissertation and sources of data included in this dissertation. These issues include bias of frame, generalizability, validity, reliability, as well as a reflection on my part in the research process, both at the data collection and analysis stages.

Case studies are used to understand both practice-level and provider-level information about the use and non-use of EHRs. At the practice-level, I obtained data on EHR selection and implementation. These will be used to understand the reasons why practices choose to use EHRs. Additionally, I analyze practice-level economic and efficiency data to understand practical differences between using paper-based and EHR-based care. At the individual provider level, I conducted semistructured interviews and open-ended interviews of two separate groups of providers. A survey was also given to providers who use EHRs to understand their attitudes about EHRs and how they perceive their own use of the EHR. Additionally, observations were conducted. Extending the results of providers' verbal and survey-based accounts of generalized or hypothetical EHR use, the observations provide a tangible outsider description of actual EHR use during patient office visits in clinical practice settings. The efficiency and economic data from the practices are also assessed on the provider-level, when possible.

To further initial findings from the observations, an ethnographic open-ended interview study was conducted to better understand how providers using EHRs feel their practice of medicine is different, with a specific focus on interactional issues between the provider and the patient.

Data Collection

Case Studies

Case studies were conducted for a Commonwealth Foundation-funded project entitled "Costs and Benefits of Implementing Electronic Medical Records in Solo/Small

Group Practices," (Robert H. Miller and Ida Sim, Prinicpal Investigators). (See Appendix A for the original CHR and Appendix B for the renewed CHR.) I was the project manager and worked on the project throughout its duration, from design of instruments, data collection, coding, analysis, and write-up. We conducted retrospective case studies of fourteen U.S. solo/small group practices, of which eleven are included in this analysis. All case studies integrate qualitative and quantitative data analyses.

Case studies are a historically relevant form of research, as documented by Emerson (2001). Case studies can include going into the field to collect existing documents, such as official records, but more often involve direct contact with those studied, to understand personal experience, introspection, and life stories, particularly through the collection of artifacts (personal documents), interviewing, and direct observation (Denzin & Lincoln, 2000; Emerson, 2001). All of these types of data are collected for the case study analysis. Specifically, we obtained data on practice operations, EHR-related hardware and software, selection and implementation processes, costs, financial benefits, use of EHR capabilities, Quality Improvement efforts, and barriers and facilitators for achieving EHR-related benefits through semistructured interviews and review of practice economic and productivity data.

Sample selection. In order to enable appropriate pre-/post-EHR comparisons, selected practices had to meet the following criteria: be a primary care practice (family/internal/general medicine specialties), used an EHR for at least one but no more than three years when first contacted (we selected this criterion to avoid effects of disruptions to the practice during the actual implementation process), have full practices

before implementation of the EHR (which eliminated new practices), had relatively stable billing providers pre- and post-EHR implementation (similar numbers and make-up of physicians, nurse practitioners, and physicians assistants that bill for services), and be willing to provide the needed data. Approximately 22% of practices meeting eligibility criteria agreed to participate, including eight from one EHR vendor and six from the other. (As I am only analyzing eleven practices for this dissertation, eight from one vendor and three from another are included.) Practices were compensated $1,400 (on average) for provider and staff time. We attribute the low response rate to the presumed time constraints of providers and the fear of observation. It is unclear whether this sample is representative of early adopters or users in general, as this population volunteered to be observed and provide financial information. Some practices may have felt that they were "not good" at using the EHR, and thus not want to be observed. Because all the practices observed viewed their EHRs favorably, we do not have extensive data pertaining to practices for whom the EHR was not beneficial. Additionally, some practices reported that they participated because of the financial gain of the study. Thus, some for whom the incentive was insufficient may not have chosen to participate.

We gained customer lists from three EHR vendors (A-4 Healthmatics, GE Logician, and PMSI Practice Partner) which were the most used EHR vendors in primary care at the time of recruitment. The customer lists obtained were supposed to include primary care practices, including general medicine and family medicine practices that implemented their EHR in the required time frame so that they would have implemented and used the EHR for at least two years.

We received variable data from the vendors. Initially we were provided lists of 158 customers from A-4, 43 customers from GE, and 106 from PMSI. After sorting these customers for our initial criteria of time of implementation and type of practice, we had 139 from A-4, 28 from GE, and 97 from PMSI which were considered viable customers for our population. (See Appendix C to view a diagram explaining the sampling process.)

We sent initial letters of invitation to 180 practices: 90 practices randomly selected from A-4's 139 potential practices; and 90 from PMSI's 97 potential practices. (See Appendix D for the original recruitment letter.) We decided not to use practices from GE because their population was too small. Nineteen practices (two A-4 and 17 PMSI) did not have correct contact information provided by the vendors. There were 47 nonresponders (20 A-4 and 27 PMSI). Of those who did not respond or not able to be contacted by phone, it is unknown how many would have actually qualified. Of those practices that we were able to contact by phone, 34 did not match our sampling criteria (16 A-4 and 18 PMSI).

We were able to fill our A-4 sample relatively quickly and, therefore, twenty-four A-4 practices were not followed up on. We had a harder time filling our sample of PMSI practices. We sent postcard reminders, re-faxed information and recruited by phone with the contact information we had from the vendors. When we were not able to recruit from our original random sample for PMSI, we went back to our population of PMSI practices provided by the vendor and selected another six practices to supplement six of the practices for which we had inaccurate contact information. Of those additional six practices, we were still unable to contact one. Another practice refused. At this point, it

appeared that we had recruited a final practice, so we stopped further recruitment efforts. In total, we finished with recruitment of eight A-4 practices and six PMSI practices. A fifteenth practice was recruited. However, we unable to obtain complete information from them and they were dropped them from our study. Therefore, in total we have data on fourteen practices in the overall Commonwealth Foundation project sample providing practice-level data. However, due to time and funding constraints, only eleven practices had complete information for all parts of the project. Those eleven practices are analyzed in this dissertation.

Observations. Ethnography involves studying groups and people as they go about their every day lives, whereby an ethnographer enters the social setting and gets to know the people involved in it (Emerson, et al., 1995; Denzin & Lincoln, 2000). In trying to understand how EHRs are used, ethnography is utilized to view the everyday worlds of providers using EHRs.

Ethnographic observations were conducted between July 2004 and May 2005. The intended aim of the ethnographic fieldwork was to collect practical practice data, specifically, economic and workflow data of practices using an EHR. Fieldwork is described as a way for analyzing what people actually do in "real life" (Stark and Roberts 1998). To understand how the EHR is used by providers "in the real world," over 200 hours of observations were conducted at eleven practices as providers engaged in their normal routines of seeing patients and engaging in other practice-related work. All providers whose practices had enrolled in the study consented to observation of their work. Observations focused on twenty-three Medical Doctors (MDs), two Doctors of

Osteopathy (DOs), eleven Nurse Practitioners (NPs), and one Physician Assistant (PA). Though not the intended focus, one practice additionally directed me to observe one Physical Therapist (PT) and two Laboratory Technicians (See Appendix E for a description of observed providers). Secondary observations were conducted on various other nurses, medical assistants, administrative staff, and other office support staff; patients receiving care during observed medical encounters for which the billing provider was the focus; as well as family members and other caregivers present for the medical encounter.

Patients with appointments with consenting providers were initially asked to fill out a paper consent form. Due to requests by some practices, we changed the patient consenting process. These changes were approved by UCSF's Committee for Human Research (CHR).[15] (See Appendix F for the approved petition for an amendment to the CHR.) Patients could consent verbally after I provided them with a consent process paper describing the process and I verbally went over their rights to consent and not consent and stop my observations at any point during the medical encounter. For patients who were under-aged, I obtained consent from both the parent/guardian and the child. I attempted to conduct observations as unobtrusively as possible to allow providers, staff, and patients to go about their usual routines with as little interference by from me as possible. I did not video record or tape record observations, though I did take handwritten notes.[16]

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[15] The Committee for Human Research is equivalent to the more often used term Institutional Review Board (IRB).

[16] Formal handwritten fieldnotes were taken during the observations. As it was impossible to note everything in complete detail, my formal fieldnotes include many abbreviated words, phrases and symbols used most often to reflect what I physically saw which do not make sense to others, but within my construct make complete sense. However, attempts were made to more closely monitor what was said, in attempting

Observations were scheduled based on practice availability and preference and observer availability. Most observations started with the practice start time or one-half hour earlier depending on practice preferences. However, some observations started mid-day as I would drive straight from the airport to the practice. Regardless of time of arrival, typically when I first arrived at a practice, the office administrator/manager or clinical EHR Champion would give me a brief tour of the physical layout of the practice. They would determine the order of billing provider observations. Each billing provider (physicians, nurse practitioners, and physician assistants) were observed for approximately one half day each.

Two providers consented, but are not included in this analysis. In one practice, a provider refused to use the EHR, despite his colleagues use. I did not observe this provider as the intention of the study called for observation of *use*. In another practice, a research assistant other than myself, observed a provider. I am excluding observations of this provider for two reasons. First, the day this provider was observed was her last day working in the observed practice. Her use *may* have been altered on that particular day as she knew she would no longer be using this particular EHR system in her new job and

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to write out full words when someone was speaking. Goffman expresses a pattern of the note taking process as, "[t]he first day you'll see more than you'll ever see again. And you'll see things that you won't see again. So, the first day you should take notes all the time" (in Emerson, 1991:157). I found this to be especially true in that significantly more detail is found in my fieldnotes on the first day in a new practice, as I was noting the "normal" and routine, while not necessarily thinking about it in that way at the time, and as the normal was noted, the abnormal became more of a focus as time progressed in a practice or with a new provider. In addition to the traditional fieldnotes taken while actively in the field. As ideas came to mind, analytic memos are utilized. Analytic memos take on the form of "written notes whereby progress is assessed, emergent ideas are identified, research strategy is sketched out, and so on" (Hammersley & Atkinson 2003:191). I also used the "experiential style" of writing as described by Emerson, Fretz, ad Shaw, in which writing can be put off "until the field researcher withdraws from the field and relying on memory, sits down at pad or computer to reconstruct important events" (1995:18). At times these notes indicated mental notes, jottings and scratch notes, sometimes with abbreviated words and phrases (Emerson, Fretz, & Shaw, 1995). They were usually written on scraps of paper lying around as a way to get my ideas out and to remember them later as a strategy to think through an idea more formally. I included three modes of note-taking- indexing, copying by hand, and summarizing (Hammersley & Atkinson 2003). Additionally, paper used in the practices were also collected for analysis.

because her use that day would no longer benefit her personally for return visits of those patients seen, as she would not be seeing those patients again. As I was not the observer, the other researcher's fieldnotes are specific to him and would not necessarily make sense to me. [17] [18] [19]

The context of the practice was indicated by noting the following information about a practice, which stem from questions by Spradley (1980) as quoted in Hammersley and Atkinson (2003:185):

- What is the physical space?
- Who are the people involved?
- How do the actors act in relation to each other?
- What are the physical things that are present?
- What are the goals the actors are trying to carry out?
- What are the emotions felt and expressed by the actors?

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[17] Despite my attempts to be invisible, the providers consistently referred to me or to the observation (such as explaining what they were doing) during medical encounters and spoke directly to me during observations. Additionally, I physically had to move during some medical encounters to either get out of the way, to be able to see the screen of the computer, or to turn around during an invasive procedure to demonstrate privacy for the patient's comfort. Sometimes the physical barriers of the room prevented my being able to capture the encounter as descriptively as others, as I physically could not see what was occurring or was physically in a body position for which I could not take notes. Additionally, my presence was obviously noticed as patients would start conversations with me when providers stepped out of the room.

[18] Observations were limited to areas "in the back" and did not include the front areas of the receptionist and waiting room. Initially, my observations were narrowed to shadowing each provider only during the medical encounter, located in an exam room, which can be considered the "frontstage" of medical work (Goffman 1959).

[19] As the consent process shifted, I began shadowing providers before, during, and after each medical encounter in an exam room. I gained access to the provider's quasi-frontstage (such as in the hallway, at the nurses station, in the support staff office, at the front office) and the "backstage" (Goffman 1959), in which less visible work was conducted (such as in empty exam rooms and in a provider's individual "office"). When able, I additionally noted other backstage events including work, interactions, and conversations between providers, nursing staff, administrative staff, office support staff, patients, and myself. This included hallway conversations, comments specifically made to me, comments made about the EHR while in my presence, as well as conversation at lunch or on breaks. These informal conversations were conducted throughout the entire data collection. Interactionally, these conversations and comments helped build rapport in the short time I was at a practice, as well as opened new lines of inquiry for ideas not developed during the planning stages of the project.

Secondly, I focused the majority of my attention on the action within the practice, specifically use of the EHR. As Hammersley and Atkinson state, "it is important to sample the routine as it is to observe the extraordinary," (2003:49) thus the first read is made to describe the everyday mundane activities. I use the following questions to help guide this set of observations:

- How is the day-to-day work of the providers and staff of the practice organized" (Adapted from Hammersley & Atkinson, 2003: 33)?
- What models of working life do the providers and staff hold? (Adapted from Hammersley & Atkinson, 2003: 33,35)
- Based on those models, what formal and informal criteria are used to employ a strategy? (Adapted from Hammersley & Atkinson, 2003: 33,35)
- What sort of work do the providers and staff engage in--- what routines and strategies are employed? (Adapted from Hammersley & Atkinson, 2003:35; Adapted from Emerson, et al., 1995: 146)?
- How does this work relate to the work of others in the practice?
- What is the information-state? (Adapted from Hammersley & Atkinson, 2003: 35)
- What record-keeping procedures are used? (Adapted from Hammersley & Atkinson, 2003: 35)
- What resources do the providers have at their disposal? (Adapted from Hammersley & Atkinson, 2003: 34)
- How do structure and context serve to support or maintain these actions or statements (Adapted from Charmaz in Emerson, 2001, 342)?

I also tried to point out if activities were out of the ordinary. The following questions are used to assess these abnormalities:

- In what ways is the work of providers and staff disorganized or dysfunctional?
- What resources do the providers not have at their disposal that they need to function smoothly? (Adapted from Hammersley & Atkinson, 2003: 34)
- How do structure and context serve to impede or change these actions or statements (Adapted from Charmaz in Emerson, 2001, 342)?

As I observed the providers, many of them made statements regarding either how they saw the EHR or how and why they used certain features within the EHR. This is assessed by indicating:

- What are the statements of providers, staff and patients regarding the EHR?

- What do the actions and statements of providers, staff and patients take for granted (Adapted from Charmaz in Emerson, 2001, 342)?
- What are the observed and described changes in the practice of primary care with EHR use as compared to paper-based care?
- What are the observed and described barriers to EHR use?
- What are the observed and described facilitators to EHR use?
- What are the observed and described benefits of EHR use?
- What are the observed and described human costs of EHR use?
- How do providers, staff members, and patients talk about, characterize, and understand what is going on?
- What assumptions are the providers and staff members making (Adapted from Emerson, et al., 146)?

Survey. All providers involved in the study were also asked to complete an online survey. Only the providers using the EHR in the eleven observed practices are included for analysis in this dissertation.[20] We achieved a 45.9% response. I attribute providers' low survey response rate in part to the financial incentive for participating and in part due to the timing of when the survey was administered. Because the major portion of payment came from the observations, once the observations were complete, the providers did not have a major financial incentive to continue with the later portions of the study. Practices received $200 for the interviews, $150 per provider for observations, and $50 per provider for completion of the survey. Therefore, the major financial incentive was allowing me to observe without much effort on the part of the providers. The time sequence of data collection may have also been a barrier to survey completion as the survey instrument was not administered until after observations in all practices were completed. Therefore, there was a time lag between the time of observations and interviews and administration of the survey. Providers may have lost interest in

[20] This analysis excludes information from the three additional practices involved in the overall Commonwealth study which we did not have the opportunity to observe. It also exclude the one provider who worked in an observed practice, but refused to use the EHR.

participating in this portion of the study as their excitement for the study may have diminished over time.

Based on my initial findings in the observational portion of the project, as well as initial patterns seen in the analysis of the economic and productivity records, we developed a survey, as part of the case study project, to assess use of the EHR by provider and provider attitudes of the EHR. (See Appendix G for a list of survey questions.) The survey was developed during and finalized after the completion of the observations. We administered the survey electronically on a free web-based survey tool called SurveyMonkey. All billing providers practicing in the practices were emailed or faxed a provider-specific username and pin number acting as an individual identifier and access to online survey. It was assessed that all providers did have access to the internet and thus would have the opportunity to complete survey. A reminder was sent if a provider had not completed the survey after one month.

Semistructured interviews. Semistructured interviews were conducted as part of the case studies. Additional in-depth interviews were conducted with a convenience sample of primary care providers not necessarily practicing in solo and small group practices, but who practice in a primary care specialty using an EHR. (See Appendix H for interview protocols.)

The semistructured interviews intended to capture some aspects of practice experience with their EHR, but mostly focused on the economic benefits and efficiency of adopting an EHR. In order to understand workflow changes, data on efficiency, financial benefits and other benefits, we analyzed financial and productivity records. The

semistructured interview questionnaire was adapted from already identified key themes and data found in Robert Miller and Ida Sim's prior studies (Miller & Sim, 2003) and was added to based on additional clarifying information obtained during the observations or interviews. (See Appendix I for the original champion interview questions. See Appendix J for the updated final champion and office manager interview questions.)

Sixty hours of interviews were conducted with practice-designated clinical "EHR Champions" and office administrators/office managers. The directed interviews were conducted by four people: an economist, two medical sociology doctoral students (including myself), and a medical informatics doctoral student.

Clinic reports from accounting, payroll, scheduling, and billing systems were additionally collected. We initially collected this data over the phone through the semistructured interview, after an electronic copy of the desired interview questions and economic data were sent via email or fax to a practice-identified EHR Champion prior to the interview.[21] However, most practices did not have data in a form compatible with our format, so we eventually requested they provide documentation, which we then translated ourselves into a compatible and comparable format.

[21] EHR Champion is jargon used in the HIT world as the point-of-contact person within a practice who deals with the main issues surrounding the EHR, including researching the product, purchasing the product, and developing templates within the product, and maintaining technical issues surrounding the product. We realized that the general designations made by the practice as "EHR Champion" did not always meet the expertise of the expected information. We found that splitting the interview into clinical-oriented questions and business-related questions was more beneficial for both data collection and time of the interviewees. Therefore, as the project continued, "EHR Champions" tended to be clinical leaders in the practice who could relate to the clinical aspects of the interview schedule and Office Administrators/Office Managers were interviewed about the business aspects of the interview schedule. (Refer back to APPENDIX 6 for a list of EHR Champions and Administrators/Office Managers interviewed.)

Description of Case Study Sites

Practice 1. The first observed practice is located in the South Atlantic division of the South region. There are five billing providers in this practice. Three providers are full-time medical doctors (MDs) who co-own the practice. Two of the physicians are male and one is female. Additionally, two family nurse practitioners (FNPs) share one full-time equivalent (FTE) status. Providers in this practice are paid entirely on a performance-based scale. This practice is made up of a board of directors with elected officials. This practice used to be owned by the local hospital from 1996 to 2000.

Supporting the provision of care, this practice has five nurses who were either licensed practical nurses-LPNs or registered nurses-RNs, one referral-specific nurse specialist, and two lab and radiology staff. Supporting the business-side, this practice has an office administrator, one medical records specialist, two billers, three front office receptionists and data entry personnel.

This practice does not do CPT Code Level 5 office visits. This patient mix in this practice is made up primarily of private pay (69%), with about a quarter self-pay or uninsured (22%). Less than 10% are Medicare patients. Additionally, this practice does not accept Medicaid patients. This practice does not accept new Medicaid patients with the exception of already existing rollover Medicare patients. Patients seen extend the entire age spectrum, from babies to the elderly.

This practice uses the A-4 EHR software. The implemented the EHR in October 2003. They have two-way data exchange with the A-4 Practice Management software. They began negotiations to adopt the EHR in 2002 and contracted in July 2003. The

EHR was championed by the office administrator. The funded the EHR through a bank loan.

Both providers and nurses in this practice use handheld computers, which they carry between rooms. There is a desktop computer at the main nursing station that the float nurse uses. They use a Practice Management software system which is interoperable with the EHR. This practice implemented all EHR capabilities at the beginning, without a rollout.

Practice 2. The second observed practice is located in the West South Central division of the South region. Practice two is a solo practice, where there is full-time one male MD and one female nurse practitioner (NP) who works 50%. There are two clinical nurses and one nurse who help with scheduling and billing. There is no office administrator or manager in this practice. The physician is paid based on billing and the number of patients seen. Both the physician and the nurse practitioner are paid by salary. The nurse ractitioner bills under the physician as long as the physician is physically present in the office. The patient mix is made up of one-quarter private insurance, 65% Medicare, 5% Medicaid, and 5% uninsured self-pay. The patients in this practice are described as “mostly older” patients. The practice is paid in a discounted fee-for-service format.

Practice 2 implemented the EHR in June 2001. The physician in practice two also conducts rounds at the local hospital. They implemented all EHR features at the beginning, without a rollout. They began negotiations and contracted in October 2000. The EHR was funded through personal money from the physician’s employment contract

with the local hospital being bought out, which allowed him to take over the independent practice of a retiring physician. This practice uses the A-4 software and the A-4 Practice Management system. The Practice Management system only sends information to the EHR, but cannot receive information from the EHR. The stated reason for not having a two-way operability between the Practice Management system and the EHR is cost and because all members of the practice know how to use both the Practice Management system and EHR, therefore, there is no need to have the information transfer between the two softwares. The EHR has an interface with LabCorp for external labs. They used to work with Qwest Diagnostics, but switched to LabCorp because LabCorp helped pay for the EHR interface. This practice does not use outside IT consulting. The physician manages the technical aspects of the computer and software himself.

This practice uses desktop computers located at the nursing station, in the private offices of the providers, and in each exam room. They had previously used handhelds, but switched to desktops. There are three exam rooms and a "procedure room". Each exam room has a normal chair and an "exam chair," rather than an exam table. They also have a designated X-ray and lab area. They have a link with the lab through the local hospital and the results are interfaced with the EHR. They receive external lab information electronically at four times throughout the day (7am, 11am, 2pm, and 4pm).

Practice 3. The third observed practice is located in the West South Central division of the South region. Practice three has four male MDs and two female nurse practitioners. One physician left the practice and one nurse practitioner was added. Additionally, there is one female physical therapist. There is one office administrator and

two business coordinators. The practice is made us of the co-owning physicians who make up the physician board. The administrator and one physician are described to be the EHR Champions. The patient mix is 54% private insurance, 30% Medicare, 6% Medicaid, and 10% self-pay. Ninety percent of reimbursement is discounted fee-for-service. Providers are paid 30% by salary and 70% based on formula (12 % based on the number of years with the practice, 8% based on years in the market, 80% number of work units, and 10% direct support expense).

Practice 3 opened in 1998. They indicate taking thee to four months to choose the EHR. They contracted with the EHR in December 2001 and started using the EHR in April 2002. They use they use the A-4 EHR. They started using all EHR capabilities at the beginning and did not do a roll out. The EHR was purchased using a bank loan. They use GE's Practice Management system, which they used prior to adopting the EHR. Information transmits two-ways between the EHR and the Practice Management system. They have an internal lab. They continued external lab services through Labdaq, but this is not interfaced with the EHR. The nurses hand enter the lab data into the EHR. (It was said this was cheaper than paying for the nurses to do it.) Nurses schedule appointments and know how to use both the EHR and the Practice Management system.

Practice 4. The fourth observed practice is located in the West North Central division of the Midwest. This practice has five billing providers. Four of the billing providers are the same before and after implementation, with a change in one physician leaving and one nurse practitioner added. Four of the five billing providers are MDs and one is a nurse practitioner. Four are male and one is female. All five billing providers

are full time. One provider left the practice because he did not want to use the EHR. The four physicians are co-owning partners in the practice in which decisions are made together. They meet once a week to make practice decisions. Though on paper, this practice appears to be a group practice, through observation, this practice is more characteristic of solo practices sharing office space and office staff, where the providers practice rather autonomously without much interaction with each other, other than official practice-wide meetings. The providers are paid partially through salary and partially through revenue based on their productivity. An office manager directs the practices business tasks. The patient mix is split between Medicare (30%), commercial private pay (30%), self-pay (20%), and HMOs (20%).

The providers in this practice were originally employed for ten years and then became an independent practice in July 2002. They adopted the A-4 EHR in August 2003. They lease the EHR using two bank loans. They used a rollout process where only two providers used it on some patients and then increased their volume over time, and then more providers joined in and progressively added more features. They have an interface with two external labs, Crest and PRL, but no interface with two other labs. The providers have desktops in their offices and use handhelds in the exam rooms.

Practice 5. The fifth observed practice is located in the Mountain division of the West region. Practice five had two co-owning male MDs. Additionally, there is one female nurse practitioner. There is an office manager and three other administrative staff who make up 2.5 FTE. At the time of observation, the providers were paid though straight salary, but they were transitioning to a performance-based pay. More than three-

quarters of the patients in this practice pay with private insurance (80%), with one-tenth paying out-of-pocket, with small proportions paying through Medicare (7%) and Medicaid (3%).

They implemented the A-4 EHR in July 2003. They reported taking a month an a half to choose A-4. They started negotiations in February 2003 and contracted in March 2003. They purchased the EHR through a bank loan. The practice implemented all EHR features at one time, without a rollout. They have two-way information exchange with their Practice Management system, which they used before EHR adoption. They do have an internal lab system, but also have electronic data exchange with LabCorps for external labs. The providers have desktops in their offices and use handhelds in the exam room.

Practice 6. The sixth observed practice is located in the South Atlantic division of the South Practice 6 is a solo practice in which there is one female MD. She also has an nurse practitioner on staff who works 80% time. There are seven administrative support staff.

Practice 6 opened in 1999. She started negotiation with PMSI in October 2001 and contracted in December 2001. She implemented the EHR in February 2002. They express that they never finished implementation. The practice took a long time deciding on an EHR as the physician preferred one software but was afraid that the EHR company would go out of business, so she settled for A-4. She tried implementing two other EHRs before implementing A-4. She has not been happy with the product she ended up using. The practice uses a Practice Management software other than that provided by A-4. The provider use handheld computers.

Practice 7. The seventh observed practice is located in the East South Central division of the South region. Practice 7 has three male MDs and one female physicians assistant-PA. To support the billing providers, there is an office manager, seven nursing staff (registered nurses, certified nurse assistants, and licensed practicing nurses), and eight administrative staff support for tasks including accounts receivable , billing, medical records, scanning, referrals, and acting as receptionists). This practice is a professional service corporation. One of the physicians is considered the Champion. The physicians in this practice are paid 100% by performance and productivity. The patient mix is 65% private insurance, 25% Medicare, 2% Medicaid, and 8% self-pay.

Practice 7 implemented the PMSI EHR in May 2002. They implemented all functionality at once, without rollout. They lease the software. They use the Physician's Office Manager Practice Management software that is not interoperable with the EHR. They have an internal lab and have an interface with LabCorps and Quest Diagnostics for external labs. This practice uses handheld computers.

Practice 8. The eighth observed practice is located in the Pacific division of the West region. Practice 8 has one MD, who is the owner and sole proprietor. She has three female nurse practitioners working for her, who share one FTE. To support the administrative aspects of the practice, there is an office administrator. The patient mix is 54% fee-for-service private ay and 46% is primary care capitation. The nurse practitioners are paid through salary and the physician is paid based on productivity and profit.

Practice 8 implemented the PMSI software in September 2003. They report taking two years to select the EHR. They contracted in October 2002. The EHR was funded through a small business loan. They implemented all functionality at the beginning, not through rollout. They use Medical Manager Practice Management software which provides one-way data exchange from the Practice Management system to the EHR. At the time of observation, they were implementing data exchange with Healthcare Clinical Laboratories. They use handheld computers.

Practice 9. The ninth observed practice is located in the East North Central division of the Midwest region. This practice has five billing providers: one male MD, three male DOs, and one female physicians assistant. All providers worked at the practice 95% time. To support the clinical-side of the practice, seven nurses provide clinical assistance. There is an office administrator and nineteen other administrative support staff. The providers are paid primarily on a percentage fee-for-service or capitation. Each physician owns 25% of the practice. The physicians meet once a week and have to have consensus on practice decisions. The physician who started the process to adopt the EHR , did not like it and reverted back to using paper records even though all other providers use the EHR. To support the business-side of the practice, there is an office manager. The patient mix was split between private insurance (35%), self-pay or uninsured (25%), Medicare (20%), and Medicaid (20%). The physicians are paid using a formula of 80% salary and 20% performance-based bonus.

Practice 9 opened in 1973. They implemented the A-4 software in February 2003, but did not start using it with patients until April 2003. They started negotiations in

June 2002 and contracted in July 2002. Some providers used the EHR for all patients and others used a rollout process where they would see a few patients a day with the EHR and the rest they would use paper records. They have two-way data exchange with the A-4 Practice Management system. They receive electronic data exchange from one hospital which is not their main hospital and were unable to get an interface with the hospital they use most often. This practice uses handheld computers.

Practice 10. The tenth observed practice is located in the Pacific division of the West region. The MD owner of this practice is the sole proprietor. He has no physician assistants or nurse practitioners. He has no official office administrator or manager, but his wife helps him with some of the administrative duties. His patient mix is half HMOs and PPOs and forty percent Medicare with ten percent neither self-pay nor uninsured, but by another payer. This practice does not accept Medicaid patients. This MD is paid half on discounted fee-for-service and half on primary care capitation. This provider describes his income as being "whatever is left after my expenses". This provider relies on his wife to help with the business aspects of his practice.

Practice 10 opened in 1992. The PMSI EHR was adopted in March 2003. The negotiations began in September 2002 and was contracted in February 2003. He does not use a Practice Management system. He does not have an interface with any external labs. He uses a desktop computer.

Practice 11. The eleventh observed practice is located in the South Atlantic division of the South region. Practice 11 has two MDs (one male and one female). To

support the clinical aspects of care, there are three nurses on staff. An office manager (the wife of the male physician) and receptionist support the administrative-side of the practice,. More than one-half of the practice's patients have private insurance (56%); about one-third have Medicare (34%); and about one-tenth self-pay or are uninsured (10%). This practice sees less than one percent Medicaid patients. The providers are paid solely on discounted fee-for-service based on performance and productivity.

Practice 11 opened in 2002. One of the owners was originally in practice with another partner and their partnership split up. Then he joined with two other partners. One of the new partners also left the practice. They indicate that they see more patients because of being a newer growing practice. The practice implemented the EHR in November 2001. They implemented all functionality at one time, with no rollout. The EHR was paid for through practice cash flow. They have two-way data exchange with the PMSI Practice Management software. They receive electronic external labs through Quest Diagnostics. They use handheld computers and have desktops in their offices.

In-Depth Interviews

Additionally, I conducted five in-depth interviews between September 2004 to February 2005 on the impact the EHR has on the provider-patient relationship from the provider's perspective. (See Appendix K for in-depth interview questions.)

I used a convenience snowball sample. I gained access to these providers through personal contacts (one of the committee members on this study as well as

medical student friends), who provided me with contact information on people they thought would be both appropriate for my study and willing to participate. Additionally, as my department is housed in the School of Nursing, I posted a recruitment announcement in the student newsletter, which one Nurse Practitioner responded to. These providers then referred me to other providers they believed would be appropriate and willing to participate. The sample criteria were based on two factors: 1) they practice primary care; and 2) they have practiced both using paper-based records (before an EHR was implemented), as well as after an EHR was implemented. This criterion was established so that providers could reflect on what it was like to practice primary care both with and without an EHR. However, I found that many providers, particularly those currently practicing at Veteran's Administration (VA) health facilities, had used some form of computerized records systems for "so long" (five years or more) that they felt they could not make this comparison, thus were unable to provide necessary comparative information and were not interviewed. Therefore, I only interviewed providers who were able to make a comparison between paper-base and EHR-based provision of care. All of the providers volunteered their time without financial incentive.

I interviewed four providers over the phone and one provider in person. The interviews lasted between 20-37 minutes. Each interview was taped and transcribed. I did not enter any medical encounters during this study. I did not observe any of the provider's work spaces within the realm of this supplemental study. However, one provider participated in both the Commonwealth Fund study and the unfunded in-depth interviews.

Data Management

Observations

Handwritten fieldnotes, digital photographs of EHR work stations, and other paper used in the practices were collected while on site and are housed in a secure environment as described below. When information was transported it was under my immediate control the entire time. (For example, when traveling from practices, I kept the data in my immediate control on the plane.) As I became more familiar with the two EHR software programs observed, less detail about the screens themselves were noted and more attention was spent writing on other aspects of use and nonuse of the EHR.

Survey

The survey was conducted through SurveyMonkey and the raw data were downloaded into an Excel file. The Excel file is located on a secure server.

Semistructured Interviews

Semistructured interviews conducted for the Commonwealth Foundation study took place in-person during the observational trip to the practice or over the phone.

Many times the semistructured interviews were split into multiple shorter interviews, due to time constraints and expertise of the interviewee. (This is described further below.) Initial semistructured and in-depth interviews were audio taped when possible. Taped interviews were transcribed as Word documents by a professional transcribing service. The digital audio files of the interviews are housed in a secure way, as described below. When it was not possible to tape an interview, handwritten notes were taken. When more than one researcher was present during an interview, notes were taken by the non-interviewing researcher as a back-up in case there was a problem with the recording. Some interviews were conducted on-site during the observations and others were conducted by phone. We conducted follow-up interviews by phone, email, and fax. Follow-up phone calls in which the practice called us with further information were not recorded. We were unable to have the appropriate recording equipment set-up for unplanned phone conversations.

We made three changes to the semistructured interview. Although we intended to obtain practice-level information by interviewing *one* designated person, the practice-identified EHR Champion did not always have knowledge of or access to some of the information we were asking about. Therefore, we split the interview into two sections, one clinically oriented and one business oriented. In addition, because practices either did not have access to the requested information, did not have the information in a format compatible with our questions, and/or the detail was tedious and privy to potential misrepresentation when requested over the phone during an interview. Thus, we changed our protocol to have practices fill in worksheets with economic and productivity information to the best of their ability and/or send us their versions of economic and

productivity paperwork by email attachment or fax which we then translated into a usable format. We then converted the data each practice was provided, in whatever format they could, into systematic measures that could be compared across practices. Finally, we also added questions about quality improvement to the interview, and changed how we requested the information, relaxing our format standards. Practices which were not initially asked the quality improvement-related questions were asked these questions in follow-up interviews. (Refer back to Appendices 9 and 10 to see the additions and format changes of requested data.)

The economic and productivity data were intended to be entered into Access and analyzed using the features in the software. This process was altered as we started our initial analyses. To expedite the analysis process for purposes of an invited paper, we found that building charts in Excel and Word was a faster and more useful way of working with the data, rather than entering the data into Access, using the analysis feature of desired data, and then reentering the data into a table readily available to insert into the publication.

In-Depth Interviews

I conducted all interviews for the unfunded supplemental study. All interviews were taped and transcribed into Word documents. Once the tapes were transcribed, they were destroyed.

Security of Confidential Data

For all data containing practice or provider identifiers, specific procedures to protect confidentiality were instituted. Electronic data are housed on a server with two levels of password protection and on my personal laptop for which also has two levels of password. Paper data are housed in a locked file cabinet under the control of the PI. All photocopies of paper data are also protected in an independent locked environment.

Data Analysis

Given the nature of the questions asked and the data from the case studies and in-depth interviews, the data analysis is both practical and theoretical. The focus is on how EHRs are actually used in practice both at the practice and provider levels. I pay attention not only to how the EHR is used, but also in how it is *not* used. Also, I compared the similarities and differences between paper-based and EHR-based practices related to patient care. Based on this comparison I describe the intended and unintended consequences of using EHRs. I pay specific attention to the social aspects of EHR use and non-use.

The ideas of the case study analysis stem from a ground-up approach. Grounded theory is used to analyze the qualitative data. Analysis started while I was in the field as observed patterns formed over time. Miles and Huberman (1994), describe this process of initial coding in action as a summarizing device. As described in the data management section the initial pattern development, coding, and summarizing was actively utilized

throughout the project and influenced the restructuring of the semi-structured interview, development of the survey, and prompted the ethnographic open-ended interview study.

The "data are used to think with" (Hammersley & Atkinson, 2003: 210). Here attention is paid to whether "any interesting patterns can be identified; whether anything stands out as surprising or puzzling; how the data relate to what one might have expected on the basis of common-sense knowledge, official accounts, or previous theory; and whether there are any apparent inconsistencies or contradictions among the views of different groups or individuals, or between peoples' expressed beliefs or attitudes and what they do" (Hammersley & Atkinson, 2003:210). I make use of "folk categories," member-identified categories that are part of the "situated vocabularies" of the medical and medical technology cultures as a way to illustrate the experience of the providers (Hammersley & Atkinson, 2003:50). I attempt to understand how what I observe is functional or dysfunctional within the system, as well as how the actors make sense of their behavior and use symbols and physical items.

Although I intended to use the qualitative analysis software, NVivo, to code data. However, I ultimately decided to hand code. Data are 'coded,' whereby they are assigned categories. Data were managed by putting all information related to a case in a binder that included sections for overall practice characteristics, transcripts of the interviews, observational notes by provider, paper records obtained during the observations that were still used in the practice at the time of observation, financial and productivity worksheets and documents, and any other material the practice had provided. Within this data management system, there are practice-level analyses and

provider-level analyses. Though the data were housed by practice, the data were analyzed separately based on both practice-level inquiry and provider-level inquiry.

My initial coding procedure was to code each interview line by line. Eventually, I found coding line-by-line was too cumbersome. A practical decision was made, through dissertation committee discussions, to limit the scope of the analyses with the understanding that I think about further analyses and write-ups after completion of the dissertation.

I then shifted my coding strategy to that described by Emerson, et al. (1995), in which I narrowed my reading of the data to four major topics that I found were missing in the current literature, and ended up using "focused coding" (Charmaz in Emerson, 1991: 344). Therefore, the coding for this dissertation analysis focuses on issues of: frontstage work, backstage work, time, and interaction. I also examined providers' tone when talking about the EHR. Additionally, I pay specific attention to inconsistencies between providers' accounts of their EHR experiences and what I saw during my observations.[22] [23]

The survey data were transported into Excel for preliminary analyses. The sample was not large enough to produce statistically significant results, my analysis only discusses trends in the data.

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[22] I attempt to pay attention to *solicited* versus *unsolicited* information (Hammersley & Atkinson, 2003).

[23] I strive to distinguish between politics *in* the field, (seeing political processes in the generation of data), politics *of* the field (seeing the politics underlying the research sites), and politics *from* the field (seeing the uses and consequences of the data) (Emerson, 1991).

Methodological Issues

Validity and Reliability

According to Stark and Roberts "the greater reliability of field research is based on the ability to observe behavior rather than trying to infer how people will act on the basis of their verbal reports" (1998: 200). According to Hammersley and Atkinson, ethnography involves the ethnographer participating, overtly or covertly, in people's daily lives *for an extended period of time* (my emphasis added), watching what happens, listening to what is said, asking questions--- in fact collecting whatever data are available to throw light on the issues that are the focus of the research (2003: 1). Unfortunately, the design of this project did not allow for extended observations. All other aspects of Hammersley and Atkinson's description of ethnography were followed. I watched what happened and listened to what was said and collected documents that I saw as relating to the process of EHR use. The attempt was made to study the social world "in its natural state" (Hammersley & Atkinson, 2003:6). Specific attention was given to participants' values (Hammerseley & Atkinson, 2003).[24]

[24] One problem with reliability related to fieldwork is deception. I was not able to utilize observations by others as a check and balance on my own observations, which is one method to attempt to reduce the impact on deception. My feeling, however, is that everyone in the participating practices works hard, and have to work in an efficient manner in their roles. Therefore, it seems unlikely that those observed would create a planned or intentional deception. Also, there is no apparent motivation to create deception, especially since they volunteered for this study. It seems to me that too much work, effort, and coordination was needed in a very short time frame, to create deception during the time I was engaging in the observations. Additionally, there is evidence to suggest that providers were not presenting a perfect or ideal performance and they showed frustration, at times even cursing, while in my presence.

Generalizability

The scope of the case studies is limited to the outpatient primary care solo and small group practices, thus excluding specialty and in-patient care. Primary care providers may use the EHR in different ways than specialists because they typically have the additional role of being a gatekeeper, thus care coordinator, in addition to being a care provider. In this function, providers may use the EHR to compile information from multiple sources rather than only using the individual information immediate to the current health need of the patient. Additionally, as primary care providers are generalists, their use of the EHR may include more comprehensive feature use as they manage the overall health of the patient, not only a discrete episode of care.

Physicians in this study are all small business owners. As a business owner, providers may use the EHR in a way that enhances business tasks more than providers that use the EHR solely for care provision. Additionally, physicians in this study all had a say in whether to adopt an EHR, which may indicate that they are more likely to believe that EHRs are beneficial than providers who are not involved in the decision to adopt an EHR. All physicians in this study were critical in choosing which EHR to adopt. Providers may have chosen a specific EHR that has features they are interested in using and therefore may use the EHR differently than other providers who are mandated to use an EHR they did not have a say in choosing.

Although we attempted construct a diverse sample by sampling practices in different regions of the U.S., our sample may not be representative of all solo/small group

primary care practices. There was only a 28% response rate, and of those practices that did participate, only a small percentage participated in the survey.

Further, in an attempt to minimize the immediate strain and change experienced in the adoption process, we limited our sample to practices that had used the EHR for at least two years upon data collection. Due to this criterion, the providers studied are considered "early-adopters". This provider population may be different than other providers who waited to adopt an EHR until the environment was more stable. The bias of early-adopters may be culture of risk-taking and being on the cutting-edge of health care, which may impact how the EHR is used. Additionally, early adopters have to learn as they go, as there is little research available for them to draw on when anticipating pitfalls and benefits. Providers who adopt later have the benefit of circumventing some issues experienced by early adopters as more information exists to help guide them in being successful. Therefore, the ways in which early adopting providers use the EHR may consist of more of a trial-and-error approach. Also, as the technology improves over time, providers are in a continual state of learning how to use new features as they are added, which may lead to a backtracking approach where prior EHR use is no longer as functional and processes may undergo significant changes.

In addition, there may be selection bias occurring in the sample. Providers may have opted into the study because they had successfully adopted EHRs, and were willing to be observed and have their financial and efficiency records analyzed. Therefore, this study does not capture the experience of providers who had a negative experience adopting and using an EHR, nor the experience of practices that went back to paper (as an entire practice). We did capture the experience of the one provider who worked in a

practice that successfully adopted the EHR, but individually went back to paper. We also did not capture the experience of providers who saw no benefits from EHR use. Some of the practices in this study saw significant set-backs when adopting and using the EHR, but have seen *some* benefit of EHR use. The way the EHR is used by practices that do not see benefits may differ significantly from the experience and use of the providers in this study.

A number of potential reasons practices chose not to participate exist and may indicate a different attitude and use of the EHR. Providers who chose not to participate in the study may be concerned with the privacy of their patients, in which they did not want another person in the exam room with their patients. Providers who chose not to participate may have believed that we would impact their productivity while conducting the observation and did not want to take a chance of having their schedule impacted. Practices that chose not to participate may not have wanted to disclose economic information. This may be due to a concern over privacy or a social taboo of disclosing financial information. Practices who did not participate may also not have had the capability to provide needed information.

CHAPTER 6
THE PRACTICING OF HEALTH CARE WHEN USING AN EHR

This chapter provides a descriptive analysis of the work solo and small group primary care providers engage in when using an electronic health record (EHR). Medical sociologists such as Parsons (1951), Freidson (1970), and Becker (1977) provide descriptive analyses of the practice of medicine in the United States in the 20th century. As we move into the 21st century, new factors impact the practice of health care. This analysis is timely given the vision of the current national health agenda which includes the formation of national interoperable electronic health record system by 2014. This analysis provides an opportunity to document and understand the impact EHRs have on the practice of primary care in the United States today.

The objective of this chapter is to describe the work primary care providers engage in and illustrate how the EHR is used in their daily work activities. The scope of the analysis is limited to descriptions of work activities of primary care providers who bill for services when using an EHR to practice health care. The focus is on indicating the features of provider work which persist and those that change when using an EHR.

Work Activities

Based on observational data, the general scope of *activities* billing providers engage in remain relatively unchanged. Even with adoption of the EHR, providers' tasks can continue to be generalized into provision of care activities, business activities, and professional activities.

The central and most formal role of the provider is to render services in an effort to care for patients' health needs and act as a care provider. But, as the physicians included in this study are all owners of their practices, the EHR is used to manage business tasks as well. Finally, though it may not appear as obviously, providers engage in work practices which replicate traditional professional roles.

The observational data and provider self reports indicate that providers across practices engage in the following patient care, business, and professional activities when using an EHR:

Patient care activities
- View known patient information (including notations in the patient's record, lab and procedure results, and consultant notes)
- Inquire about current health status indicators (ask questions, review laboratory or procedural data)
- Conduct the physical exam
- Order procedures and tests (to gather more information on a patient's current state of health through health indicators)
- Make a clinical decision
- Document current health status indicators, treatment plans, and communications
- Prescribe treatments (including prescriptions and procedures)
- Interact with the patient and/or caregiver(s)
- Coordinate the activities of others (internal nursing, medical assistant, and lab staff, external laboratories, external specialists, hospitals, nursing homes, family members and caretakers, and reimbursers (insurance companies).

Business activities
- Manage the overall practice
- Document using CPT and ICD-9 codes
- Coordinate patient care and billing activities of other care workers in the practice
- Protect from malpractice law suits

Professional activities
- Maintain high status in the hierarchy of health care workers
- Train new professionals
- Maintain personal certification
- Maintain a monopoly over certain services

There are no indications that these activities are different when using an EHR than when using paper records.

Organization of Work Based on Location and Time: The Medical Encounter

The formal reason for the role of the provider is to render health-related services to people in need of health-related help. Observational data are used to describe and categorize how the provision of care is structured. The organization of services suggests that one provider is designated to provide services to one patient at a time. To accomplish this, the work of the health care provider is situated around face-to-face interaction with a patient. This face-to-face time is referred to as the medical encounter or the appointment. The medical encounter takes place in the medical practice, and even more specifically, in an exam room. Most often only the patient and provider are involved in the medical encounter, although, sometimes additional people, such clinical support staff, family members or caretakers of the patient, are also present. This format reflects the standard organization of outpatient care provision generally used in primary care in the U.S.

Medical encounters are observed to be structured into discrete scheduled appointments, which begin and end at designated times. The length of the medical encounter is pre-determined when the patient makes an appointment. When an appointment is made, the patient must specify a reason for the visit. The reason the patient provides is used as a guide in determining the length of time the appointment is scheduled for. Some practices had the receptionists schedule appointments and others

had the nurses do it. When nurses were assigned the task of scheduling appointments the rationale provided was because the nurse's training allowed them to have a better understanding of the clinical issue intended to be dealt with and could better estimate whether it was a short or long appointment.

The general length of a scheduled appointment was around 10-15 minutes for new acute issues or follow-ups from prior health issues. Typically, 30-45 minutes were scheduled for physicals, multiple problems, or for the first visit of a new patient. The longer time scheduled for new patients was added in for purposes of entering historical patient information into the EHR. A few providers deviated from these appointment averages. One physician indicated that he asked the scheduler to extend all appointments for older patients because they usually need to have additional follow-ups that they did not know or think to indicate to the scheduler when making the appointment. A nurse practitioner indicated that she fought with the front office to make her appointment times longer. She indicated that she had threatened to quit if they did not allow her more time.

> "They wanted me to see patients every 10 minutes and I refused. I want to *see* a patient. I want 15 minutes for a short interview and I want 30 minutes for physicals" (In-depth interview 2).

Although the medical encounter is the central feature of provider work, much of what they do occurs outside the medical encounter. Providers are demonstrated to work in patterned areas outside of the medical encounter, such as a private office, semi-private work stations, at the nursing station (which is semi-private), and in the hallway (which is semi-private). This will be described in more depth in the next section.

Three Phases Stages of Work at the Office: Preparation, Medical Encounter, Wrap-up

Situated around the medical encounter, providers are observed engaging in repeated patterns for which there appears to be three stages used in carrying out work at the office. These stages are: 1) preparation for the medical encounter; 2) engagement in the medical encounter; and 3) post-medical encounter wrap-up. This process is repeated over and over, as providers engage in a string of medical encounters back-to-back throughout the day. Some providers take a formal "lunch break", which splits the day into the morning and the afternoon. Other providers work through the normal lunch hour and continue seeing patients. The following sections indicate what providers typically do during these three phases.

Preparatory work. All providers observed engaged in some form of preparatory patient care work before entering the exam room. One physician, who was interviewed, but not observed, indicated the preference of engaging in this preparatory behavior.

> "I will often try to review my patient's chart before I go into the room with the patient. So at least I've got that part done, so I walk in a little more knowledgeable. I don't always get to, but, I try to do that when I can" (In-depth interview 1, physician).

The major preparatory behavior was viewing patient information already indicated in the individual patient's chart. All providers observed consistently viewed some information before entering the exam room. The most obvious difference between preparation using the EHR versus paper records is the format the information is

presented. Providers described when using paper records the paper chart was put in a bin either attached to the exam room door or on the wall next to the exam room door that the medical encounter will take place in. The chart would have been put there by the nurse or medical assistant after they conducted the "in-take". The provider would then stand in the hall and briefly flip through the pages in the chart just before entering the exam room to start the medical encounter.

When using the EHR to view patient information in preparation for the medical encounter, two strategies are observed. The first and most often observed strategy for providers using portable computers was to view information while walking down the hallway or stopping just in front of the exam room door just before entry into the exam room to start a new medical encounter. The second strategy used is where providers intentionally situate themselves in a location in which the primary activity was to view information. Where the information is viewed depends on the type of computer used by the provider. Sometimes, this process occurs with a handheld at the nursing station or a designated work station.

A less obvious distinction between paper and electronic records is what information is viewed before a medical encounter. Based on observational data, at minimum providers reviewed the patient's name and reason for the current medical visit. Most providers also quickly reviewed the list of current "active" diagnoses and prescriptions currently prescribed (and assumed to be taken). The EHR provides an efficient format for viewing this information. As soon as a provider clicks on the patient's name, which opens up the patient's health record, a face page appears providing information on reason for visit, chief complaint, current prescriptions, and active

diagnoses. When using paper records, finding the detail of the face page is described as being cumbersome. A limit of this study is the absence of baseline observations of provider activity when using paper charts, although some providers report the use of more information when using the EHR because the information is more accessible. Less often, providers were observed searching other parts of the medical chart for lab values, consultant notes, or previous encounter notes.

Medical encounter work. A choppiness of activities was observed during medical encounters when the EHR was used. This choppiness is also illustrated by providers as they describe their experience using the EHR during the medical encounter.

> "I'm constantly looking down and up and down and up (when using the EHR)" (In-depth interview, physician).

The choppiness is experienced as a strain on the interaction. Providers often describe this strain through a comparison with their perception of the interaction when using paper charts as being a more fluid interactional process.

> "I would go in again, shake the patient's hand, make direct eye contact- which I still do, but, then, I could maintain it and could stay face-to-face with the patient- jot things down as I needed" (In-depth interview 1, physician).

The choppiness appears to stem from the use of the computer during the interaction, in which there were distinct times when the computer was used and times in which the computer was not used which created a different interactional dynamic. This dynamic was observed as both physical movement, such as a disruption in eye contact,

having their back to the patient while they are typing, or being in a further physical proximity to the patient. Examples of feeling the interactional strain suggest that providers miss interactional cues of their patients and may appear rude to their patients.

> "(When using paper charts) They're looking at me. I'm looking at them. I see if they're uncomfortable… I can see when someone is anxious or if they have their eyes tear up or something. Sometimes (when using the computer) they could have been doing that for a few seconds before I look up and I realize, 'Oh my goodness, they're not comfortable with what I'm asking or something'" (In-depth interview 2, nurse practitioner).

When providers describe a change in the dynamics of the interaction with the patient, they are illustrating the *interaction with the computer* as an added feature of the medical encounter, whereby, when using an EHR during a medical encounter, there are two interactions- one with the patient and a separate one with the computer.

> "I try to interact with the computer and the patient at the same time" (In-depth interview 1, physician).

Therefore, the time during an encounter when the computer is use is categorized as *computer time* and the time during an encounter when the computer is not used is categorized as *patient time*.

Based on both observational data and provider self-reports, the addition of interaction with the computer appear to add two new stages to the encounter. Based on the type of task being performed and interactional cues, the observed pattern of work during the medical encounter appears to be broken into the following six stages:

- Greeting stage
- Information-gathering stage
- Laying-on-of-hands stage

- Processing of information stage
- Counseling stage
- Closing stage

The *greeting stage* indicates the start of the medical encounter and appears to be relatively unchanged when using the EHR. As the patient has already been "roomed" (taken back to the exam room by the nurse or medical assistant), the medical encounter begins upon entry by the provider. Patients are typically sitting in a chair, not on the exam table, when the provider enters the room. Providers across practices were typically observed addressing their patients by name as they enter the room, which is generally followed by a standard conversational statement, such as, "How are you today?" Some providers shake the patient's hand or touch their shoulder or arm. These gestures appear to be an interactional demonstration of acknowledgement. Patients mostly remain seated in the chair, though a few patients, mostly older male patients, stand up and extend their hand out to shake the provider's hand upon the provider's entry into the exam room.

The one obvious observed new task in the workflow pattern of the greeting is that providers then situate themselves in relation to the computer. They usually sit facing the computer while they "bring up the (electronic) chart". Most providers' attention is usually split between greeting the patient and engaging with the computer. Sometimes the process occurs fluidly, as the providers talk with the patient and work on the computer at the same time. At other times, providers greet the patient and then manage the computer in silence.

During the *information-gathering stage*, both the provider and the patient are almost always seated. It is unclear how the seating position observed compares with previous information-gathering patterns. It is assumed that most providers sat when

using paper records, as many indicated that they would jot down a few notes while eliciting information from the patient. As writing while standing is more awkward than sitting, sitting behavior is assumed. It is also assumed that patients typically did not stand during pre-EHR encounters. However, where the patient sat is unclear. There are some indications from providers that patients previously sat on the exam table instead of sitting in the chair.

A new workflow pattern observed in this stage is that providers actively engage with the computer and ask the patient questions in an effort to assess symptoms related to the chief complaint. Providers are physically situated near the computer, sometimes sitting on a stool with the computer on the counter or with the computer sitting on their lap. One provider pulled the exam table leg extension out and used it as a makeshift desk.

In this stage, providers elicit information from both the patient and the computer as part of the data gathering activity. Attention of the provider is frequently split between the computer and the patient.

> "I'm constantly looking down and up and down and up. Whereas before, when I would interview someone, I looked at them and we were having a conversation. And then I would write a note kind of brief. And it was just notes to jog my memory when I would go back and dictate. Now, I'm typing the entire conversation out. Or clicking on something" (In-depth interview 2, nurse practitioner).

Providers constantly start and stop their discrete activities of listening to the patient (or others present); viewing information; and entering information once the desired information is provided, in which there is verbal exchange and silence. The

silence is indicated when providers attempt to find desired information in the EHR, paper chart, or papers brought in by patients. The verbal exchange typically exists where a provider is asking questions or a patient is answering. Typically information is solicited from patients with the goal of filling out symptom checklists in a yes/no (absence or presence) format, using directed questioning. Providers were observed cutting off their patients answers and speaking over them when the answer provided did not specifically address the information desired or the information had already been provided in the earlier part of the answer. Sometimes patients had family members or caregivers with them. Many times providers directed their attention and questions toward the caregiver more than the actual patient. This pattern was especially noticed in terms of parents bringing children in for care, where the parents would be asked the questions and would answer on behalf of the patient.

Most often this stage ends when the provider stops viewing or entering information into the computer. Many times providers transition to the next stage by using time, space and activity by physically moving away from the computer to wash their hands or gather tools to be used in the physical examination, such as a stethoscope, ear, nose and throat light, or blood pressure cuff. Sometimes the transition into the next stage was more abruptly indicated as providers physically left the exam room so the patient could undress as necessary for a more extensive physical exam. Sometimes the provider left a portable computer in the exam room and other times the provider took it with them. When using a desktop computer, the EHR was typically left up on the computer screen during this encounter intermission.

During the *laying-on of hands stage* providers conduct the "physical exam". The presence of symptoms is assessed both visually and through touch during this stage. Providers actively lessen the patient's personal space by moving toward the patient and maintaining a close physical proximity during this stage, where physical touching by the provider occurs. The computer was rarely observed being used during this stage. In this stage, the provider's attention is typically solely on the patient, unless another person involved in the encounter is present and providing information. Providers typically ask directed questions regarding specific symptoms related to the area of the body that was being touched.

Other than soliciting descriptive information, most providers do not speak during this portion of the encounter, although a few providers engage in small talk during this time. Patients typically did not speak during this part of the encounter unless asked a question by the provider for which they provided an answer and then continued their work in silence. Providers rarely conducted basic physical work with the patient on the exam table. Much of the touching by nurse practitioners, physician assistants, and medical doctors occurred while the patient was still sitting in the chair they sat in when the medical encounter started. It is unclear whether assessing symptoms primarily from the chair was typical behavior before the EHR or if this is shaped by having the patient sit near the computer station.

Basic physical examinations include activities such as using a stethoscope, feeling patients' lymph nodes, re-checking the patient's blood pressure and/or pulse, and checking reflexes and mobility. When basic physical examinations are conducted patients typically remain seated in the original chair. They remain clothed except to

expose an easily accessible and non-private area being examined. Providers usually remain sitting on their stools and roll over to where the patient is located and conduct the physical exam from a seated position. Occasionally, providers stand up from the stool and walk over to where the patient is located and stand while conducting the physical exam. The physical movement of providers from the computer to the patient delineates these activities as separate stages. This movement allows providers to reduce the physical space between themselves and their patients. This stage can be considered distinctly different when using an EHR because providers indicate the former blending of information-gathering and physical examination as they were able to write brief notes when using paper records, as the paper chart takes up less space and requires less physical activity to write than type; whereas entering of information into the EHR is more physically and action-prohibitive.

Only a few medical doctors, nurse practitioners, and physician assistants have their patients move from the chair to the exam table to carry out the basic physical exams, however, there is usually movement to the exam table for more extensive physical examinations. In more *extensive physical examinations* patients are directed by the provider to move to the exam table. Providers typically stand, but occasionally sit on their rolling stools, during the exam. In more extensive physical examinations, providers engage activities such as breast exams, PAP smears, and rectal exams. Patients typically disrobe from their pedestrian clothing and change into a gown provided by the nurse or physician. May times a nurse is also present during these activities and acts as a chaperone. The distinction between the information-gathering and laying-on of hands is

delineated even more clearly when time and space are utilized to move between the chair and the exam table.

However, the work of doctors of osteopathy (DOs) is different than that of nurse practitioners, physician assistants, and medical doctors (MDs). DOs regularly used the exam table as they designated portions of their medical encounters to manipulation in which patients sat or laid on the exam table during the manipulation procedure. Most often the patient's spine is "worked on", where it is necessary for the patient's back to be exposed either through lying horizontally or sitting. This positioning allows DOs to manipulate the spine without the back of the chair in the way. This exam table is described as a more optimal height for the DO to conduct the manipulation. Though DOs often utilize the exam table, they continue having a separate seated information-gathering stage rather than having the patient seated on the exam table upon entry into the room.

The touching of the patient by providers for the purpose of diagnosis of a health condition may be called a *diagnostic manipulation*. DOs additionally engage in more extensive physical manipulation of patients' bodies for the purposes of relief or treatment which can be considered a *therapeutic manipulation* of a patient's body. DOs uniquely intertwine the stages of diagnosis and treatment through use of physical touching, whereas therapeutic solutions mostly occur during the later counseling stage for physicians, nurse practitioners, and physician assistants.

Providers indicated the end of this stage by exiting the close personal space of the patient. At this time they engaged in combinations of activities which also indicated the end of this stage, such as gathering their tools, walking back to their computers, washing

their hands, and/or leaving the exam room (to allow patients to redress in private, if they had undressed for the physical exam or to document).

The most distinct new phase when using an EHR is the *processing of information stage*. Symptoms monitored during the physical exam are further documented. Labs are ordered to obtain further information. Labs and other diagnostic tests, such as electocardiograms (EKGs), are managed through order entry in the EHR by the provider, which is carried out by the nursing staff.

> "We simply note on the EMR the labs we want. The nursing personnel then draw or obtain those from the patient and then input data…" (Practice 7, physician).

Ultimately the information is processed and a treatment care plan is developed, which may include the prescribing of prescriptions, physical therapy, or other procedures.

During this stage, patients either continue to sit in the original chair or move from the exam room back to the original chair. I observed most providers engaging in a combination of processing information both in the exam room with the patient present and processing information outside of the exam room and then re-enter for the next stage.

When providers leave the room to process the information, they usually indicated that they needed look up further information utilizing props and resources located outside the exam room or that were having difficulty concentrating in the exam room. Some providers indicated being uncomfortable typing in the room because they had trouble with the computer.

> "I would do it (process the information/document) after I came out of the room because I was uncomfortable with the movement (and) the distraction of it" (In-depth interview 2, nurse practitioner).

Others left because they thought it was rude to type in front of the patient.

> "I feel like it's kind of rude, like I'm sitting there typing away I'm not talking to the parent (of a child patient)" (In-depth interview 3, physician)

Others left the exam room to document because of the inability to process information while carrying on a conversation with the patient.

> "I just feel to me, it's not my style and it's something between me and the patient" (In-depth interview 2, nurse practitioner).

Providers typically process the information at their semi-private workstation or the nursing station, and occasionally in their private personal office. Informal communication between the provider and the assigned nurse sometimes occurs during this time.

When processing information in the exam room, most providers were silent and there was no conversation with patients. Providers described the inability to type and talk or listen at the same time. They needed to concentrate on the computer and were unable to process information and talk with the patient at the same time.

However, a few providers were observed engaging in conversation with their patients while processing information in the exam room, thus, for some providers it was possible. For those few providers who were able to interact with the patient and the computer at the same time, providers usually engaged in small talk during this time.

Sometimes, when providers were particularly adept at multi-tasking, they would overlap this stage with the counseling stage. For providers who engaged in this stage in the exam room, sometimes providers close the computer lid of a portable computer or log off a desktop computer. Usually providers then leave the exam room to gather sample medications, prescriptions, and educational materials not accessible in the exam room. Sometimes, the provider's assigned nurse or medical assistant enters the exam room to provide a combination of these physical items to the provider, so that the provider did not have to leave the exam room at this time.

When using the EHR providers often engage in detailed documentation at the point of care, rather than later. Providers hint that, when using paper records, this stage was skipped and impromptu counseling of the patient ensued, while detailed documentation occurred later.

> "Before, when I would interview someone, I looked at them and we were having a conversation. And then I would write a note kind of brief. And it was just notes to jog my memory when I would go back and dictate. Now, I'm typing the entire conversation out or clicking on something" (In-depth interview 2, nurse practitioner).

During this time providers process the information by documenting the findings of the physical examination in detail, ordering labwork, radiology, procedures and consultant referrals, making clinical decisions, prescribing medications, formulating and documenting treatment plans, finding and printing educational materials, processing patient paperwork (e.g. work/school absence notes, workman's compensation paperwork, school physical paperwork), and developing the billing code. For some providers developing the billing code included not only the electronic calculation, but also filling in

the “Superbill” or “Router,” which is a paper form listing biomedical terms for symptoms and treatments and associated billing codes)

The next stage is the *counseling stage*, in which the processed information is translated for the patient and explained in laymen’s terms. The diagnosis and plan of action is verbally indicated at this time. Although this may be categorized as the counseling stage, little true counseling occurs. The counseling is brief and mainly consists of directions for behavior modification, the name, dosage and directions for taking medications. Sometimes, brief behavior modification is discussed, but little patient education actually occurs. Mostly during this time, providers would indicate that a faxed prescription had been sent to their pharmacy of choice.

If the provider had exited the room to document or allow the patient to change, the provider indicated the next stage by re-entering the exam room. Patients typically remain sitting in the original chair. Providers also drastically change their body positions during this stage. The provider usually directly faces the patient. Sometimes, the provider remains sitting and will either roll toward the patient and be in close physically proximity to the patient, lean towards the patient, or lean away from the computer and rest an arm on the exam table or counter. At other times, providers either leaned up against the wall or counter, or stood directly in front of the patient. Most providers look the patient directly in the eye, which is emphasized by one provider who consistently physically removes his eye glasses during this phase.

Sometimes providers use specific props to explain the diagnosis and treatment plan. These props include printed prescriptions, educational materials, paper lab or radiology order forms, consultant referral forms, and Superbills. Sometimes papers

would be given to the patient indicating courses of action. For example, the patient would be given a paper prescription or lab order form which they were to fill, or patient education materials indicating guidelines of behavioral changes they were supposed to follow. One physician indicated that he prints all prescriptions rather than faxing them, even though there is the capability to fax, because "otherwise patients forget" (Observation, Practice 4, physician).

The *closing stage* indicates the end of the medical encounter. Providers engage in a variety of closing behaviors, including use of space, movement, props, and speech. Most often providers engage in a combination of these behaviors. Sometimes closing was very clear and other times closing was somewhat ambiguous.

Providers use space and movement by walking toward the door. Sometimes providers motion for the patient to exit first by extending their arm toward the door and standing a step back from the door so the patient has room to exit first. Other times, providers hold the exam room door open for the patients. The movement beyond the door differs. Some providers walk all the way to the check-out station with the patient, others walk until they reach their semi-private workstation or nursing station. Some providers take a few steps outside the exam room and gesture toward the check-out station.

In many cases, providers use norms relating interactional gestures to close the encounter. Often providers shook their patients' hands or touch their patients' shoulders, arms, or hands, much in the same way they greeted the patient upon entry into the exam room. Sometimes, the helped patients (and their companions) stand up from their seats,

which was most prevalent in helping older patients who were less mobile. Occasionally, providers hugged their patients.

Sometimes props are used to indicate the close of the encounter. When a portable computer is used, providers physically indicate the end of an encounter by picking up the computer. For providers who had not previously closed the lid of a portable computer, use this moment to close the lid, and then pick up the computer. When using a desktop, providers who had not previously logged off do so at this time. For practices continuing to use paper Superbills, providers can physically indicate the end of the encounter by handing patients the paper Superbill which they take to the check-out station. Providers also verbally indicate the end of the encounter during this stage.

Sometimes actions of patients during the closing stage elicited verbal frustration by providers after the patient left the room, particularly when patients asked about other health problems once the "case is already closed out" and the individual record had been signed off. Consistently, patients would ask about other health issues not specifically related to the current episodic care after the provider had closed out the chart and many times as the provider was physically exiting the room. Providers often described the patient using negative character descriptions, rather than describing the situation and format of the encounter as negative.

Post-encounter wrap-up. Much of the work providers do actually occurs outside of the exam room either during the encounter intermission where providers leave the room to process information, as described above, or after the encounter has ended, primarily either between encounters, at lunch, or at the end of the day. This stage is referred to as

the *post-encounter wrap-up*. All observed providers, but one, typically "finish documenting," "close out the chart," or "sign off on the chart" during this time, as there is a consistent norm in all observed practices of closing out the patient's chart the same day the patient was seen.

> "We encourage everybody to try to complete the notes on the day of visit. Most of us – I think we've all found that it works best if you have it completed when they get up and walk out of the room, you do it right there at the end, and certainly if not, before you leave the office that day. Some of us work from home at night, so, you know, from home, everything is wrapped up that day" (Practice 7, physician).

Of the 39 observed providers, only one provider (in Practice 4) was described as documenting on the weekends as a routine documentation pattern.

Before the EHR, it was indicated that closing out charts was a slow delayed process, whereby providers would dictate at the end of the day, wait for the transcription, add further notes with additional information, and have a billing specialist code the notes and process a bill- a process which took multiple days. Now the chart is completed and closed out on the same day.

I observed nurse practitioners in this study engage in more documentation activity outside of the exam room than the physicians. Most nurse practitioners observed made at least one unsolicited comment and many made multiple comments indicating that they documented outside of the exam room because of their perception that the EHR is a barrier to the interactional process of the medical encounter. It cannot be asserted that this is true for all nurse practitioners, but for the ones in this study, most of the documentation occurred outside of the encounter. These nurse practitioners were observed either typing a free text note in the EHR in real-time during the encounter,

rather than documenting in a coded format, or handwriting notes on scraps of paper, which they referred to later when formally documenting in the EHR when the patient was not present.

Importance of Data Gathering and Documentation

Based on the described importance of activities and the observed time and resources utilized to complete work activities, it appears as if two provider activities are most critical and central to provider work: 1) data gathering and 2) documentation. These two activities are mostly merged when using the EHR. The practices in this study made a deliberate choice to put their capital into obtaining and using their EHRs. None of the providers observed or interviewed indicated questioning of the usefulness of data collection or documentation. Quite the contrary, they herald the EHR as the tool they use to aid in data collection and documentation. Providers' use to EHR as a thread which weaves data collection and documentation together to more efficiently and effectively carry out provision of care, business, and professional activities.

Data collection and documentation is observed to be an ongoing process in which an accumulation of patient health information is gathered over time, thus EHR use persists beyond the capture of information gathered in one medical encounter. Documentation is reported to be important for:

- Future clinical decision-making
- Legitimation of the billing level
- Protection in the case of law suits

Future clinical decision-making. Many providers indicated the belief that information they were currently documenting may be useful when making future clinical decisions; however, observational data indicate that only a handful of providers actually reviewed previous medical encounter notes ("progress notes"), before making clinical decisions. The most prevalent use of progress notes from prior encounters was to efficiently document previously known information about a patient, so that it shows up in the current note. Some providers "copied and pasted" prior encounter progress note information into the current progress note, using an electronic feature which allows the provider to indicate desired information in a previous note and then create an identical copy of the information in the current note.

Legitimation of billing. Providers are observed expending much of their energy on tasks which do not directly relate to patient care. In multiple instances, providers disclosed entrepreneurial motivations for tasks which appear to be related to care provision, but were actually motivated by financial reasons. When using paper records, providers relied heavily on the expertise of the billing specialist to bill at the highest rate possible. According to providers and office administrators and managers, before the EHR, the billing process took longer and relied on a billing specialist to find diagnosis and billing codes based on documentation in the patient record. The EHR became the tool providers used to more closely control the billing process personally. Now, providers are able to indicate the billing codes for their work themselves. With the EHR, providers document diagnoses and treatments in coded fields in the EHR, whereby the EHR software automatically generates the diagnosis and billing codes.

Many providers actively engaged in activities specifically structured by fulfillment of criteria necessary for reimbursement, which is made easier and more efficient when using an EHR. One example is that one nurse practitioner spent more minutes looking for the code to bill for filling out a form a patient had brought into the practice than it actually took her to fill out the form (Observation, Practice 1, nurse practitioner).

An often observed illustration is the advanced use of the EHR to bill at higher rates. The A-4 software has a feature providers can click on which displays an EHR-generated billing code. Providers can view the billing code level before closing out a chart, and therefore, they have the opportunity to change the billing code before the chart is closed out. All but one provider using this software consistently used this feature. Based on the code displayed providers would continue further documentation specifically so they could generate a higher billing code level, referred to as "upcoding". (Further detail about the process and impact of this patterned behavior is further detailed in Chapter 9.)

A further illustration is that providers are observed spending significantly more time and energy engaging in billable activities than non-billable activities. (Non-billable patient care work, includes tasks such as phone consults, prescription refills, and responding to e-mails.) Typically, there is less formal accounting of non-billable information. For example, phone messages in some practices continue to be indicated using paper notebooks or "sticky notes," rather than formally being indicated in the EHR. Additionally, much of the grunt work associated with these tasks are performed by the clinical support staff or the office support staff, for example filling out paper work or

calling in a prescription. Many times the providers only provided a verbal, "okay", handwritten signature, or electronic sign-off once the support staff had already taken the necessary steps in managing the task.

Protection in the case of lawsuits. Many providers indicate the usefulness of the EHR as a protection from potential lawsuits. None of the practices in this study indicated being involved in a malpractice case during the course of the observations, therefore, the accuracy of this assumption in unverified. However, providers have the perception that they will be protected by using the EHR in the event of a malpractice suit.

> "We were hoping that on the long haul that this would help reduce medical liability. That we were doing better documentation, reminders, drug interaction, drug allergy, reminders and things and felt that the system would probably in the long haul reduce medical liability issues and that was ranked up (there)" (Practice 7, physician).

Conclusion

Key Findings

- Most work remains relatively unchanged in type and content as it relates to provision of care, business, and professional activities.
- EHR use facilitates a reordering of work tasks, so that documentation occurs throughout the day
- EHR use facilitates the splitting of formerly fluid stages of a medical encounter into six choppy stages
- Documentation is the main activity of providers

Much of the content of providers' work remains the same when using an EHR. Providers continue to structure their work time around scheduled medical encounters.

The major change in provider work is in how the work is ordered. One example of this shift is the increase in the number of stages in a medical encounter, where two additional stages are added to account for computer use by the provider. The activities engaged in during the medical encounter have increased because they document in detail during the confines of the medical encounter instead of at the end of the day. They appear to fit other work in between encounters and other free time during the day.

The second example of this shift is the increase in detailed documentation occurring closer in time to the medical encounter. Providers document during the scheduled appointment time instead of documenting all the day's medical encounters through dictation at the end of the work day.

Providers spend more time and energy engaging in data gathering and documentation than any other tasks, including actual provision of treatment. Data collection and documentation are said to be collected for reasons of current and future care provision, billing, and protection from lawsuits. It appears as if providers are engaging in behaviors that will help them in clinical decision-making, but much of the detail of what they do relates more to billing and defensive medicine, where more data is gathered on a patient than is needed for the immediate reason for the visit and subsequently documented in order to prove to insurers or lawyers that they have billed and acted appropriately.

CHAPTER 7

BASIC EHR USE

The previous chapter presented an overview of what activities primary care providers using an EHR engage in during a typical work day. This chapter focuses on how use the EHR to complete those activities. This chapter focuses on *basic* use of the EHR to manage patient information at the practice-level by thirty-seven primary care billing providers, two laboratory technicians, as well as various nursing staff and administrative/office staff working in the observed practices.

The electronic health record (EHR) is computer software which maintains patient health information in individual records. The physical entity housing health information shifts when using an EHR. This information is stored in the entity called the "chart", "medical record", or "health record".

To better understand the potential quality of information contained in a record, we need to assess both where the information came from, who enters the information, what is the information based on, where information is entered, when is the information entered, how the information is entered and why information is entered. The who, what, where, when, how, and why of information surrounding the electronic charts are described in this section.

Who

Information contained in a patient's chart is provided by multiple people. Information contained in the chart comes from a combination of the actual patient's accounting, information brought in by the patient (such as over-the-counter medication containers or records from another provider), accounts by persons accompanying the patient, the billing provider, in-house health care provider colleagues, nursing or MA staff, laboratory and radiology technicians, external health care provider consultants, insurance companies, and the patient's employer.

Information originates from many places, but who actually enters information into the chart is somewhat limited. When using paper records, access to data entry into a chart was potentially unfettered by members of a practice. Clinical and non-clinical workers in multiple practices identified potential insecurities of using paper charts because of open access to paper chart filing system. A norm appears to have existed whereby only the nurse or medical assistant recorded basic-level in-take notations and billing providers made handwritten indications about diagnosis and treatments in the paper charts and non-clinical staff did not make any notations in a patient's paper chart. Transcriptionists, not usually in-house, but acting as subcontractors, had access to privileged patient information by virtue of the function of their job.

Based on study observations, the individuals designated to enter information into the electronic chart on an on-going basis appeared to be consistent across practices,

where one or two medical records specialists were assigned the task of entering information received from external sources into the EHR.

In the practices observed, receptionists had the most limited access to individual electronic patient records. Receptionists managed most of their work using Practice Management (PM) software. The PM systems used by practices in this study were able to communicate with the EHR software, so that patient demographics and appointment schedules could be transmitted to the EHR from the PM system. Therefore, very little receptionist work required access to EHR records.

Billing specialists have the next level of access, as patient bills were based off information contained in the chart. Billing specialists could view information, but could not add information to the EHR. Most practices used either the EHR billing generation feature or a feature which transferred EHR generated information back to the Practice Management system for bill generation.

Medical Records specialists had the next level of access to the EHR. They could view and add information. However, the type of information that could be added was limited. Most often, medical records specialists were in charge of "populating the record".

"Populating the record" is a term used across practices to indicate the process of entering patient information into the electronic chart. This typically consisted of reviewing the paper record and scanning or typing information into the EHR. "Pre-population" refers to the process practices engaged in to get paper record information into the electronic chart before the patient was seen for the first time by the provider after EHR adoption. This process occurred either before the "go live" (the date providers start

using the EHR with patients during medical encounters), or in the first months of EHR adoptions once patients were scheduled for an appointment. During pre-population, more people, with less clinical experience, had access to information. Many practices utilized multiple practice members to pre-populate the data. This practice was deemed acceptable and necessary for prior patient information to be accessible and usable by providers during medical encounters. Some practices allowed non-clinical staff to populate the EHR. The non-clinical staff that entered data included both permanent and temporary office support staff. Sometimes additional office support staff was hired specifically for purposes of populating the record. In these cases, the practices usually hired physicians' children working over summer break.

Data population of the EHR continues in all practices, but usually has become limited specific designated staff charged with maintaining population of incoming information. This staff person is usually the former medical records specialist, who was responsible for maintaining and filing of paper records before the EHR. Sometimes providers delegate the populating tasks to their nursing and medical assistant staff rather than to office staff. At this point, little, if any data is hand entered and practices manage new information through scanning and attaching scanned information to a specific patient's record. This is an on-going process, given that consultant notes, insurance information, and non-electronic labs/X-rays are sent in paper format (usually through fax).

Nursing and medical assistant staff, considered clinical support staff, has the next level of access to patient chart information. Nursing and medical assistant staff is responsible for patient "in-take" in all observed practices. This includes the data entry of

patient vital signs, referred to as "vitals" (height, weight, temperature, blood pressure, and pulse) and "reason for visit". Vitals values are entered into a coded template. The reason for visit is free texted in a designated area and is uncoded. Nursing staff are able to send electronic messages to billing providers and office staff through the EHR. Some practices normatively stop nurse and medical assistant activity at this point, where more detailed information is then indicated by the nurse practitioner, physician assistant, or physician, although access is allowed for nurses to monitor prescription lists and set-up prescription refills, bring up a template, inquire about and document patient health and family history, and indicate symptoms.

> "(The MA) picks up some preliminary history that is considerably more detailed than what we did before we used templates" (Practice 7, physician).

The level of nurse/medical assistant activity appears to revolve around the preferences of their individual provider. The more faith a provider indicated about the nurse's abilities, both in terms of computer skills and in terms of intelligence, the more likely providers allowed and prompted their nurses to engage in more advanced monitoring and documenting of health histories and current health issues. In a few practices, nursing staff were utilized to enter specific medical information into coded fields in the electronic chart.

> "If you looked at a typical patient chart for one of the doctors, the nurse notes might have said, 'Patient wants to be seen today for a headache, or whatever. But now, it will have all the vitals, the headache, how many days, just more detail" (Practice 4, Office Manager).

Their abilities to decipher important information, without interpretation beyond importance of the information, are utilized. In a few practices, nurses and laboratory technicians enter lab data, without interpretation, and indicate information either in the paper chart or the electronic chart into flowsheets, in order to better track health maintenance, such as dates of last immunizations, PAP smears, and mammograms. Nurses and medical assistants also assist with tasks during the medical encounter. Once a lab test or EKG is ordered by a billing provider, the nurse is able to view the order, fulfill the order, and enter the results (without interpretation). They are able to enter result information into the EHR results pages. Further, they have access to enter flowchart information, specifically as it relates to health maintenance and chronic care management. For example, nursing and medical assistant staff is able to enter date of the last PAP smear (for women's health maintenance) or foot check (for diabetes management).

In some practices a specific nurse is designated to manage patient phone calls. This includes filling out prescription refill forms in the EHR to be reviewed by the physician. Once reviewed, processing is completed by the nurse (calling or faxing the refill request to the pharmacy and indicating the refill to the patient). The nursing staff and medical assistants have somewhat different tasks and responsibilities depending on the practice workflow patterns, which vary widely by practice and provider. The major tasks nurses and medical assistants cannot engage in is actual prescribing, treatment, and sign-off on the chart.

It is assumed that external laboratory information is or will be to be entered by laboratory technicians. The information is then transferred to the EHR internal to the

practice, either in an electronic format compatible with the EHR or as a fax then entered by the practice clinical support staff.

Office administrators and managers have much more access to EHR information than do other office staff, including nursing staff. Some administrators/managers build templates used in the EHR, when they need more extensive EHR access. Administrators and managers have access for the purpose of running population-level analyses. Also, they have access in their role as computer technician to trouble-shoot for billing and documentation anomalies. In this capacity, they have the ability to view, add, and change information in the patient's records.

Although office administrators and managers have the capability of entering information into individual charts, it appears that the only time office managers go into an individual chart is to make a correction for an error. Administrators and managers typically act as EHR "trouble-shooters" and need full access to make corrections to the records when anomalies arise. For example, in one practice the administrator's was observed to be managing faxed prescription errors and fixing coding errors in the software. A specific example is when a nurse practitioner and the billing specialist were in disagreement over a code used to bill. The office administrator "fixed" the code in the EHR for that particular patient's chart.

Billing providers, including the physical therapist, physician assistants, murse practitioners, and physicians, entered the most medical information into patients' individual electronic health records. Billing providers have access to view and change all parts of a patient's record including past visit information, consultant notes, templates, short lists, medication lists, alerts, reminders, and warnings. Nurse practitioners (NPs)

and physician assistants (PAs) have the same access for viewing, changing, and entering data that physicians do with one major exception. Physicians have an extra layer of sign-off, in which they oversee the work of nurse practitioners and physician assistants, so that there is both a nurse practitioner/physician assistant sign-off and a physician sign-off. This practice reconstructs the hierarchy embedded in health care. Even when other staff completes the actual task, the official sign-off is by the physician.

Not a single practice was observed allowing patients to enter information into their own charts. Based on the biomedical nature of the EHR documentation format, it appears as if neither the EHR vendors nor the providers had intentions of allowing patients to enter information directly into the EHR. None of the patients observed indicated a desire to enter their own information into the EHR.

Both EHR software vendors used in this study offered basic capabilities for patient entry, such as demographic information, scheduling an appointment, and viewing of lab data through a secure website compatible to transfer information into the Practice Management system or EHR for a fee. A few practices expressed the desire to have patients enter historical information through a website which would ideally populate the EHR. But, for most practices, it appeared as if this was not even on their radar, as many indicated they had not thought about it before. None of the practices indicated use of any of these available patient-entered features.

The conception of the information contained in the chart is protected as private, so private that unless requested, patients barely had access to viewing information contained in their chart, let alone access to entering information. Some providers openly held patient-entered information suspect. For example, a few providers explained perceived

negatives of allowing patients to actively maintain information in their own health records. One reason provided is that providers cannot trust patient self-reports. These providers did not appear to reflect on the likelihood that information provided during an encounter is probably the same if not more informed when entered themselves than when accounted on the spot during a medical encounter. It is possible that if left up to themselves, patients may utilize resources than memory to provide accurate information, rather than trying to remember specifics of past history on the spot during accounting provided during a medical encounter. Many providers appeared to "trust" laboratory values over patient self-reports. This is evidenced by many providers who had patients "tested" either the day before the medical encounter, earlier in the day on the day of the medical encounter, or at the beginning of the medical encounter. In many instances the providers would wait for the lab values to appear ("show up") in the patient's electronic record before making a clinical decision, regardless of the information provided by the patient during the encounter. The EHR may be seen as a tool to collect increasing amounts of abstract information, such as lab values, without consideration the fact that lab values are indicators and proxies for the patient's experience. But, these values appear to be taken as facts which trump information provided by the patient.

Another example is that most providers in this study rely on the consultant notes over the patient's account of an appointment to a consultant. This is evidenced by most providers spending extended periods of time in relation to the scheduled appointment time searching for a scanned attachment of a consultant note. This is especially obvious as most practices demonstrated multiple instances where the coding system used for scanned documents appeared unclear or cumbersome and providers expressed frustration

in their inefficiency in finding a specific scanned consultant note, yet they continued searching until they found the desired note. For example, in two separate instances in a half day observation, one provider was observed indicating that they had not received a report yet when the document could not be found after a significant pause in the encounter. It in unclear whether this provider's claims were true and that there was no document to fund or whether they merely could not find the document in the EHR. However, the provider verbally placed blame to the patient on the consulting provider for not being able to access the information. This pattern was observed for many of the providers, where they would make similar statements at the point that they stop searching for documents they believe to exist in the EHR.

The unquestioned nature of patient information collected by a practice being deemed the property of the practice and not the patient is illustrated further. In one practice, a provider indicated that even if a patient requests a copy of their chart, there is a section in the EHR designed so that providers can indicate notes that will not be contained in the version of the record the patient can have printed. This indicates that the EHR facilitates the assumption that it is acceptable and useful for parts of a patient's record to be withheld from the patient and to only be seen by providers who have access to the practice's EHR.

What

Providers use the EHR to complete many tasks. Figure 1 demonstrates which features providers indicated using in the structured survey. All but one provider of the 17

that responded indicated that they "always" document medical encounters using the EHR, which was confirmed in the observations. Most providers also record ICD-9 and CPT codes using the EHR. A majority also report viewing lab reports and consultant notes using the EHR. A majority also order labs, referrals, and prescribe medications using the EHR. Finding patient education materials is reported to be the least utilized feature measured in the survey. Providers also use the EHR to set reminders for care provision during a future visit, as described in the section on quality improvement efforts as seen in Chapter 8.

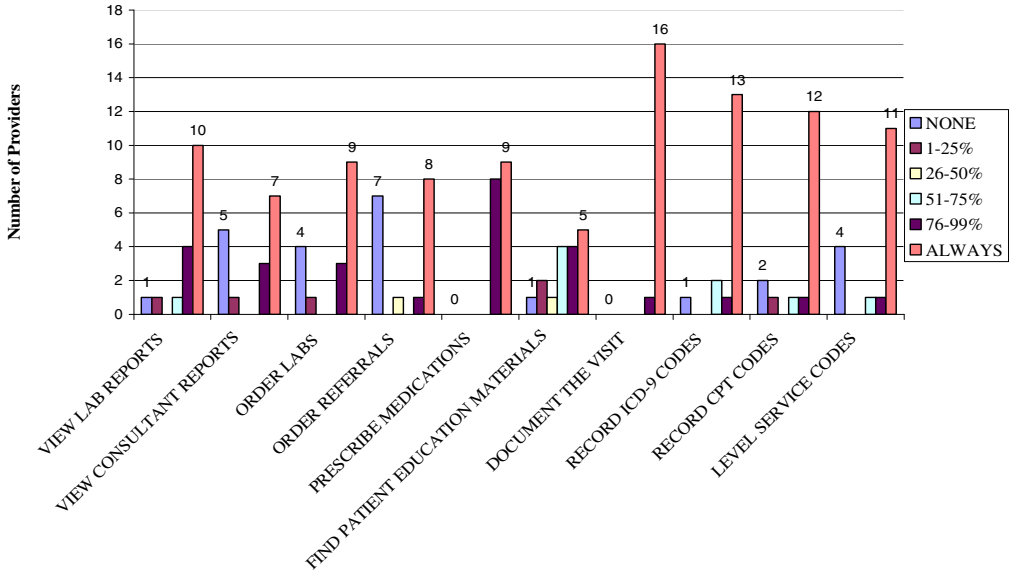

***Figure 1*. Self-Reported Use of EHR to Complete Tasks**

Based on the observational data, much of the information in the electronic chart is the same as information contained in a paper chart, just in a different format. Paper records do not easily have the ability to provide an overall picture of the patient, rather, information contained in a paper chart is indicated in the form of a note generated for a specific visit, not the overall situation of a patient. Sometimes practices used paper-based

templates indicating health maintenance, such as listing the history of immunizations or mammograms, but this was maintained as a separate form, specifically designed and managed for tracking, which can be seen as a quality-enhancing strategy.

Information in the electronic record can be either uncoded or coded. Uncoded information replicates the paper-based documentation method and is the least helpful in managing overall health of the patient. Uncoded information most often is documented in the form of free texted words or sentences and scanned documents. Much of the uncoded data is just as cumbersome for providers to utilize as when using paper records. Uncoded data is unable to be found using search features in the EHR. Even though the information exists and is accessible in the EHR, this information is usually entered for historical reference. Much of the information appears to be hard to find when wanted and remains unutilized. Further, providers need to know it exists to be able to know to search for it.

Scanned documents which providers know exist are the most highly utilized uncoded data. Providers typically know a document exists (or should exist) because they personally ordered a lab test, referral, or procedure or a patient indicates that they had a test, procedure or consult appointment, and it is assumed that the results were faxed from the external source to the practice. They also know about documents that are scanned in when practices that have providers review all incoming faxes or sign off on documents filtered to the attention of the provider by the office staff. Therefore, providers rely on their memories when attempting to find attached scanned documents.

Providers demonstrate frustration trying to “find” what they are looking for, even when they know a document exists. There are localized naming conventions used to

manage scanned documents individualized to the practice. Providers do not appear to search for documents in cases in which they do not already have an idea that the document exists and has been attached to the record. This leaves much attached information unused.

If the push to have interoperable health records at the national level materializes, use of scanned documents will be problematic. Not only are naming conventions local, providers demonstrate only using this information when they are aware that it exists. Therefore, providers who do not have a previous history with the patient and would not know about documents that have been scanned into the EHR and therefore would likely overlook this previously captured information.

Free texted information is mostly used to document detail about a symptom. Though the benefit is that more detailed information is documented, access to this information is accessible mostly through viewing of the specific medical encounter note it is embedded. Free texted information is not necessarily better than handwritten detail in a paper chart for quality improvement.

One of the major benefits of using an EHR is the ability to code data, which can then be used in advanced ways for quality. Few providers document symptoms in much detail and instead mostly engage in brief coded symptom indication. The forms of data coded most often by providers in this study are diagnoses, medications, allergies, laboratory values, vitals, and treatments. Diagnosis codes *may* be important for the provision of care, when looking at a trajectory of diagnoses, but is *critical* in determining reimbursement levels. The widely accepted standardized coding system is built around medical terms for specific diagnoses. Each specific diagnosis is given a numeric code,

which is referred to as the ICD-9 code. These codes are developed by the Centers for Medicare and Medicaid Services (CMS), and have been historically adopted and used as the standard by insurance companies.

Medication lists are maintained mostly so there is easy and efficient ability to refill a prescription and to receive warnings of drug-to-drug or drug-allergy interactions. Allergy lists are maintained to receive alerts when a medication or treatment is prescribed for which a patient as an allergy. Coded laboratory and vital values are valuable in two main ways. Coded lab data has the potential to passively improve quality by quickly indicating values as normal or out-of-normal range through a color coding, where green or black indicate normal values, yellow indicates a slightly abnormal level, and red indicates a lab value out of the accepted range, indicating a health problem needing attention. Providers could utilize this alert measure to visualize and track the course of health indicators, such as cholesterol, height and weight, over time. The capability to graph this information exists, which allows providers (and patients) to visually see the trajectory of the same type of information over time.

The most critical codes used are the billing codes. Current procedural terminology (CPT) codes are developed by the American Medical Association (AMA) and indicate a negotiated reimbursement rates. CPT codes are based in part on diagnosis codes. Therefore, providers must use coded diagnoses to utilize the EHR-generated billing code. Both EHR softwares observed for this study generate a formulated billing code based on utilization of features in the software, which is then transferable to the practice management software, which electronically develops an encounter “claim” or bill. One software has what is called an E&M Calculator, which providers use as a

replacement for their former paper method using a “Superbill”. The value calculated by the software is viewable by the provider before a chart is closed out. In the next chapter, the use of the E&M Calculator is discussed in more detail.

Both EHR softwares have the capability to generate diagnoses, graphs and tables, billing on individual patients as well as population-level lists. Although there are advanced ways to use coded data for quality, as described later in this chapter, few providers actually use the functions associated with information being coded other than for billing. Rather coding is a style of documentation to aid in billing, more than to aid in quality.

One additional benefit of coded data entry is that once the information is coded, that information is instantly accessible in multiple places in the record, not only in the exact place the coded information is entered. Information documented when building an encounter-specific note is therefore not limited to specific medical encounters, as with paper documentation. Instead it is combined with previous encounter notes to create overview lists across encounters. For example, when a provider enters a coded diagnosis into the electronic note for a specific encounter, the diagnosis code of that specific encounter is added to the comprehensive additive diagnosis list (which also includes diagnoses automatically pulled from prior electronic encounter notes). Diagnosis lists allow for easier overview of diagnoses across time in a feature called a “Patient Problem List”.

The overview format potentially subtly indicates health trajectories when combined with a provider’s medical knowledge. The lists in and of themselves do not appear to contain specific quality-enhancing features, such as treatment suggestions or

automatic options for prescribing medications related to a diagnosis code. The provider must be able to translate the diagnoses indicated on the overview list into usable information and link this with medical knowledge embedded in their memories from their training and experience. Therefore, the EHR *may* be seen as an aid in quality associated with having a quick overview of a patient's general state of health as long as the diagnoses listed are meaningful to the person accessing the list.

Not a single practice had a designated person who made sure all known information was contained in the chart or verified the existing information as being accurate in the record. A few practices did designate nursing or lab staffs to work on updating certain fields in the EHR to better manage health maintenance and chronic care by going through the electronic record and finding unlinked information and putting it in a format that is more usable for quality efforts. This process is described later in this chapter.

Beyond documentation, the EHR is used in other patient care activities, such as lab ordering, prescribing, and referring. All practices described ordering prescriptions electronically. Eight practices ordered labs electronically. Only seven practices ordered referrals electronically. Some have the capability of electronically faxing prescriptions. Many practices continue to print prescriptions instead of sending them electronically. Seven practices electronically fax prescriptions to pharmacies, three practices do a mixture of printing prescriptions to give to the patient and electronically faxing prescriptions directly to the pharmacy, and six use only printed prescriptions and did not use an electronic fax feature. Printing prescriptions is described as being due to provider preference, as an intentional strategy by the provider to remind the patient to fill their

prescription, and because the prescription is considered a controlled substance, for which pharmacies will not accept electronic signatures and the provider has to handwrite their signature on the printed prescription.

The major distinction in the prescription refill request process is *who* enters the request to the billing provider and *when*. In some practices, patients were either forwarded to speak directly with a designated nurse or they were sent to a voice mailbox and leave a message which a designated nurse listens to and processes. In other practices, the front office staff managed the phone calls and processed the prescription refill. Prescription refills sent to providers in the form of patient message notes attached to an individual patient chart, which is sent to the provider's in-box. Management of prescription refills using this method in the EHR described as much easier and faster.

Eight practices order labs electronically. Electronic ordering is viewed favorably by providers. Four of the eight practices who documented the ordering of the labwork electronically, printed the actual lab orders. One practice did a mix of electronic ordering and printing. Three practices solely handwrote lab order forms and did not use the EHR for lab orders at all. Though seven practices ordered referrals electronically, only two were completely processed and sent electronically. Four practices continued to handwrite referrals. Some of the continued use of paper prescriptions was provider-preference and some was influenced by the compatibility of the EHR with outside entities work processes.

The EHR can be used to support clinical decision-making. Decision support through the EHR can be either formal or informal. Very little decision-support was formally set by the practice. Typically information regarding features and tricks (such as

shortcuts) were spread informally among the users. (See the quality improvement chapter for further description.)

Information within an electronic chart is seen as more organized and accessible which may allow for some level of decision-support, as there is the assumption that access to more information improves decision-making. However, there were no observations of explicit decision-support utilized during this study. Indeed the actual use of the EHR for decision-making as an improvement may be critiqued for three main reasons. First, as the set of observed physicians had a say in which software to purchase because they were practice owners, some physicians describe EHR template structures as mimicking their usual style of thinking.

"It thinks like a doctor" (Practice 3, physician).

Providers openly described decision-making assistance through use of the EHR. However, the assumption that access to information improves decision-making may also be a fallacy. Thus, information itself may not be important in decision-making; how the information is able to be utilized is the critical factor. This maintains that providers need knowledge and wisdom beyond the facts in the EHR to make clinical decisions. Further, as EHR decision-support is regarded as beneficial, providers did not use all available features in the EHR, as will be described below in the quality improvement efforts section.

Therefore, little actual decision-support can be indicated as decisions would be made in the same way whether using the EHR or not. Second, as described earlier in the chapter in the discussion of chart population, much of the information housed in the EHR

is scanned, however, scanning does not automatically equate into usable information. Oftentimes, providers actually got frustrated looking for particular scanned documents and stopped looking; thus, they did not utilize scanned information. Third, also as further described in the population section, much of the information from the paper record was not entered into the EHR at all, and thus is omitted from the currently-used electronic version of the chart. If the information does not exist in a way the provider knows to look for it, it cannot be utilized in decision-support.

All practices demonstrated some use of patient educational materials. Many are observed using either the EHR-provided patient education materials or those accessible through the computer and include the American Academy of Family Physicians (AAFP) website, familydoc.org, or other health sites, which were printed for patients. Additionally, some providers rely on "old favorites" used before the EHR, which are photocopied for patients.

Beyond provision of patient education materials, however, few practices actively engaged in patient self management activities, such as providing encounter summaries and allowing patients to view, monitor, change or add information to their own charts. One office manager illustrates the lack of specific agency encouraged by the patient and instead refers to passive patient self management through provision of patient education materials.

> "They (Providers) don't do the summary, but they will print out the diabetic education pamphlet or immunizations, what to watch for, that kind of thing" (Practice 5, Office Manager).

Five of the practices studied indicate printing information for patients "as needed" or when requested rather than being completely systematic.

Practices indicate three rare situations in which patients receive paper-based information: 1) when a patient has actively initiated it; 2) there is a special circumstance where it is "needed", usually by another entity; and 3) when a patient has specific memory loss, such as that of an elderly patient. When information is provided to patients, providers indicate medication lists as the typical content. Less frequently, providers describe provision of diagnoses. It is unclear if information given to patients is actually a summary of care or medication lists, such as printouts of prescriptions to be filled by the patient, or diagnoses as indicated on patient education materials.

As providers indicate they print a patient summaries "when requested by a patient," it must be noted that the patient given historical physician power, patients probably need to be advised that it is possible to get a patient summary printout in order to ask for one. The patient must also feel comfortable requesting one. Therefore, if providers are willing to give patients summary sheets upon request, but patients do not know they can ask or do not feel comfortable asking, this potential EHR benefit is not realized.

Only one provider was observed providing actual patient summaries and plan print-outs. This provider was practicing differently from other providers studied in that he spent far greater time in documenting activities than any other provider. With his colleagues, the provider discussed the enormous amount of time he spent documenting activities. This provider would not close out charts the same day of the encounter as his

colleagues did. This particular provider described documenting on weekends to "catch up".

The previous results highlight provider responsibility in patient care management. But, sometimes patients actively participate in their care management. Focusing specifically on patient actions regarding the EHR and not the interaction generally, patients are observed as overwhelmingly passive. Patient involvement can be described as either active or passive. For example, the patient could actively or passively view information in the EHR. I did not see a single example of a patient entering or changing data in the EHR. There were very few reports by providers that patients even speak up to correct information they are able to view in the EHR which they believe to be inaccurate. While enacting a passive role, a patient could be seen to turn their head to view the screen. Patients may not know that viewing or accessing their chart is permissible, thus the option to view or access information in their chart is moot.

On a few rare occasions, patients viewed the computer screen when prompted by the provider. Most often, providers view and document without much attention to patient activity or response to the EHR. During those times when the patient was "allowed" to view the screen, the provider actively included the patient by turning the screen to specifically show the patient information in the EHR. In these cases, the providers act as a filter to what information the patient sees. Only three providers were observed to allow patients to view the EHR screen. It is not clear whether the lack of patient viewing behavior is intentional or not. Only one patient was observed turning to see what was being typed, but the majority of the time patients did not seem to behave in a manner in indicating that they were secretly or overtly viewing what was on the screen. Most

patients even shifted their eyes away with what appears to me to be an unspoken rule of not looking at the screen unless prompted by the provider as the norm.

There were two exceptions to these overall observed patterns. First, providers actively show charts of a child's growth and weight to the parent, and depending on the age of the child, also show the chart to the child. Second, children appeared uninhibited in viewing the computer screen, in which they physically moved around the room to view the screen better, or asked the provider to explain what they were doing.

Another EHR-feature is internal communication. Although it is possible to categorize practice communication as business-related, for purposes of this discussion it will be considered a patient care activity. Communication can be seen as being either internal or external. Internal communication is communication between formal members of the practice. External communication consists of incoming faxes, incoming phone calls, and incoming emails.

Providers, nursing, and office staffs utilize the internal messaging system. They report improved internal communication.

> "The internal messaging and sort of internal email, the communication is tremendously better" (Practice 3, physician).

Previously much of the internal communication occurred informally, either verbally or through handwritten "stick notes" or notes on "scratch paper". When utilizing internal messages in the EHR, messages are able to be referred to again and do not become expendable; they are more organized, and are more formal.

> "You don't have a thousand sticky notes all over the place. The sticky notes are all captured in the computer. So messages and everything are captured nicely and neatly in one place" (Practice 4, Office Administrator).

When communication was formalized before EHR adoption, many practices used notepads with carbon copies, which they have mostly done away with.

One described change could be framed either positively or negatively.

> "There might be a little bit less face-to-face interaction because it's now done by computer. But because it's such a small office, if there's any reason for clarification, the person just walks around and talks to the person" (Practice 1, Office Administrator).

As described, these are small practices where everyone knows each other, and for the most part have good relationships between them, and informal verbal communication between in-house practice members continues, and thus messages are not formally indicated in the electronic chart. On the other hand, providers use the electronic messaging while in the room with a patient to indicate the nurse to do something, which is completed more efficiently, and is indicated in the chart.

Another provider indicated an additional unintended benefit of internal message tracking is access to knowing that other practice members have been in communication with a patient and about what the communication actually consisted. This is described as beneficial for problem patients.

> "A lot of times if the nurse is on the phone with an irate patient, they can look at that message to know, 'well, no Nurse X, who is on a break right now, has already called you four times' looking at her notes" (Practice 3, physician).

But, even when some electronic messaging was observed, much communication remained informal in the practice, through both informal notes and verbal communication. Providers were observed to give nursing staff tasks verbally while in the hallway or at the nursing stations. Providers also informally discussed billing issues with the billing specialists. Further, in many practices the continued use of post-it notes were observed being exchanged between billing providers and the nursing staff. This appears to mimic pre-EHR workflow patterns related to quick communications about currently seen patients.

> "I would say, 'I'm not going to read a paper note. I only read a note that's sent to me electronically'" (Practice 2, physician).

Even though this hard stance was reported, it is difficult to know how closely this manager actually stuck to this hard line.

Incoming information typically came into practices mostly through phone and fax as external providers did not have access to the internal EHR messaging system. Lab results, procedure results, and consultant notes were the most frequent external information managed. External labs compatible with the EHR electronically populated the EHR lab fields. External labs not compatible with the EHR would fax information to the practice, which was then either hand-entered by a nurse or MA into the lab fields in the EHR or they were scanned.

Patient phone messages were recorded in an electronic message attached to a patient's chart and sent to either a nurse's or the provider's inbox. Before electronic messaging, patient calls were either taken by a nurse assigned to manage phone calls or

by the front office staff and were typically indicated in a carbon copy spiral notebook in which the message was put in the physician's box attached to a chart with a paperclip. One practice continued to handwrite patient phone messages taken off the voice mail on a paper chart, which was then transferred to an electronic message by the phone nurse.

Additionally, outgoing information was seen as better through EHR use. One practice emphasized on numerous occasions, both in the formal interview, and informally during the observation, that outside providers positively commented on his notes.

A few providers indicate using email to communicate with patient, though this form of communication was minute compared to phone calls. The email was not attached to the EHR, but was rather accessed and copied and pasted into a patient's chart.

One practice stood out as having the most advanced and extensive capabilities in communicating with patients outside the medical encounter. Patients can communicate in a secure mailing system with their provider, can request appointment times, pay their bill online, fill in history and employment information which was printed by the practice and scanned, and request prescription refills. Any updates patients make are indicated to the provider through an alert feature where the provider receives a message indicating updated information. One provider indicates accepting emails from patients.

> "I don't send unsolicited emails to patients. I only send emails – if someone sent me an email and asked me a question, I would email them back. I figure they know it wasn't encrypted; I know it wasn't encrypted" (Practice 2, physician).

Another practice is actively working toward improved external communication with patients.

Where

Where data is entered appears to depend on the immediacy and use of the data. For immediate documentation, nurses and medical assistants, and providers type words into a non-coded field. This information is sometimes translated into coded fields later. Providers mostly enter information into a current encounter note, which when coded, is viewable in multiple places as needed for review.

When

As discussed in Chapter 6, as documentation revolves around discrete medical encounters, most of it occurs during in-take, during the medical encounter, and after the encounter (immediately following an encounter, later in the day, and occasionally on a different day). Sometimes information is also documented between visits. For example, prescription refill requests by a pharmacy or by the patient over the phone or email are indicated in the chart between office visits.

How

Management of information is described as a heady task. The EHR is used to manage both internal and external information electronically. One of the major described benefits of the EHR is the improvement in managing information.

> "Paper is impossible to manage. Charts are lost, misfiled. It's a horrifying way of managing data… It (the EHR) just provides the most superior resource of data… Basically do away with paper and be able to manage all the aspects of a practice in a much more organized way" (Practice 6, physician).

Most providers transitioned relatively easily to electronic data management. Seven practices indicate not pulling or using any paper charts and have made the transition to solely using the EHR for provision of care. Most often providers had set up a process of indicating the information they thought was important to be transferred into the electronic record and the paper chart was phased out and no longer used.

Management of paper records. The management of paper records included a process of going through the entire paper chart for all patients before go-live or day-by-day as patients were scheduled for appointments and indicating desired material to be scanned. This process was consistently referred to as "earmarking" and "flagging" of data in the paper chart. For many practices, the paper record was not used unless there was a specific reason.

> "(The paper record) became a historical document for the doctors to use to reference back to what they had already previously seen for the patient" (Practice 1, Office Administrator).

Sometimes providers remembered that information existed on a patient, which was not indicated in the EHR, and the provider would pull the chart to seek out that information. But, mostly practices "weaned" off paper chart use and have transitioned into only EHR use.

Four of the eleven practices that were observed have not made a "complete transition" to electronic documentation, in which all current medical encounters are reviewed and documented solely using the EHR and no longer utilizing paper records. This supports the Robert Wood Johnson Foundation Report (2006) reporting that the number of practices which have health information technology, because 10% are not "fully operational". Two practices continue to use paper charts for most visits. One practice had a provider refuse to use the EHR after an initial attempt at use. A final practice occasionally uses paper records. One of the two practices continues to use paper records for most visits. This provider indicates that this is due to not having pre-populated the EHR with prior encounter and history information. The paper chart is maintained to house lab data and incoming paper information, such as consultant notes. It is important to note that this workflow process was amplified because this was the only true solo provider in the study. He had no help from other colleagues or staff to manage data entry of lab data. Thus, his workaround is to maintain paper charts for the purpose of housing lab data, housing paper coming in to the practice, and reviewing past information not yet entered.

The other practice also indicates continuing "chart pulls" for every encounter. Incoming lab results are housed in a patient's paper chart. It is stated that in this practice charts continue to be used for documents that are not scanned in, to look at historical information, and to do some documenting. The provider in this practice indicates continuing to handwrite a brief note into the paper chart regarding each visit. This practice is also a solo practitioner, though she did have some staff able to help with data

management tasks. Neither of these providers shows the significant economic success of the larger practices which have more "help" with data management processes.

One practice had a provider refuse to use the EHR. He bought into adoption of using an EHR along with the other providers. However, after trying to use the EHR, he decided to go back to using paper charts. Thus, paper charts need to be maintained in this practice for the benefit of the non-using provider. This was both time and resource intensive for office staff to maintain both paper and electronic records.

The final practice reporting any paper chart use indicates minimal use of approximately one chart per week for information not scanned into the EHR. Providers generally describe the infrequent case where they go back and pull a paper, primarily to view an old X-ray or lab, which has not been entered in the EHR. One of the reasons for not having electronic access is that the format is not electronically compatible. For example, traditional X-rays are not currently able to be scanned.

Management of current in-house information by non-clinical staff. Management of in-house information includes the entering (population) of data indicated in paper charts and documentation of current in-house encounters, in-house lab and procedure results, and communication is also described as improved. Management of external information coming into the practice, includes faxed papers, papers patients bring in with them, and external lab and procedure results.

Even when practices have switched entirely to electronic provision of care, significant amounts of paper are still used in the practices. Reportedly, patients continue to fill out paper registration or demographic and HIPAA forms in seven practices.

Additionally, consultant notes come to all practices, but only one practice manages faxes completely electronically, all others print then scan incoming faxes. Patient education materials are printed for patients in all practices. Paper forms patients bring in are scanned in all practices except two, who maintain incoming paper in paper records, as described earlier. Practices seem to manage paper in the practice through scanning and shredding, with the three exceptions that maintain current paper records noted earlier.

The process for managing papers faxed to the practice such as discharge summaries, specialist reports, and lab reports, have reportedly improved. Organization of in-coming paper from external sources is described as being much improved when using the EHR.

"This is so much easier" (Practice 2, physician)

Although practices find organization to be better, the organization system used remains individualized and local to the organization. Some practices organize by date of encounter "newest to oldest, or oldest to new", by type of document, separating out consultant notes, lab reports, physical forms, phone messages, etc.

Even though the management of information is said to be better when using the EHR, some problems arise. Much of the pre-populated information was scanned and not hand-entered into coded fields, which precludes use of the populated for advanced use of the EHR.

Retrospectively, providers had trouble organizing in-coming external information.

Not only is the format prohibitive in review for immediate clinical decision, but it is also prohibitive for population-based analyses as scanned information is not coded. This is discussed in more detail in the next chapter on quality.

Also, much of the populated information was filtered during the population process as being "critical" or "immediate," which leaves much information indicated in the paper chart unused and unusable. As documents were earmarked/flagged, only *part* of a patient's prior chart are indicated in the EHR. In this case it is possible that important previously indicated features of a patient's health are not transferred over to the EHR record. This pick-and-choose, filtering of information is typically based

> "So as patients come in, we are updating the EMR system with not the entire chart but just certain sections that the doctor feels is relevant" (Practice 1, Office Administrator).

Many practices indicated the impracticality and costliness of scanning (or entering) all patient information.

> "We felt like it would be too costly to scan in and too time consuming really to scan in the entire document because the patient record – some of them are very lengthy; they've been here for 6-7 years" (Practice 1, Office Administrator).

The one practice in our study that was a relatively new practice foreshadowed these potential pitfalls and planned their practice start-up and adoption efforts with quality in mind with attention to the format and type of information entered from the beginning. The rest of the practices have to play catch up by reformatting information as they go, designating a clinical staff person to reformat information, or just work off inefficient and incomplete records when using the EHR.

Documentation by providers. The majority of provider's time and attention focuses on documentation of current medical encounters. All eleven practices report improvement in the accuracy of their documentation with use of the EHR. Of the providers in those practices, all but one provider uses the EHR for documentation of current encounters, as described in the research methods section.

Providers who use the EHR speak favorably of electronic documentation.

> "The notes are better" (Practice 3, physician).

The general notion that documentation is better is due to described benefits of legibility, broadened scope of what is formally documented, higher billing coding, and defense against law suits.

> "You've seen doctors' notes. They're two or three lines and they're signed and that's it" (Practice 2, physician)

Encounter notes indicated in the EHR are seen as "more complete".

> "They probably get more information than they did before, because it prompts them" (Practice 3, Office Administrator).

Providers use four main methods for documenting information in a coded format. The example of diagnosis codes illustrated these methods. The most often way data is coded is through a pre-set "short list" of frequently used diagnosis codes. Short lists are created by the office administrators, office managers, or individual providers. The list of

frequently used diagnoses appear as a “dropdown” feature where a list of diagnosis names are in put in a horizontal list and the desired diagnosis is highlighted by the provider. The second most often used method is using a “search” feature. Much like the short list, the search feature has an alphabetic list of diagnoses and their associated codes. Providers can type using free text either the full medical diagnostic term, the first letters of the diagnostic term, the numeric ICD-9 code associated with the medical term for the diagnosis in a search box, or they can scroll through the alphabetic list of diagnoses to see the names, when the desired diagnosis name and code appears or is highlighted using the mouse and is selected, the diagnosis becomes coded data. The second is to enter the numeric diagnostic code into the search box. The third method is by copying and pasting information from a previous note into the current encounter note. The coded data from the prior encounter note maintains its integrity and becomes coded data indicating current information in the current encounter note. The fourth method to document in a coded format is to enter numeric information into a coded text field. Laboratory data illustrates the fifth method. Numeric laboratory information is typed into a coded text field indicating the lab value. These numeric values are recognizes as coded values, which can then be used with other EHR functions.

Why

Although providers were not asked why they document, they offer three main reasons for documenting. First, providers document to formulate and legitimate billing levels. Second, providers indicate that they document to have information on a patient

for a potential future visit. Third, providers indicate that they document to protect from malpractice suits. Only one of these reasons relates directly to provision of care, which may or may not be utilized in actuality. Though providers may assume that they document in order to provide quality care, this is not explicitly stated.

Providers' notes remain highly individualized private documents, even when using an EHR. With the exception of nurse practitioner and physician assistant notes needing a legal sign-off, providers notes remain mostly unmonitored. The limited monitoring that occurs is through insurance companies. Insurance companies have an invested interest in the information formally indicated in a patient chart as it relates to billing. More insurance companies are taking an interest in quality and are starting to begin limited oversight of provider work, but this is not done hands-on and is only retrospective as it relates to the matching of diagnosis and billing codes. The actual quality of care is not monitored, nor is the quality of the record.

Conclusion

Practices report many benefits of adopting the EHR, including quality and business improvements. Different job positions have different levels of access to EHR information. Office staff has the least access to patient information. This access is increased for EHR populating and scanning responsibilities. Medical assistant and nursing staff has the next level of access where they can view and enter limited information into the EHR. Office administrators and managers are able to build templates, troubleshoot, and fix incorrect information in individual patient charts. Billing

providers are able to view, add, and change information in individual patient records. Most providers use the EHR for viewing of past information, information organization and management, documentation, lab, procedure, and referral ordering, decision-making, and communicating internally. A few providers use the EHR for patient self management. More advanced uses of the EHR are described in the following two chapters, where quality improvement efforts and revenue enhancement efforts are assessed.

CHAPTER 8

ADVANCED EHR USE FOR QUALITY IMPROVEMENT

Quality improvements, stemming from use of an EHR, are proposed to come from appropriate information to guide medical decisions including, automated reminders, eliminating illegible orders, improving communication, improving the tracking of orders, checking for inappropriate orders, and reminding professionals of actions to be undertaken (Ash, et al., 2004). Quality improvements are either *active*, in which someone intentionally engages in quality-improving behaviors, or are *passive*, in which quality-enhancement is built into the EHR software itself or where behaviors of people result in an inactive consequence of quality improvement. *When* information is elicited as well as when information is processed can affect quality efforts and is examined in the fourth section. This chapter examines the perception of quality improvements and the actions taken to engage in quality improvement through use of quality-enhancing features in the EHR.

Quality as a Reason to Adopt an EHR

Examining the reasons for adopting an EHR can help us understand the expressed desire for provision of quality care through use of an EHR. All practices included in this study indicated quality as a motivation for adoption of the EHR. Some of the described benefits of EHR use are legibility of information, improved access to information, improved organization of information, improved quality of the note through template use,

as well as embedded alerts in the EHR relating to formulary compliance, drug-drug interactions, and drug-allergy interactions.

> "I've always felt like every medical record should have a Problem List, Medication List, and Medication Allergies listed or the fact they did not have allergies. In our paper record, that was not as consistent – it wasn't as easy to keep up, wasn't very neat, hard to read, and those were three things right off the bat we said we're going to have in an EMR. Also, we were going to do electronic prescribing, faxing prescriptions where we can, but except for controlled substances, anything we weren't faxing, we're going to print. We're going to have legible prescriptions going out now. Those were the key things that we set. We allow any provider to free hand text or use templates. Pretty much everybody found the templates are the way to go, saves a lot of work, and we use templates and free hand within the template" (Practice 7, physician).

Perception the Quality Has Improved with EHR Use

Not only do practices indicate a perception that quality would improve with EHR adoption, they also report their belief that quality *has* improved as indicated in Figure 2 and Table 1.

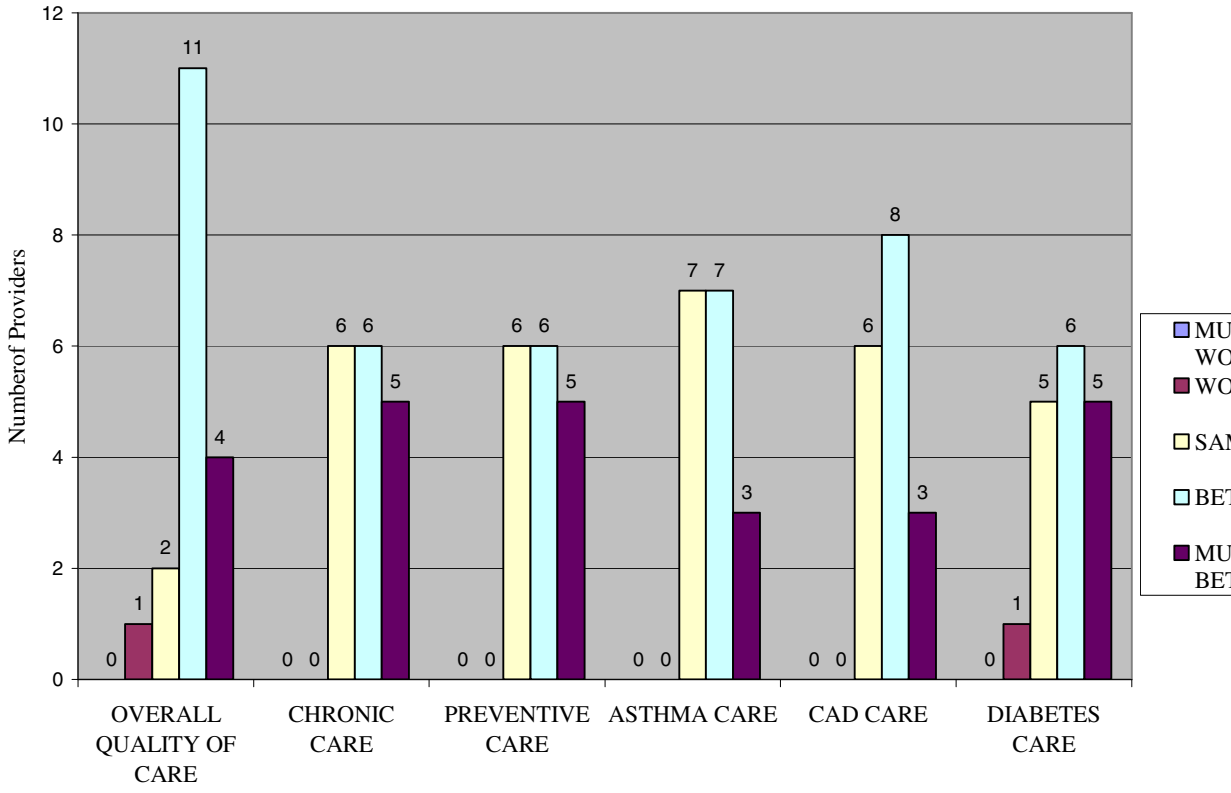

Figure 2 . Provider Self-Reported Changes in Quality by Primary Care Providers Using an EHR

Table 1.

EHR Champion Reports of Improvements in Quality of Care from EHR Use by Practice

Types of Quality	1	2	3	4	5	6	7	8	9	10	11
Overall Quality of care	Strongly Agree	Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Disagree	Neutral - No change	Agree	Strongly Agree
Preventive Care	Disagree	Agree	Strongly Agree	Disagree	Agree	Strongly Agree	Agree	Disagree	Agree	Agree	Strongly Agree
Chronic Care	Disagree	Agree	Strongly Agree	Neutral - No change	Agree	Strongly Agree	Strongly Agree	Disagree	Neutral - No change	Strongly Agree	Strongly Agree
Urgent Care	Strongly Agree	Disagree	Agree	Strongly Agree	Unsure	Agree	Neutral - No change	Disagree	Neutral - No change	Neutral - No change	Strongly Agree
Coordination of Care	Strongly Agree	Agree	Strongly Agree	Agree	Agree	Agree	Agree	Agree	Neutral - No change	Agree	Strongly Agree

We did not measure actual quality of care or patient indicator improvements from EHR use, but we did ask about providers' impressions of quality improvement. Nine practices reported believing that overall quality of care had improved.

> "Quality and note improvement really ranked right up there and I think we just saw that soar here, overall quality as well as quality of our notes" (Practice 7, physician).

Even patients observed commented on the implied improvements in quality because of EHR use, where they express the assumption that EHR inherently improves patient care. There is no known evidence of a relationship between a provider's (lack of) computer skills and their abilities as a medical provider. However, there could be a link (as yet untested) between having a computer system and seeing the provider as providing "better" care by both patients and patients' significant others who attend the medical encounter with the patient.

Management and improvement of health problems is the most often stated goal of health care provision. Even though providers may have broader definitions of quality and health, their working definitions tend to be based on management and improvement of health indicators. The way appointments are scheduled reflect this goal, where appointments are scheduled because of a specific health issue, regardless of whether the health issue focused on is immediate or chronic. The first question asked for which information is documented is, "Why are you here today". Patients are expected and do provide discrete problem-oriented answers. These answers are indicated in the "Reason for Visit" box indicated in the EHR. No cases were observed where this information was

left blank or unanswered before the provider entered the exam room. The question would be reiterated and asked again or a paraphrasing of the answer provided by the nurse or medical assistant taken during the in-take process is provided. "So, you think you have strep throat, huh?"

In order to assess fulfillment of the goal of providing quality care through "improving" a patient's health, a measurable indicator of illness is necessary to demonstrate improvement. The usual way of indicating illness is by finding abnormalities, which indicate illness. At the working level, the thought is that quality care is provided when patients who have been "diagnosed" as having a health issue are at minimum stabilized and ideally improved.

Quality Improvement Efforts

Using the conceptualization of quality as it relates to specifically to appropriate diagnosing and treatment plan development, quality in health care stems from the ability to accurately and usefully utilize information related to a person's health. The documentation of this information may provide one way of understanding the quality of health indicators utilized in diagnosing and treatment plan development.

How the EHR is used to gather, format, and process information has implications for quality. This section assesses how the practices studied actually use the EHR for quality-improvement. Both use and nonuse are discussed, which exposes room for improvements in use of an EHR for quality. The process of documentation can be seen as the method through which providers engage in the provision of quality care. Another

assumed quality benefit of EHR use is improved documentation, which reminds professionals of actions to be undertaken and improves the tracking of orders (Ash, et al., 2004). Documentation is assumed to improve through use coded data and access to and use of templates. Coded data allows for population-level monitoring on needed health maintenance or chronic care procedures or laboratory tests. Templates offer standards of care. Some practices informally agree on use of certain features in the EHR, mostly use of templates, electronic prescribing and ordering, and coded problem lists.

Although two practices indicate no mandatory use of EHR features, all other practices require use of coded data, including diagnosis/problem lists (use of ICD-9 codes), medication lists, and allergy lists. Practices also indicate "that's just the way documentation is done" and using templates is "strongly encouraged" when applicable. In most of the practices, providers shared new "tricks" as they found them, though use of these new features, were not standardized.

Use of Templates

Providers describe using templates more often with the EHR than with paper-based records. This behavior can be seen as quality-enhancing. However, the types of templates used and the ways templates are used challenge the idea that template use itself is automatically quality-enhancing. Beginning with the design of EHR templates, how the template is designed may play a role in the provision of quality care.

The use of templates assumes standards of care, however *where* the standards of care used to build the templates stem from is unclear. Most providers indicated using

templates that came with the software or were bought through the EHR software as supplements. Many providers made statements indicating that they assumed that these templates were evidence-based. It is unclear how the templates in the EHR were built, therefore, it is not possible to comment on the accuracy of these ideas. Many of the templates provided by the EHR software company were "tweaked" or "altered" by individual providers. Specifically, providers are able to manipulate the software-provided templates to match their personal standards of care.

> "If they wanted to add something, they can add it. If they wanted to take something away, they could take it away" (Practice 5, Office Manager).

Providers often alter and ignore parts of the template, which is referred to as "customizing". This practice is seen by providers as beneficial, not problematic. The pattern of altering or ignoring standards built into the templates may minimize the quality-enhancing benefits. Providers and office administrators and managers appear to be unaware of the quality implications of customizing templates and see templates as a tool for efficiency, rather than for quality.

> "If I had it to do all over again, I would really just start from scratch because… the templates are so easy to create" (Practice 3, Office Administrator).

Beyond customizing templates provided by the software company, with assumed standards of care, many providers describe building the templates *themselves*, either through use of evidence-based literature, use of former paper templates, or their ideas of "best practices". Exactly how the provider-built templates were developed is somewhat

unclear. The clearest description comes from the practice involved in the quality-based research study who utilized PPRNet protocols to develop templates. Three practices indicate a general attempt to use published evidence-based protocols in the initial development of their templates and indicate updating their templates as new evidence is published. But, how the information from evidence-based literature was actually used is unclear. What specific information is used or ignored and where the information came from in the first place are unclear.

Many times the providers, administrators or managers are responsible for building templates and indicated that many of the templates built in-house are built off provider preferences.

> "I know how they think. I know how we document. I know what they think is important and that's one of those we use so much" (Practice 3, Office Administrator).

It is unclear how current literature and the experience of individual providers are utilized in developing a template. Template design and is important in understanding quality of care because template use is observed and described as analytically shaping the framework for the encounter, even before a provider enters the exam room. Most times the patient problem is labeled through the template before the patient is spoken to by the provider.

Some practices rely on and trust less trained workers, their nurses and Medical Assistants, to do more in-depth tasks when using the EHR than they were given with paper. Many nurses and medical assistants are given the responsibility to choose and insert templates for the provider, before the provider has seen the patient. The nurse or

medical assistant acts as the first data entry point in a patient's chart. Therefore, many of the initial medical decisions are being formed by the opinion of the nursing and Medical Assistant staff through the choice of which template to bring up for the provider to use. It is unclear whether providers ever disagree with a template brought up by the nurse or medical assistant and change the template.

Some nurses were given permission and expected to ask more questions about the patient's chief complaint, which were then recorded in the symptom check-list in the EHR.

> "It varies from provider to provider based on what their interests are, what templates that they choose to use and what they expect of their MA" (Practice 7, physician).

Another data point is the population of information by staff recording laboratory values or by office support staff who enter scanned information or type information into the EHR. Typing errors or unclear and inconsistent labeling can put a provider in a situation in which knowable information is unutilized or utilized incorrectly.

The next data entry point is by providers. Providers typically have access to all of the templates built in a practice as well as the templates that came with the software or were purchased. However, most providers indicated that use is up to the individual providers.

> "It depends on the doctor. If a doctor has a specific kind of form that they want or a template they want, then they can enter it in and use it themselves, but there is a list of them that is available to all the doctors" (Practice 1, Office Administrator).

Some providers clearly state their own ideas of "best practices" through their experience and not through scientific literature, indicating that standards of care are mostly individualized.

> "We don't have any standardized templates or chronic disease formats in the whole office for any diseases. Each one is on an individual basis. Each practitioner is on their individual basis, and they do theirs separately" (Practice 4, physician).

When documenting in paper records providers indicate primarily documenting presence of symptoms, not absence of symptoms, but indicate and are observed documenting both presence and *absence* of symptoms. (The exception to this was a physical required by a school, where indication of health is the desired result, not definition of illness.) This change is passively encouraged by use of the EHR when using templates because columns for both presence and absence of symptoms are present next to a specific symptom. Also, normal lab values are contained in the electronic chart and are not omitted, as they were with paper charts, where only abnormal lab values indicating illness were kept. These two processes may allow for improved tracking of *health*, not only illness. This process is particularly important for patients managing chronic conditions. However, this working conception of quality does not take into consideration the maintenance of health (such as maintenance of actual health not illness, where a patient in unable indicate symptoms because they do not exist, thus they do not have a diagnosis).

The EHR is unable take into consideration missing or omitted information. It is impossible to tell how much information is missed, either through an ignorance of documented information or through not checking on an indicator. The likelihood is

possible as I did observe providers give up on finding documented information because they could not find it in the chart, thus omitting the information in their decision-making process. Information that never made it into the chart, but is known in some form, either in the patient's memory or the paper chart, is likely missed. Under the assumption that missed or omitted information could have aided in a more comprehensive decision-making process, quality could be lessened when information is inaccessible or unusable. However, if the assumption is that there was good reason for omitting information from a chart or ignoring it in the decision-making process, omissions and missed information may not actually decrease quality of care provision. The provider may have had enough information to come to the same or better conclusion without this information. These two assumptions can neither be confirmed nor denied in relation to actual quality. Further, there is a possibility that the provider may have too much information rendering that the clinical decision unmanageable when trying to take all factors into consideration. But, the assumption behind the EHR is that having access to all information and being able to weed out this information implies that providers are capable of this analytical process.

If the majority of clinical behavior using the EHR revolves around using templates as a documentation tool, not as a quality-enhancing decision-making tool, a question arises as to the need for the medical record in the first place. The probable answer is to be able to have access to as much information as possible about the patient. But, is *all* the information really necessary? What information is crucial? What information is useful/helpful? If providers leave out some information they may do it intentionally as they are filtering out information that is not seen as being useful either

immediately or in the future. The study did not examine the intention of providers' behaviors. The medical record may be seen as a behavior out of habit, tradition, or legal protection rather than as a clinical decision-making or quality-enhancing tool.

Chronic Care and Health Maintenance Management

Practices report using advanced EHR features for quality-improvement. Practices report engaging in more chronic care management efforts than preventive care improvements. Two practices had formal targets and processes for preventive and chronic care. One informally had targets, as one of the nurse practitioners was certified as a diabetes instructor (Practice 3).

Use of flowsheets. About half of the practices have providers who use coded flowsheets, which are forms indicating when health maintenance or chronic care procedures or laboratory tests were last conducted. These forms are linked with the results of these procedures or labs. When flow sheets (where health maintenance, chronic care tests, procedure dates, and values are monitored in a coded format) are used, they are typically used to indicate "overdue tests or services" at the point of care when a patient is already in for a scheduled visit rather than bringing them in specifically for health maintenance or chronic care management. Use of these higher-level features can be important for quality of care, when actually used.

The use of advanced quality-enhancing features was inconsistent across practices as is demonstrated in Table 2. Six practices indicated use of flow sheets for monitoring

PAPs and mammograms. Five practices indicated using flow sheets for monitoring immunizations, diabetes, hypertension and cholesterol. Only three used flow sheets to monitor vaccinations. Two used flow sheets to monitor asthma. This indicates that the preventive health issues being monitored most closely are women's health maintenance through PAPs, mammograms, childhood immunizations, and physicals - particularly as they relate to the monitoring by schools. The chronic care health issues being monitored by providers most systematically are diabetes, hypertension and cholesterol. Providers also indicate monitoring colon cancer, osteoporosis, Chlamydia (a sexually transmitted disease), and coumadin (which is a blood thinning medication to reduce the likelihood of blood clots and is primarily taken by patients who have had a heart attack or have a replacement tissue or mechanical prosthesis heart value).

Table 2.

Flowsheet Use Reported by EHR Champions by Practice

	1	2	3	4	5	6	7	8	9	10	11
Software	A-4	A-4	A-4	A-4	A-4	A-4	PMSI	PMSI	A-4	PMSI	PMSI
Type of Flowsheet											
Mammograms	NO	YES	YES	NO	NO	NO	YES	YES	YES	NO	YES
Paps	NO	YES	YES	NO	NO	NO	YES	YES	YES	NO	YES
Immunizations	NO	NO	YES	YES	NO	NO	YES	YES	NO	NO	YES
Diabetes	NO	YES	YES	NO	NO	NO	YES	NO	YES	YES	YES
Hypertension	NO	YES	YES	NO	NO	NO	YES	NO	YES	NO	YES
CAD/lipids	NO	YES	YES	NO	NO	NO	YES	NO	YES	NO	YES
Flu Vaccination	NO	NO	YES	NO	NO	NO	YES	NO	NO	NO	YES

*Data in this table are based on interview data

Population list generation. A more advanced use of the EHR is the use of population lists. Using the flowsheets and coded data features, there is the possibility of

developing lists of patients who need services based on the last date of the particular service. However, only three practices used the list generation feature. One practice generates an electronic list using the EHR to monitor when ordered labs had been conducted. The results are seen through presence of the lab results. If lab results are not present, the patient is sent a letter as a reminder to have the lab test taken. One practice indicates trying to run once-a-year reports on patients. For example, one office manager stated that the list generation feature is used for alerting patients that they need a flu shot or immunizations or that a prescription drug has been recalled.

> "What I will do in July is run a report and get all of our names that we've given flu vaccines to before and generate a letter and mail everybody out a letter to say, 'Come in for your flu vaccine on October 1'… We pulled the information to find out how many shots were given. We were challenging the system to make sure the information they had came through in charges and to make sure we weren't missing some pediatric patients. That was what we were looking for" (Practice 5, Office Manager).

Two practices attempted to use lists of patients beyond the point of care, but these reports were not run systematically. These searches were conducted for specific drug-recalls. During the course of observations, two prescriptions, Vioxx, and Adderall XR were reported in the news cautioning patients of their use. I observed the reactions of practices to these news releases in real time. When Adderall XR was pulled in Canada at the time of observation, the practice anticipated patient concern and immediately reacted to the situation by contacting patients to address their concerns.

> "The FDA is not pulling it here, but we're going to have a lot of our folks with our ADHD patients calling in." (Practice 7, physician).

The practice indicates preempting patient concern by informing parents of patients who take Adderall XR. They were able to generate a list of all patients having electronic charts in the practice and contact information associated with those patients. Therefore, parents were able to easily be quickly contacted.

> "That is nice to be able to go in and with some assurance that you can capture that population. This process is described as better in relation to the process they engaged in before the EHR. "I had two or three people just going through paper record after paper record for days to capture" (Practice 7, physician).

Use of Alerts and Reminders

One assumed quality benefit of EHR is through automated reminders and checking for inappropriate orders (Ash, et al., 2004). Providers do engage in use of reminders and alerts.

Providers use alerts and reminders to manage preventive and chronic care using the EHR. The reminders can either be pulled by a provider or pushed by the software. Most *alerts* come pre-set as part of the software and are viewed in as either pop-ups, flags, or color-coded messages. These warnings are typically in relation to drug-to-drug interactions, including prescription drugs, over-the-counter drugs, or as patient allergies related to prescriptions. There are different alert "flags" which indicate the seriousness of the alert.

> "You get in A4, using a yellow/red/white system. Red being pay attention and white, usually we rarely look at a white warning" (Observation, Practice 3, physician).

Reminders are designed to push users to do something. They are typically set by a provider or nurse for either a population of patients with a certain diagnosis code or an individual patient. Providers usually set pop-up messages to appear when the chart is opened either at the population or individual level or they send messages to themselves which can be set to show up in their (or their nurse's) EHR message in-box on a specified date. Typically, the purpose of these reminders is to prompt them, at a later time, to run lab tests or conduct a procedure. Both EHR softwares have the capability to set reminders for all patients in an entire practice meeting certain criteria. For example, the software *can* be programmed to send providers reminders on all their diabetic patients who have not had an HgA1C (lab test indicating insulin levels, which monitors diabetes maintenance) in the last six months. Only two practices indicate using practice-set reminders in their provision of care. More often, providers set reminders for individual patients at the point of care to remind them later about needed services or to remind them of their train of thought during the previous visit.

> "You can either set it to pop up in three months or tell somebody to do it or you can set it to pop up every time that chart is pulled to remind that patient she needs a pap in three months" (Observation, Practice 3, physician).

Also, many providers describe building many of the templates themselves.

Other providers set reminders which are viewed as pop-up messages the next time an individual patient's chart is opened. They are usually followed-up on at the next scheduled appointment by asking the patient about a condition's progress or scheduling lab work before the next appointment occurs. For example, one practice described personalized reminders set for diabetic patients. Before the patient comes in for a

scheduled appointment, the provider sets a reminder when the chart is opened for the nurses to have patients take off their shoes and socks before they do a finger stick. This set-up is a framework in which the clinical support staff examined patients as they come in for any visit and make sure things are up to date.

Some reminders providers must actively seek out or appear in the form of a passive prompt. For example, providers may review a flowsheet during an appointment to assess what needs to be followed-up on. Missing information or out-of-date information in a flowchart would be an indicator that a patient needs a follow-up on the missing data.

One of the assumed quality benefits of EHRs is the subtle reminders embedded within the organization of information. Providers may be reminded to provide a service by viewing parts of the record. For example, during a medical encounter with a patient, providers might utilize problem lists, templates, and short lists. The templates and short lists subtlety remind providers to ask the patient about the specifics of a condition listed in the problem list. Providers may view information in a flow sheet and utilize the information in clinical decision-making, even if information in the flowsheet is not being utilized at a practice-wide level. A reminder is visible through the absence of data or through a visible indicator. Practices describe the process of general documentation in the EHR as a reminder system. Reminders are in the form of using the template as a passive reminder or a red box in the health maintenance section for something that needs to be done.

When measuring intentional quality improvement efforts, two practices engaged in an active overhaul of workflow to include specific focus on quality improvement.

Practice 11 indicated that multiple members of the office staff were involved in managing health maintenance, starting with the receptionist at the time an appointment is scheduled to his review of health maintenance items flagged on the face sheet.

> ”When the secretary makes an appointment for a patient, if the patient has health maintenance items due, she gets a little red light that says there are health maintenance items due. She can check it and say, “I noticed you’re due for your pulmonary function test or Sigmoidoscopy. Do you want to schedule that now too?” So they do get that. I don’t think they use that a lot, because most of the items there are not ones that they schedule themselves” (Practice 11, physician 1).

Non-EHR Quality Efforts

Providers often describe management of chronic care and health maintenance efforts through non-EHR activities. Many times these are strategies that were employed when using paper records as management of information was difficult. One strategy is having the patient schedule another visit upon check-out.

> “[A]s they leave, we’re giving a time for a follow-up appointment and they make the appointment… If they have chosen not to make an appointment… we’ve coded in dummy appointments for them, and the staff will review those on a regular basis in advance and then contact patients for those appointments” (Practice 7, physician).

A second strategy relates to scheduling future appointments, but is distinct as well. Appointments are scheduled in advance for a medical encounter focusing on a specific issue. Usually the follow-up appointment is scheduled at the end of the current encounter upon check-out. The parameters of the next medical encounter are already defined when the visit is scheduled. Sometimes patients have to make new appointments

in a set period of time designed for check-ins which revolve around getting refills for prescriptions.

> "In a way, we kind of track them insofar as a diabetic will only get refills for three months at a time, and then they have to come. So there's a guarantee that these people will be coming back" (Practice 6, physician).

The parameters are usually indicated by the provider as the next scheduled visit is expressed as part of the treatment plan. For example, patients may be asked to come in before their next scheduled visit to have lab work done. For example, one practice scheduled diabetic patients every 3 months for blood lab tests monitoring

> "(The patient is) a set panel of labs to do before a visit" (Observation, Practice 1, physician).

Further, the parameters are formalized when the appointment is scheduled upon check-out as the time for the scheduled visit is based on the type of visit. There was little discussion of feasibility of a plan with the patient. It was assumed that the patient would engage in the treatment plan the provider developed. The only observed case was where a provider did take the patient's ability to engage in treatment was when one provider charged a patient less than the usual and customary rate indicated by the CPT coding level the work of the provider was formulated as charging. This provider made a conscious decision to charge the patient less in order to set up a situation where she could adhere to the prescribed treatment. Even though an accommodation was made to better allow a patient to adhere, the same standard treatment was presented as the treatment

option, without discussion of whether the patient could actually carry out the treatment plan developed by the provider.

A third strategy is to use a paper reminder system. One practice refers to this system as a "tickler".

> "A tickler is a paper flag on the chart for something that the patient needs to be called and reminded to come back in… We log you (the patient) for next year a month before to remind you to get in for your PSA testing… We print out a list and the month before, we sit and do all of our cards" (Practice 5, Office Manager).

One practice indicates sending letters to or calling patients "who have not been seen in awhile," although it is unclear what "awhile" means. Another practice indicates sending reminders for flu shots to all patients over 65. Before the EHR, many practices indicated having a filing system to manage reminders.

> "We had just a file box with reminder cards" (Practice 4, physician).

A fourth strategy is to automatically refer patients with a certain diagnosis to the certified specialist. In the sole practice with diabetes certification, patients with a diagnosis of diabetes seen by any provider in the practice are automatically scheduled to meet with the nurse practitioner diabetes counseling certification. This is an informal process of filtering patients into diabetes-specific treatment.

> "I guess a new patient, if they're – like a new diabetic is going to get plugged in to see (nurse practitioner)" (Practice 1, Office Administrator).

Passive Quality-Enhancement

Most of the described benefits are consequences of EHR use, not necessarily intentional changes in practice. Most described quality benefits do not require much extra work on the part of providers, once the software is installed and templates are entered. Since most practices demonstrate engaging in little advanced EHR use for quality improvement, their perceived quality improvements can be explained as being a consequence of using the EHR rather than through specific actions taken to change the style of practice to include intentional quality improvements. An example is potential quality improvement through access to electronically available information from remote places, where providers are not tied to the office using paper records to access information and make informed clinical decisions. Providers indicate their perceptions that quality has improved because they are able to access information at home, particularly while on-call, which allows them to access more information to use in clinical decision-making.

> "That's (remote access) been a major advantage… we just remote access that data and we can have an intelligent conversation with Mom (or the patient) and give her the appropriate instructions… If I'm at home and prescribe from home for a patient, I do it through our system. Open the patient's chart and literally deal with it just like I was sitting in the office" (Practice 7, physician).

One practice indicated informal oversight, but expressed it in terms of being caught when seeing another provider's patient when the typical provider was not available. Informal suggestions were made, without a formal penalty.

> "We did have an agreement that we would all practice what would be considered good sound medical practice… nowadays you don't hardly use penicillin for bladder infections. If I noticed Doctor C – maybe I'd seen three or four bladder infections where he saw them and I saw them on Saturday because they weren't getting well and he was using penicillin. Well, all of a sudden, because of that agreement, I'm going to talk to him. We're still a small enough group that it gets handled that way. I'm going to talk to him and say, 'hey, don't use penicillin for bladder infections'" (Practice 7, physician).

Even though providers are aware of capabilities to document using coded data, some providers chose not to use coded features and instead chose to free-text information into the EHR, much like they handwrote in the paper chart.

> "I've got one that likes to freehand type versus one that likes to drag and drop it, and that makes a big difference" (Practice 4, Office Manager).

This minimizes the effectiveness of the EHR for decision-support. The purpose of coding is the ability for population list generation and decision-support, therefore, providers are limiting their capability to manage population-level information in the future. Practices generally report informal agreement to document history and lifestyle information, although this information is typically not coded. Only four practices specified mandatory use of coded history data. Additionally, only two practices specified mandatory used of coded lifestyle information. One practice estimated that only 60% of data is coded.

Quality Assessment

As demonstrated, providers engage in different levels of quality improvement. This section addresses the level of quality assessment.

Formal Performance Monitoring

External performance monitoring. However, one practice indicated being monitored on 85 performance measures and receiving feedback related to those performance indicators on a quarterly basis through another study which measured performance based on EHR information. The provider in this practice indicates improved quality of care through improved documentation, management, and tracking of information through use of the EHR.

> "Beforehand, what I was counting on was just my memory and that if I saw a diabetic patient that I knew they needed hemoglobin A1c's, that they needed urine microalbumins, etc. Beforehand, I didn't have any real way of tracking it" (Practice 11, physician 2).

Two practices reported physician performance being monitored by insurance companies. In one practice, the local insurance performance agency (IPA) sent feedback information to the providers regarding quality indicators. No information was provided to delineate the quality indicator measures used for monitoring. The other practice made a general statement that the local insurance companies sometimes provided quality-related feedback to the providers. The closest activity used by multiple practices related

to provider performance monitoring is development of a list of utilization of services, which is not specifically quality-related. Usually, these activities related to billing codes, compiled from Practice Management software, rather than through the EHR. For example, one practice indicated monitoring Hb1aC, on a yearly basis, which indicates lab testing of diabetes patients.

In-house performance monitoring. None of the eleven practices studied used the EHR in-house for physician performance monitoring related to quality. This evidence raises questions as to how providers and office administrators and managers were able to assess their level of quality improvement if they are not systematically measuring and analyzing quality indicators. This result may also indicate that providers and office administrators and managers have not formulated a clear, consistent, or measurable definition of what constitutes quality provision of care.

Some practices conceptualized provider performance differently measured provider performance based on number of visits, not what was done during a visit.

> "There is an appointment review schedule that will show details on appointment levels. It's basically breaks it out by doctor and it will show the doctor's schedule, the numbers of patients, how many were actually seen. And it will also show no-shows and cancellations. It does that over a period of time, so that you can see how the doctors are performing" (Practice 1, Office Administrator).

> "Right now we just do our month end reports to tell them where they rank, what the procedures that they're doing, what their diagnoses are, how many patients they saw, that kind of thing" (Practice 5, Office Manager).

Most frequently, the encounter note is seen as the evidence for the provision of quality care. Individual patient charts continue to be the accepted documentation format.

These records are developed by individual providers in individual locations. These charts were not automatically linked with other patient information (such as information known by other providers but not reported by the patient or recorded), nor were they linked with other known family members' records. Rather, they were based solely on information provided by an individual patient (such as patient accounts of family history) or health indicators (such as lab values) of the individual patient. Electronic housing of charts is assumed to be "better" than paper housing of charts. The idea that "the note is better" indicates some form of quality related to electronic use. This general sense of quality is based on the assumption that information is correctly and accurately entered into the chart. Practices observed continue to house individual unlinked charts within the bounds of authorized practice users. A shift to being interoperable may mean a shift in where the record is actually housed might shift. There were no observed instances of security or confidentiality breaches, which may be facilitated by the current location of where the chart is housed, where the chart is maintained and housed in-house, thus less transfer of information occurs for which information may be compromised.

One illustrated problem with electronic formatting of records is that the process of putting information into a specific chart may become problematic, although not necessarily more problematic than when using paper charts. Providers indicate how easy it is to be typing in the wrong person's chart, particularly when patients have the same name or same first initial and last name. One practice took pictures of their patients and attached them to appear as a pop-up when the chart was opened to ensure that the correct patient chart was being utilized. The origin of information used in diagnosing and clinical decisions may be critical for understanding quality.

Most providers believe that they document "better" using the EHR. (See Figure 3.) This is expressed as due partially to improved legibility and also due to use of systematic documentation, such as template use. Therefore quality is conceptualized in terms of number of patients seen, diagnoses assessed, treatments provided for which there are codes associated, and the content of the encounter note. This does not indicate *actual* quality, rather quality is assessed through *proxy* indicators.

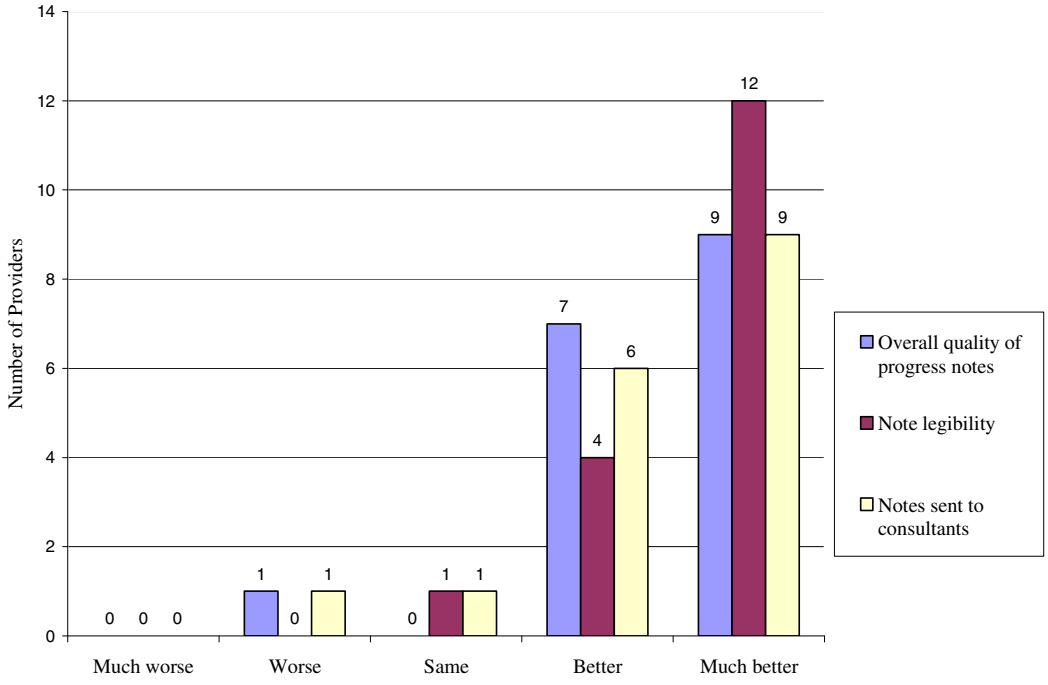

Figure 3. Providers' Self-Reported Changes in Quality of Encounter Notes When Using an EHR

Further, many of the practices were confused by the study questions regarding general quality improvement efforts and monitoring of physician performance.

The following quotes demonstrate the dialogue and confusion with three practices regarding the issue of quality improvement efforts.

Practice 2

Interviewer: After the implementation period, what performance improvement initiatives did you undertake that were aided by EHR capabilities, e.g., what were your efficiency improvement initiatives?

Physician: I mean there were personal goals of trying to have better documentation, but being a solo practitioner, it's sort of a personal thing…"

Practice 3

Interviewer: Do you have any other chronic care prevention programs other than the diabetes one? Would you consider the mammograms here to be…?

Administrator: Well, I was going to say part of – there's a – you know, October is always breast cancer awareness and we always take part in the Race for the Cure/Walk for the Cure, because there's a march next week…"

Practice 5

Interviewer: Let me ask you about your template use. Would you say that there's a specific provider who leads the chronic care quality improvement programs? Do you do anything like that?

Manager: We don't have any chronic care—what do you mean, like diabetes?

Interviewer: At the point of care, do the providers see any sort of reminders, like pop-ups or in-box message or a reminder at the bottom of the screen? Do they see anything like that?

Manager: For what purpose?

Interviewer: How about quality performance reports?

Manager: What do you mean by quality performance?

This confusion may indicate that, while there is a general sense of quality improvement, when specific physician performance improvements are asked about, providers seem timid in answering or completely confused. For many providers asking

about quality improvement efforts did not make sense, as they believed they were already providing good quality of care before the EHR. Providers sometimes found it hard to quantify when provision of care is "better". The confusion over what quality is and how to measure it may indicate a lack of provider knowledge of literature on the quality movement in medicine which may make a paper to EHR comparison difficult. Another difficulty for providers comparing quality when using paper versus the EHR, is that many providers reported the belief that they have always provided "good" care, regardless of using paper or an EHR. If they were to indicate that they are providing "better" care with the EHR, it might signal that they did not provide good before the EHR; therefore, it might be defined as substandard care, which the providers were not readily willing to admit. Thus, it does not occur to the providers to monitor their quality, as their perceived quality is high, thus it does not need monitoring.

The EHR may be constructed as a tool to help *aid* in provision of quality care, but not as the *cause* of quality care provision. The guidelines providers use to make diagnosis and treatment plan decisions may indicate quality. As is described earlier, providers mostly document using templates which are said to provide guidelines for clinical decisions. However, much of what is utilized and ignored is based on personal provider decisions, not decisions actively initiated by the provider. The support provided for diagnosing and treatment is passive and, for the most part, providers rely on their training and experience to make diagnosing and treatment plan decisions. Providers who chose a specific EHR software because it "thinks like a doctor," may not realize the benefits embedded in the EHR because the they are using the EHR in a way that mimics their pre-existing diagnosing and treatment planning processes, without much change. Providers

who struggle with the EHR logic may be hindered by the EHR because documentation disrupts their normal flow.

For some providers, using the EHR efficiently at the point of care disrupted their usual sequence of information-gathering and logic of decision-making. Many times providers expressed that the new sequence of information-gathering is directly shaped by the sequence of symptoms presented in the EHR software; and that it conflicts with prior sequence of information-gathering.

> "That makes it very disorganized. For instance, it does it in a different order than I myself would do it in normally… You're forced to ask questions in their order, not necessarily in the order that makes sense to me… I've kind-of given up on that and I just do all the history myself… I was getting so distracted and it was seeming so awkward the way that they wanted it done." (In-depth interview 3, physician)

Providers raised concerns about the affect using EHR documentation was having on the quality of patient care.

> "You're putting people in boxes that they don't fit into… A lot of times those templates guide you through questions that- that to me- narrow what you're talking about and miss things" (In-depth interview 2, nurse practitioner).

> "I frequently find that it's like diagnosing your patients before you talk to them. Because you have to find something that fits them before you actually go through the whole story and then a lot of times at the end I'm thinking, 'well this really is not what- the person comes up with this complaint, but this is really not what they're there for'" (In-depth interview 1, physician).

> "It was kind of dictating how I would do the visit. Instead of letting me do it myself" (In-depth interview 3, physician)

Additionally, the actual quality of care may be extended beyond the plan to actualization of the plan. Therefore, patient self-management, is a critical feature of

quality. Since providers are not immediately present when many patients actually engage in their treatments, patient self-management becomes a critical feature to quality. Thus, developing a system to promote engagement in the treatment plan and make sure the treatment plan is being carried out is a potential step to provide optimal quality care.

Providers refer to patient adherence as dependent on the patient. Of the providers who made comments related to patient adherence, the role of care provider was narrowly defined as diagnoser and treatment planner. In the study there was no indication that providers actively tried to ensure that their patients were adhering to treatment on an ongoing basis and that they were engaging in their treatment correctly. There were no indications of any provider or clinical support staff calling patients to see how they if they were carrying out their treatment plan.

Other Quality Factors

Time Sensitivity of Information

Timing is important in health care. If needed information is not available in a timely fashion, it could become a matter of life-or-death for a patient. Patient-provided information is time sensitive in its current process. Typically, patients are asked to reflect on or remember information that occurred at some time prior to the encounter. For example, a patient may be asked about prior health history, for which they need to know the information and be able to recall that information when asked. Another example of time sensitivity of information is in recalling symptom descriptions. Not all symptoms

are immediately present or present in accurate detail during the time frame of an encounter. Instead of being able to document as the symptom is being experienced, patients are asked to reflect on their symptoms when they come in for their encounter.

The timing of clinical information may also be critical. For example, the timeliness of internal lab turnaround is important for clinical decision-making while the patient is present for the encounter. Sometimes, when the lab is "backed-up," providers have to put together a puzzle without all the appropriate and necessary pieces, and they make a clinical decision during the scheduled appointment time, so they can move on to work on the next scheduled patient and not have to make the patient wait.

The practice of documenting closer to the time of the visit can be constructed as a quality-enhancing practice as memory becomes less of an issue. Evidence shows that people are able to recall details when recall occurs soon after the information was taken in. Also, when documenting closer to the actual encounter less information needing distinction between patients is needed. Therefore, the practice of documenting closer to the actual time of information-gathering can be seen as quality-enhancing.

Sometimes the symptoms are listed so closely together than providers indicate presence of a symptom in the wrong box. Providers were often observed doing this and then correcting their mistakes or mumbling about it under their breath. There is no way to ascertain how often providers did or did not catch such mistakes of indicating presence or absence of a symptom because of the documentation method of checking boxes, but it is a potential problem. If this information is incorrectly indicated in the chart, the decision-making based on that information may be impacted.

Most providers made individual or practice-wide decisions to finish documenting a medical encounter by the end of the day, leaving less time for memory loss. However, when seeing 30 plus patients a day, remembering each individual medical encounter is likely to be challenging. In addition, one provider documented over the weekend. Memory may be a major factor here, although the provider specifically waited to document in this manner so he could be more thorough in his documentation.

Additionally, memory itself can be problematic, as evidence shows that the longer one waits to recall details, the more inaccurate the information. Psychologist David Myers (1992) describes problems with memory and recall. First "any event requires that we *get information into our brain, retain it*, and later *get it back out*" (p. 255). "At any given moment, we can process only a very limited amount of information" (Myers, 1992, p. 256). Why does this matter for health care? Providers both indicate and were observed frequently relying on their long-term and short-term memories. Long-term memory is observed as used to remember their patients' names, as well as patients' spouses' and childrens' names. Related to patient care, providers rely on their long-term memories to know whether information needed was indicated in the paper chart, thus the chart needed to be pulled to refer to an "old X-ray" or lab result. Myers also indicates that "[o]ur short term memory typically stores but seven or so chunks of information (give or take two)… Actually, people's short-term memory spans- the quantity of information they can immediately recall correctly 50 percent of the time- vary." (1992, p. 256). This could be particularly problematic as providers continue to document at times after an actual encounter, relying on their short-term memories to continue documentation.

Where Providers Document

Additionally, the physical location in which providers enter, access, and utilize information contained in the chart has implications for quality as well. Providers document in a mixture of locations. The main location is in the exam room while the patient is present. If providers are distracted by using the EHR while with the patient, quality may be limited by use in this location. One provider was observed to be working on other care work associated with one patient while in an encounter with a different patient. It is highly likely that information relating to one patient may be unintentionally crossed and conceptually and possibly in reality be associated with the wrong patient. Although only one extreme case was observed where the provider was listening to one patient while working in another patient's chart, some providers check inbox messages and lab results of patients not being immediately seen, while they are in the medical encounter with a different patient. Providers described this practice as efficient, though if we are focusing on quality without paying attention to efficiency, the potential for mix-ups seems likely. Maybe on a smaller scale, the practice of processing and checking off lab values back-to-back in a very quick review of the specific lab data for only a few seconds without looking at the context of the data by referencing a specific chart of only a few seconds, may create possibilities for existing information not to be processed or utilized in the ultimate manner. Many times providers checked lab results and messages in their in-boxes while in an encounter with a different patient, between visits, during lunch, or while at home watching tv.

The second location that is most often is in the semi-private areas of the work station and nursing stations. Providers can more easily access hidden props, such as reference books, or engage in the expertise of another care provider. Therefore, the potential for quality can be assumed to be better in this space. There may be fewer distractions in these spaces, so problems of concentration could be minimized. However, there is typically a higher flow of people in these areas, which could impede quality reporting.

Providers rarely work in their private offices, except when they can engage in uninterrupted or scheduled work for a longer period of time, such as lunch time or after the last patient is seen. (The one exception to this is for the provider who did not have a usable workspace between the exam rooms and his office, thus utilization of his office is just as convenient as having made another workspace in the hallway.) Work occurring in this location has benefits of mostly uninterrupted time, where distractions are lessened. However, providers usually try to multitask during these times and are overseeing many different pieces and formats of information which could potentially become intertwined, thus reducing quality. Further, information documented and utilized in this location typically is also linked with when information is documented. This is further discussed later in this chapter.

Providers access information from remote locations, for example, working from home. Such a practice may assume that providers are more able to take their time, thus quality is improved, compared to office time within the structure of the typical schedule of a providers day at a quick pace, with little time to reflect, with instant on-the-spot decision-making. This time burden is potentially lessened when working from home.

Although time burden is lessened, the feature of efficiency is maintained, even when using the EHR from a remote location. Providers also report the same sense of time constraints while at home and use the EHR at home as way to be more efficient. For example, one provider indicates using the EHR while waiting for his wife or daughter to "get ready" for some other activity. Thus, use of the EHR in remote locations may be fit into the providers schedule and not actually allowing more reflective time about information being processed. Insofar as using the EHR at home is a form of multitasking, it may be much the same as in the office. For example, some report reviewing messages and labs while watching television.

No Formal Oversight

Instead of using quality-enhancing EHR features, providers continue to rely on informal methods of general oversight, where a patient's condition is monitored only during scheduled appointments. Overall there does not seem to be a *formal* standardized plan of action for managing preventive or chronic care at the *practice* level without or with the EHR. Very few practices engage in intentional chronic care and preventive care management through using advanced features in the EHR. Eight practices are not engaging in higher-level standards of care, where *practice-set* performance targets for either preventive or chronic care are implemented.

Although the EHR is heralded for improved organization of information, one provider indicates that in certain cases paper charts were more manageable than the EHR.

This statement is made by a provider who has successfully transitioned to electronic-based care management.

> "In the old days, I would flip back when I'm talking, when was their last lab done, when was their mammogram for a female, when was their pap smear, when was their last stress test? I could do all of that while I was talking. You can still do it on the computer, but it's not any better. It's probably a little bit slower on the computer than it is on paper. It's not a huge advantage on the computer that way" (Practice 4, physician).

As reported earlier, only half of the practices have providers who use coded flowsheets. Use of flowsheets allows for population-level list generation. None of the practices routinely develop lists of populations of patients needing care.

Even when templates are available across the practice, providers choose to practice in their own way. There appears to be a problem of getting providers to use the same simple features such as templates because they are stuck working in their individual paradigm which does not include practice-wide use. One practice explains the difficulty in getting providers in the same office to use the same templates.

> "The problem was more as far as treatment templates, there's just no uniformity across five different practitioners. You couldn't make a treatment template unless each one had their own" (Practice 4, physician).

Providers do not overtly question the different practice patterns of their colleagues. A physician in Practice 1 asked me how another provider was using the EHR, showing there to be some concern over features used which might translate into a questioning of practice patterns. But, from what I saw and what was said to me, critiques mostly come in hidden form, through informal suggestions of sharing newly found features, which

subtly prompts providers to utilize a tool, which then may help improve quality. But, but this is largely seen as sharing rather than critique.

As described earlier, reminders and alerts are utilized by providers, but those alerts may not being utilized as effectively as possible. Providers ignore certain alerts.

> "[W]hen I say I ignore the white one, it's usually so trivial it's really trivial" (Observation, Practice 1, physician).

Also, software-set levels of alerts are changed by some providers making the sensitivity at a lower level, thus fewer alerts are provided. Beyond ignoring or altering quality-enhancing features, some providers go as far so turning off quality-enhancing features, particularly alerts. Only one provider was observed using the audible alert feature. All other providers had either intentionally turned off this feature or were using computers that did not have auditory features.

The electronic chart is supposed to help providers access information more easily, but this is not always the case. There were many instances where providers spent many minutes scanning and opening previous notes and scanned documents to find information. The information that is coded tended to be easily access. However, information that came from an outside source, i.e. a specialist's note or an X-ray image, was particularly difficult for providers to find. One practice set up a very detailed way to categorize and name scanned documents. Other practices relied on the dates of scanned information. These methods rely on the provider to first know that the information exists in the chart to be viewed and second to find where it is located to be able to view it. This leaves much information left unused or useless, as it is not readily accessible to the

provider during decision-making. To be able to conduct advanced quality-enhancing features, providers need to document in a coded fashion. Many providers continue to free text symptoms, thus loosing the benefit of coding.

Intentions for Future Use- "We're not that far yet"

Some practices indicate knowledge of features that they have not utilized yet.

> "We are sure that the EMR can do it – can actually track and start letting us know which patients should be coming in for physicals or which of our diabetic patients need to be coming back for checks…" Practice 1, Office Administrator).

They further express expectations of future use of more advanced quality-enhancing features.

> "The system is capable of reporting it and providing documentation for it, but at this point we have not integrated that into our normal work schedule" (Practice 1, Office Administrator).

Reasons for Nonuse of Quality-Enhancing Features

Even though providers speak favorably of the EHR, and express recognition of quality benefits and knowledge of quality enhancing features, they do not always utilize those features. Providers resist overall changes, sometimes actively and sometimes passively. Some providers are conscious of their nonuse and express explanations for non-use. Sometimes providers are not conscious of their resistance to advanced EHR use

for quality. Hidden in their outward statements of desiring quality are also statements demonstrating that providers legitimate limited active engagement in quality-enhancing behaviors. Some demonstrate both unawareness of the need for complete overhauls to workflows and unwillingness to fully engage in quality-enhancement efforts. They explain their use and nonuse of quality-enhancing features in ways that seem very rational to them.

Beyond Individual Provider's Control

Technical difficulties. Most of the described problems are in reference to the system being "down" or inoperable, which becomes problematic at the point of care because of the inability to use the EHR. Down time translates into minimized access to information, standards of care through templates, and alerts and reminders. A few practices experienced consistent and costly episodes of down time, but most practices rarely had a problem. However, when episodes did occur, they typically become at least temporarily paralyzing for a practice. One provider described the impact that down time has on work.

> "When the computer system goes down, everything is at a standstill and can be very disrupting. Visits can not be scheduled, labs or consults can not be seen" (Practice 5, Office Manager).

One practice indicates that downtime is particularly crippling for nursing staff managing tasks beyond immediate patient care.

> "One of the biggest concerns we had was when we go down, it is absolute pandemonium, it is just wild… My doctors can still see with paper. But my nurses, everything stops, because they don't know if a prescription has been called in. They can't get to their messages. They don't know who's arrived, who's not arrived. The nursing staff, it really cripples them when it goes down out of all groups of people" (Practice 5, Office Manager).

No in-house IT staff. Practices struggle to deal with managing technical problems, as they indicate that they can not afford to have a staff person designated to information technology (IT), so they try to manage problems on their own. Practice members, usually the administrator or manager, or family members of practice members, take on the role of IT specialist within a practice, even though that does not match their training or expertise.

> "We are the information staff. If we don't have the skill to do it ourselves as the small managers, we call in assistance from outside… So we have about three people on the staff who are reasonably knowledgeable about it and can generally work with any of the vendors that can provide us information. Usually we can do it internally without having to have information services people" (Practice 1, Office Administrator).

Most practices subcontract IT help for more complex technology issues, which is problematic as there is a different person working on the problem, indicating inconsistency and wasteful time of subcontracted help.

> "I don't know how you find an IT group that's going to give you consistency. We've run into the same problem with two different IT groups. Again, it's turnover. Somebody comes in – an individual comes in and they know your system. They set up your system and each one of them has a little different way of handling the software and the setup and they go on to another job elsewhere and somebody else comes in and they spend 8 hours trying to figure out our

> system… It's kind of starting all over and we remake the wheel on a very frequent basis with these staff turnovers…" (Practice 7, physician).

Multiple practices also suggest that when they receive upgrades, there are consistent technical problems.

> "When we have to do any upgrades, there's usually disasters associated with any upgrade. When we just installed this new server, the last week and a half, it's just disastrous. So there's many, many hours on solving problems" (Practice 6, physician).

Another described technical problem is the hassle of changing information in a chart. For example, they indicate how easy it is to be documenting in the wrong chart, particularly for patients with similar names. When this happens, they indicate that it is very difficult to remove the information. This could have disastrous effects on quality of patient care, as they may be using incorrect information in their clinical decision.

> "[I]f you have like a glitch in the software, the glitch in a patient's chart where there's something you can't get rid of, you have to call them and they have to dial in and go into the database to fix it… On an occasion like you discontinue a drug and it doesn't – it will just sort of hang there and nothing will happen, and they have to go in the database and free up that data" (Practice 2, physician).

One practice indicates the use of an electronic faxing system which links directly with the EHR. They find the technical qualities of this system frustrating and problematic because as a fax is coming in it is either accepted or denied. As an office manager deals with incoming faxes, she has to accept or deny the fax. If accepted it automatically goes into a patient's chart. This leaves many items providers see as

extraneous attached to the chart without the option of approving or deleting it, given the current practice patterns.

> "[Y]ou have to trust one person to make the determination whether it's garbage or not garbage. We can't send it to each, like doctors, for them to review it and make that decision, because the way it comes into the system, it all goes into this module. Before it can even be sent to the individual physicians, it has to be accepted. Once it's accepted or imported, it's imported into the chart. It's more we don't know how to get past that, because we don't want all of that stuff kept… The doctors can usually take a stack of papers and take it from 40 pages down to 20 pages, because 20 of it is trash. If we let it come through electronically into the system, we're going to keep all 40 pages" (Practice 4, Office Manager).

Non-technical practical issues. Related to technical difficulties are other practical difficulties, such as problems of substitutes or other temporary staff who know how to use the EHR. Practices indicate problems with these situations because there is too long of a learning curve to be able to use general subs.

> "We've had one temp in since we've gone to EHR and it was a disaster. If you get somebody in who's only going to be there for a week, they just can't learn the system." But, this practice overcame this problem, by keeping "enough medical assistants on board to be sure that… we had enough folks here to cover for illness and vacation" (Practice 7, physician).

Practices indicate that there are times when charts are not accessible because the licensing structure sets up a situation in which only a certain number and type of office worker are allowed access at any given time. Sometimes staff forget to close out a chart and leave it open when working on other tasks, thus blocking someone else from getting into the EHR system. The physician in Practice 2 was observed forgetting to log off a chart in the exam room desktop and would go to his office to complete documentation

and would be blocked. Though many practices have added workstations, as far as access to the computer itself, there appears to be a resistance to adding more licenses. One provider describes the cost as not worth the potential benefit because

> "… is it's like another $3000 (for an additional license) and then it's an annual fee. It doesn't seem like it's worth it for that" (Practice 2, physician).

The usual work-around for this situation was to find who is using the EHR and either waiting for them to complete their task or ask them to log off so they can complete their task. This seemed to happen most frequently with nursing staff and billing staff.

A further complaint about the EHR indicating another practical barrier to quality is problems with the software itself, where use of quality-enhancing features are cumbersome and don't develop useful products.

> "It has a couple of things that are hideous and they're just worthless. We have tried occasionally to generate a report, say, of what drug gets recalled or something. It doesn't work very well. So it doesn't have a whole lot of reporting capacity" (Practice 6, physician).

Another practical barrier to immediate use of advanced quality-enhancing features is that the database needs to be populated to be able to use quality-enhancing features.

> "I think it will be more valuable after the first two years because it takes time to get patient records completely built into EMRs so that the EMR record stands alone from the paper record that we previously had, that's now a historical document. So I think that once you reach that point that there's a lot more efficiency in it. So just a matter of time passing and learning the benefits of it. Right now we're not taking advantage of reporting capabilities in EMR because the database is not in the system yet. So after two years we'll have enough data in the system and we can start using reporting better" (Practice 1, Office Administrator).

Providers also describe disjointed coordination of care. Part of this is a problem with interoperability between providers in other practice settings. Even non-EHR tasks of sending and receiving faxes to communicate information about a patient is frustratingly problematic and time consuming. Delays in communication could result in detrimental effects if the information needed was time-sensitive to a clinical decision.

A final described barrier is in the ease of use of the features. Two of the practices which monitored all quality indicators, as seen in Table_: Flow Sheets Use presented earlier, used PMSI software. Thus, ease of use may be related to quality improvement efforts, where PMSI has flowsheets that are easier to use for multiple issues at one time than those described for A-4. Although this distinction may be a possible indicator of provider behavior regarding quality improvement efforts, this is not an assertion of preference of one software over the other. The report here is only what was presented to us by the members of the observed practices. Some of these features are described as being unused because of the lack of ease of use. For example, one practice indicated, "I can't find a way to bring the lab data into the results summary sheets" as the reason for nonuse of templates. One provider indicates wanting to track PSA (prostate cancer), "but can't with A-4".

Accurate descriptions of health condition not available. An example of how providers struggle with trying to fit provider accounts into codable units.

"It's hard to know what to call some symptoms" (Observation, Practice 2).

"[Y]ou can't just put into the simple check box" (Practice 4, physician).

In these cases providers choose the "closest option" even if that option in not accurate. Therefore, the documentation method encouraged in the EHR may not accurately capture the patient's situation. The inability to manage the overall care of the patient when coded documentation utilizes boxes that are checked by the provider to indicate absence or presence of symptoms.

Provider-Perpetuated

Providers indicate they recognize because we are asking about quality that they should be doing more, but admit that they are not. Many times providers indicated that they want to in the future, but have not actively made that a priority yet as demonstrated by current behaviors. Further, when asked about quality improvements, participants were confused about what we were asking, demonstrating inattention or lack of clarity about to quality as an issue.

Ease of use problems. Providers express difficulty of using certain features in the EHR and many times give up and leave those features unused. Some of the active nonuse is due to technical difficulties. Some of the active nonuse is due to the structuring of the software, whereby use of certain advanced features requires compatibility with use in the appropriate format.

Disruption to workflow. Providers also indicate turning off alert features because they disrupted their workflow and were seen as unmanageable. A physician in Practice 1 indicated to me that he turned off the feature for high priority whereby an icon flashes on the bottom panel of the EHR screen indicating there is something of high priority (either an electronic message sent from someone within the practice, or a lab result that has been received electronically for which the values are considered out of the normal range. He further describes this deliberate action because too many lab values are alerted as out of range and needing attention, when in reality the significance of the lab result is minimal.

> "I only really have nine, but it would say I have 999" (Observation, Practice 1, physician).

Lack of reflection on current processes. Information indicated in patient records, either paper or electronic is taken-for-granted and assumed to be accurate. Information indicated in patient charts are not consistently monitored generally, which indicates that the quality of information contained in the chart is also not monitored. The quality of the information contained in the chart is not assessed in this study, however, how quality is conceptualized, outline the structures of organization and practice of care which maximize, minimize of have no affect on quality efforts, through discussion of who uses the EHR, when, and where is discussed in this chapter. These structural aspects are used as a context for understanding what actual quality-improvements are actually being engaged in and what features go unused.

Providers appear to lack reflection on the purpose and usefulness of their ways of practicing. This conceptual limitation may lead to a limited construction of the potential benefits of advanced EHR use for quality. This is demonstrated by providers indicating that they specifically chose the specific EHR software adopted because is a system that easily fits into their existing workflows. Therefore, current processes are legitimated and solidified through use of the EHR. Therefore, the idea that they should engage in an extreme overhaul is seen as unnecessary.

Construction of care provision as "good" already. Part of the lack of reflection may stem from providers' constructions that their prior methods of providing care were already high quality, thus not needing improvement. They see their standards of care as sufficient to begin with, and not as problematic. They do not believe anything needs to be changed in the first place.

> "It's hard to tell people you're doing a lousy job right now. You could do a better job" (Practice 3, physician).

Therefore, there is a lack of reflexivity regarding the actual quality or type of care they are providing.

Want to maintain autonomy and practice in their own way. They want to practice in their own way. Therefore, further barriers to quality improvement are rooted in the way providers practice with the EHR, which mimics prior patterns with paper-based care,

without much change. This is most obviously demonstrated in only two practices overhauling their way of practicing to specifically include quality improvement practices.

Practices tried to "fit" the computer into providers' previously held "way(s) of doing business". The continued autonomy of providers is expressed in an illustration of the freedom to document in their own personal style, such that documentation of the same problem within a practice is documented using individual styles.

> "He can take that (same) cold template and then he can individually kind of modify but just adding terms… 'green, ugly', where I'm going to say, 'exudates' or something…" (Practice 3, physician).

Construction of care "different" without judgment of good or bad. Autonomy continues through individualized methods of work, providers express acute awareness of different practice and documentation styles of providers in the same practice, but refrain from describing judgments of one practice style over another as better or worse. The differential practice styles described in multiple practices across providers is not spoken of as problematic or needing standardization. Rather, it is characterized as simply "different", rather than as better or worse.

For example, even when the same templates are used in a practice, they are used differently by different providers. Not only are differences recognized and described, the EHR is championed for allowing individualized practicing, thus autonomy to continue. One provider indicates even when using the same template, individual differences in documenting are based on provider preferences and styles.

> "It makes the notes, I think, more individual… you could really read the notes and tell it was two different doctors because mine's going to read one way, even though it's a templated field, and his is going to read another" (Observation, Practice 4, physician).

The provider describes his style of documenting as, "a little more clinical" and his colleague's style as "more visual".

The same provider offers a specific example demonstrating the content of differences by explaining the difference in documenting the same symptoms when doing a "throat exam".

> "He would describe a specific symptom related to a "throat exam" as 'erythematous, exudative tonsillitis' or, 'large ulcer, posterior tongue'," whereas he describes his colleague as noting the same symptom as, "'green, snotty-looking pus on tonsils' and 'big old ulcer on the back of tongue'" (Practice 7, physician).

Thus, there is an indication that providers describe individualization of care as at minimum unproblematic, but also as beneficial. This description illustrates differences in documenting practices, but there are no words of judgment, where one practice is seen as better than the other.

The format of data entry is critical for use of quality-enhancing EHR features. Data need to be in a coded format to utilize the more advanced features. Data formatted in individualized ways also limits the ability of a "new" provider in maximizing use of the EHR for decision-making. This particularly true if providers do not use coded data. Even though providers describe differences in documentation as unproblematic, the format of documented information is related to use of information, which has implications for quality. As described in Chapter 6, uncoded information is particularly

problematic because it is more likely not to be utilized in decision-making, therefore the way information is documented could indicate quality of care by proxy of quality and usability of information indicated in a prior encounter.

Construction standards of care as unnecessary at times. Providers may not really believe in the value of standards of care. One provider openly questions the validity of practicing evidence-based medicine. He sees the idea as positive, but as impractical in reality.

> "[E]vidence-based medicine, I think is a noble idea and probably the way medicine ought to be practiced, but what I've seen… until there is enough academic professional people willing to go out on a limb and state categorically and in court when you're being sued that evidence-based medicine is the way medicine should be practiced, I think right now it's forever got an Achilles heel or a noose around its neck in that it's not to talk about and sure it makes sense… (It) has a great future and will be the way to go, but even for 2004, right this minute, it's not practical because… you want to call it defensive medicine… we don't have flowcharts, we don't have all the doctors hooked up to links to stuff like that. Now to be fair, some of the doctors like with the diabetics, now we do use a lot of the guidelines and stuff that's more evidenced-based… but as far as today, if somebody comes in with a low back strain, like, 'okay, let's go find out what does the evidence say is supposed to be the best treatment for back pain'. We don't do that currently" (Practice 7, physician).

Disjunctures in expected flow do not prompt reflection on processes. Providers' belief that they are already providing high quality care without the aid of advanced EHR features is also expressed by their conceptualizations of disjunctures in their expected workflow. Disjunctures such as running behind or dealing with multiple problems at one time, are not expressed as being due to their processes, thus needing a revamping of work processed. Instead, disjunctures are expressed as being due to difficult patients.

Disjunctures in workflow which do not prompt overall work processes are indicated by providers continuing to work in the same time structure as with paper records. Providers consistently complain about the EHR taking more time to document, but do not alter their system of scheduling patients. They also express frustration when an encounter goes over the scheduled time, thus they "get behind". When this frustration is expressed, comments are typically made blaming the patient from the encounter that "ran over". Even when time pressures commonly occur, there appears to be a resistance to changing the timing of scheduling. What appears to be resistance may be an unintended consequence from the efforts to increase productivity through the number of patients seen in a day.

This is also indicated when providers show frustration with their patients who ask about multiple problems than the intended practice of dealing with one at a time when they are only scheduled in a way to deal with one problem at a time. The expressed frustration was with the patient and not with the inability to manage multiple problems because of time or payment constraints. Therefore, providers did not express a reflection on quality.

The structure of dealing with one health problem at a time is problematic for a multiple reasons. One reason is that the overall health and well being of patients are likely to be glossed over. Further, when treating individual issues one-at-a-time may minimize attention on issues relating to comorbidity, where patients manage multiple health problems on a daily basis, even when a medical encounter focuses on only one problem at a time.

Preoccupation with efficiency. Another reason observed as to why the providers may not be fully engaging in optimum quality care is that providers are preoccupied with their time, thus their efficiency. Time is a precious commodity for providers, as is indicated in Chapter 6. As providers strive for immediate efficiency, they leave out quality-enhancing features during an encounter. Some providers expressed searching for and choosing a system that would most closely mimic their pre-EHR workflow and style of practicing medicine.

For efficiency's sake providers do what is an immediate benefit, not necessarily what is a long-term or overall benefit. This mirrors the upstream/downstream paradigm of medicine. Medicine is set up to deal with acute cases and not primary care or even further up stream, what societal things lead to injuries and illnesses for which patients are being treated. This same model is true in actually carrying out care and use of technologies, such as the EHR. Immediate (acute) actions are taken to deal with the immediate. For example, many providers and nurses were observed writing handwritten notes to each other, rather than typing the note and sending the message through the EHR messaging system. This may be more efficient as far as the provider is actually seeing it and not having to know to look for it (or how to look for it), but it is right there to be used in the immediate circumstance. The downside is that note and interaction between providers is not documented within the electronic medical record. This may not actually be critical, but it has the potential to be critical both in decision-making, documentation, and practicing of defensive medicine.

Struggles with interaction lead to struggles documenting. Providers express concern about the effect of using the computer during the encounter on the quality of the provider-patient relationship. When looking at interactional studies, patients who are connected with their providers and who consider the interaction positively are demonstrated as having better outcomes including higher patient satisfaction and higher compliance with treatment (Wartman, 1983). Therefore, when providers describe use of the computer during the medical encounter as causing "distancing and alienation," there is cause for concern. One provider reported catching herself being so caught up in interacting with the computer that she missed the social indicator that her patient was crying.

> "They could have been doing that (crying) for a few seconds before I look up" (in-depth interview 2, nurse practitioner).

This example indicates the potential for information to be missed or misunderstood. I was not able to measure patient satisfaction or adherence to treatment in this study, but use of the EHR as detrimental to the provider—patient relationship is an important area for future research.

Quality is not the main priority. Quality may be expressed an important, but actions demonstrate that quality is not the priority in provider behavior. Motivation to use quality-enhancing features is based on economics.

> "I think there is revenue there…" (Practice 1, Office Administrator)

Reimbursement structure does not incent use. In addition, the current reimbursement structure is not set up to reward providers for working on quality-enhancing services. Those for which reimbursement supports, the providers tended to engage in, whereas others that were not reimbursable were typically ignored. Some providers actually articulated that there was a cost-benefit to spending a lot of time entering information and asking questions that the provider didn't feel were necessarily going to improve the quality of care and if it did improve care, that the amount was so little it wasn't worth the time expended.

> "Some of the issues we talked about just a few minutes ago in terms of quality. That we're not doing them, and I think there's a lot of capability in the program to do, to generate reminders to deal with issues and health maintenance. I think time becomes a factor in that. I think just the time - to dedicate the time to tweaking the program to get what you want out of it and that's been a major, I think, issue in terms of failure to achieve benefit" (Practice 7, physician).

Unintended Negative Quality-Related Consequences of EHR Use

EHR use Creates Distractions in Interaction

An unintended consequence of using the EHR is the strain put on the provider-patient relationship. In many cases the provider reported trouble with maintaining eye contact. Providers also have trouble maintaining physical proximity to the patient during non-physical exam portions of the medical encounter, and flow of the encounter, as the computer seemed to shape what the providers was doing and saying during both a medical encounter itself as well as between medical encounters.

The gathering of information within the context of interacting with both the patient and the computer can negatively impact quality. Inattention to the patient created by the distraction of using the computer and having a hard time interactionally managing the encounter may create a situation of not hearing what the patient is saying.

> "I'm clearly not giving the patient my full attention" (In-depth interview 1, physician).

If attention is not paid to what the patient is saying, the possibility of error in what the patient accounted or ignorance of information by not hearing it as they were concentrating on something else may occur.

> "You are sitting there trying to type or do things or then messing up…" (In-depth interview 3, physician).

Another area of concern related to provider distraction when gathering information and documenting with the patient in the room and attempting to engage in conversation with the patient, the attention may be taken away and mistakes made in the chart. There is no indication that this occurred, but it is possible.

Changes Logic of Diagnosis and Decision-Making

Providers describe the way that using the computer during an encounter shapes what they *do* during an encounter. This is in contrast to the idea that the provider (or the patient) shapes the encounter based on what is said during the encounter, leaving a more flexible agenda for managing patient concerns. For some providers the influence of the

EHR templates was implicit, as it appeared to be mentioned mainly by providers who found the EHR logic problematic, and therefore, the influence of the EHR on how providers managed the medical encounter was expressed more explicitly. For the providers who commented favorably about the logic of the EHR, the comments indicate that the ordering is seen as logical and more efficient, thus beneficial. This is expressed by a physician who stated, "It (the EHR) thinks like a doctor." However, for other providers this ordering was confusing, fragmenting, and many times ineffective. "It was kind of dictating how I would do the visit. Instead of letting me do it myself." One provider expresses the sentiment that, "A lot of times those templates guide you through questions that- that to me- narrow what you're talking about and miss things." Her statement may indicate a larger problem in relation to quality of care as symptoms may be missed in gathering information.

Narrowed patient accounting is most strongly described as being due to use of templates in the EHR, which structures the order and format of data entry. Contrary to the rhetoric that templates are beneficial to patient care because they prompt them to ask about other symptoms, this narrowing of patient account is also described as problematic because of the shift to a more limited process of accounting and documenting. Patient accounting is also consistently narrowed through a change in the logic sequence of EHR software-driven structuring of data entry, which then leads to a less conversational accounting by the patient using their own personal understanding of their health issue to a directed questing process structured by the provider. This process is important because all providers interviewed and observed indicate at least some use of templates and coded data.

Patients and providers both are forced to reorganize how they understand symptoms in order for the provider to document them in the appropriate format using the EHR software. Documenting using templates and coded fields requires providers to either work in the logic of the EHR software for data entry or to have good short term memory and recall to be able keep track of all the individual pieces of the puzzle not presented in the same format requested by the EHR software. To be clear, this process occurs primarily when using templates and other codable data entry fields, not when free text is used, since using free text, allows the patient's terminology, flow, and logic to be maintained.

Provider's work being shaped by the EHR software may be particularly stressful for providers who document in the room with the patient.

> "You are sitting there trying to type or do things or then messing up and having to take all this extra time" (In-depth interview 3, physician).

This logical process is less restrictive when documenting at a later point in time, usually not in the presence of the patient, where the provider has more time to think through all the pieces before or while documenting without the limiting impromptu organization required when documenting with the patient in the room.

It has always been up to the provider to translate the information the patient gives into a specific documentation format, whether the format was rigid and systematic or more individualized and loose. When using an EHR, providers have less freedom to format documentation using their individualized processes and methods. Instead, they must use a format the EHR software will accept. However, the patient's accounting may

not be in sync with the logic of the computer system related to history or symptoms experienced. Usually the patient will talk about symptoms that are most painful or irritating, but the computer lists the symptoms in terms of frequency with a diagnosis or some other logical scheme.

Further, the experience documented using the EHR may not accurately reflect the experience of the patient. The linear format of documentation using templates highlights simple absence or presence of symptoms, without much prompting for further description of the symptoms. Providers must actively engage more extensive features of the EHR to represent specifics of a particular symptom. This process of documentation also leaves out the context of symptoms. One provider expressed concern over loosing the overall context by, "putting people in boxes that they don't fit into" (In-depth interview 2, nurse practitioner).

Changes Sequence of Tasks

Additionally, the EHR changes the sequence of documentation and decision-making which can create a strain in decision-making. Some providers chose an EHR which closely mimics their "way of thinking," but according to other providers the EHR does not enhance their way of thinking, instead, the EHR becomes an impediment. Though the templates embedded in the software are created with the intention of being time saving (thus beneficial to the provider) providers comment on how they are forced into a new sequence of information-gathering, based on the way the data and templated forms are designed. Many times providers expressed that the new sequence of

information-gathering is directly shaped by the sequence of symptoms presented in the EHR software; and that it conflicts with prior sequence of information-gathering.

Sometimes providers attempt to continue use of their individualized sequence and move around in the EHR based on the information as is comes, but this process is not fluid. One pattern important to point out is that the described frustration with logic and sequence are most often described by providers who did not have a large say in either whether to adopt and EHR or which EHR to adopt. This may be explained because the logic embedded in a specific EHR software may not be as compatible with their usual sequence and logic of questioning before (or without) the EHR.

Frames of Encounter Before It Begins

Providers have historically used a biomedical gaze to narrow the patient's experience. In the past a provider may have informally analytically narrowed the diagnosis before entering the room based on the notes indicated by the nurse or Medical Assistant, which may have helped the provider script what questions to ask the patient in order to obtain evidence to confirm or deny the informal diagnosis. However, a formal narrowing of the patient's experience occurs through use of the EHR before the medical encounter even begins. Many times before entering the exam room templates are chosen and "pulled up" to document the medical encounter based on an initial projection for the issue intended to be managed during that specific encounter. Some practices have their nurses and Medical Assistants "pull up an appropriate template" based on the chief complaint elicited during the in-take. Other times, providers pull up the template

themselves based on the nurse or Medical Assistant provided accounting of the chief complaint before entering the exam room. This process analytically shapes the framework for the encounter even before entry into the exam room. This labeling occurs through the practice of choosing a template in which to document patient concerns before talking with the patient. One problem with the method of pulling up a template to document before talking with the patient is that the originally *stated* reason for the visit is not always the *actual* reason for the visit.

Beyond the general framing of a medical encounter through use of a template before entrance into the medical encounter, providers describe altering their behavior during medical encounters based on the logic of the software. Once the template is up, the provider works to fill in the details required by the templates and other coded fields. Many times this leads to cutting off or ignorance of the patients' logic and understanding through the process of storytelling about their symptoms.

Continued use of inaccessible biomedical language

A further illustration of providers' resistance to change was through continued use of inaccessible language. Observational data showed the frequent use of unfamiliar abbreviations, acronyms, and words being free texted into the EHR. Providers did not demonstrate reflection on this process, but instead spoke of these practices as time-saving. A few providers indicated typing more full words, where they used to use abbreviations in handwritten notes, but this was seen as "natural" as typing is so much faster and they can "do it quickly without thinking". Practicing using abbreviations,

acronyms, and medical jargon maintains the record as inaccessible to many people. The medical jargon keeps many patients, who are laypeople, unable to understand what is written in their chart, thus potentially limiting the ability of the patient to manage their own care. Use of acronyms may be a barrier for access of information to other health care professionals. Acronyms may be "local" and may not be transferable to other health care professionals, thus limiting access of information with which to make a clinical decision when records are accessible. Abbreviations are the most likely "local" culprits, where even other providers in a practice may not understand the individual provider's abbreviations. If we move into an interoperable system, these practices could be very hazardous to quality of care. If the provider accessing information does not understand what it is, they could either be, at best, unable to use the information or, at worst, think the term used means something different, thus making a clinical decision on inaccurate information which potentially could be very harmful.

Localized practice patterns

As the EHR was specific to an individual provider or set of providers, local uses of the EHR are used. Providers did not need to make their form of documenting accessible to others. For example, patients health maintenance is not systematically tracked online, rather practices use personalized methods to manage these issues. This practice leaves opportunity for issues to be missed or not followed-up on if the record is transferred to another provider.

Providers engage in other individualized practices as well. For example, they continue to utilize non-EHR resources for coding. Providers continued to use coding and reference posters and "cheat sheets" while at workstations outside of the exam room. For example, the work station of a physician at Practice 1 had and ICD-9 code list as well as a childhood immunization schedule poster. This physician describes keeping diagnosis code books available at his workstation, "just in case".

Continued reliance on memory

Much of the documentation occurred outside the exam room. Providers are documenting more in the presence of the patient or before the patient leaves so further questions can be asked, and when they are relying on their memories, they are typically documenting at times closer to the actual encounter rather than waiting until the end of the day.

> "It's not that I didn't know what the standards were before, it's just that as you move from room to room, lots of questions asked by the patient, issues to cover, you didn't have that template in front of you and you zip through that template, finishing them. That's why we like to finish them in the room with the patient there. (After leaving the room to document) You get down the template and say, 'oops, I didn't ask about such-and-such'" (Practice 7, physician).

But, although more documentation is conducted at the point of care than before the EHR, by continuing to document at other times after the encounter is over, quality may be reduced as there is more reliance on memory and no opportunity to ask the patient further details about symptoms. There is no evidence in this study that quality is

reduced or that reliance on memory is actually problematic, but, some providers indicate that the EHR prompts them to ask questions. This would make one think that if not documenting and being prompted with the EHR at the point of care, when the patient is present, that less information is available for documentation at later points in time. If less information is documented, there is the possibility of not having enough information to make decisions at a later point in time.

Some providers minimize the influence of their memories on care by documenting at the point of care while the patient is present. However, some providers indicate being distracted by the patient talking, a child playing in the room, or other environmental factors, which may lessen their effectiveness at documenting the medical encounter. In addition, some providers choose to document at another time, usually because of concerns over time, particularly staying on schedule, and because of concerns over provider-patient interaction issues. When providers document at other times, they may be more focused, but at the same time, there may be memory lapses as time passes, thus reducing the ability to accurately capture aspects of the medical encounter. One provider indicates being unable to meet this standard because of other tasks. It is assumed that these tasks are nonclinical based on the description. Providers also explained that they "have to" document later because they have too many tasks to handle, if they are to "stay on schedule." One provider in particular described how the nurse practitioner working in the practice is able to sign off on all charts before leaving for the day, whereas this provider indicates that he is responsible for more tasks than the nurse practitioner, hinting at business tasks, which prevent him from closing out all the charts at the day's end, thus he is unable to document on the same day.

> "(Nurse Practitioner) is much more efficient in that. When her day is over, it's over. I work from home a lot. That's because usually during the course of the day I'm doing the 20 other things, while (nurse practitioner) is strictly seeing patients" (Practice 6, physician).

Successes and Pitfalls

Providers who were successful in utilizing more quality-enhancing features two distinct characteristics: they had thought about how to improve quality before implementing the EHR and came up with a plan for how to do so. Another characteristic is the way information is entered into the EHR. Practices which started off using coded data did not have to "catch up" by reentering information into a different format. Particularly for pre-populated data, the ease of use of the information in decision-making is crucial. The use of coded data to create lists of populations of patients with certain health issues or treatments require the use of coded data. Additionally, the use of coded features which promote passive reminders is critical.

Many practices used the EHR in very individualized ways which raises concerns about quality. The constant building and "customizing" of templates to suit individual provider preferences may lead to less optimal care, than when using scientific standards of care.

Conclusion

It is important to remember that no system itself, including the EHR, creates quality; the user has to use the system in a way to enhance quality. There may be

inactive quality benefits from improved legibility and organization of information. However, as demonstrated by study observations of an overwhelming nonuse of features and even turn off of quality-enhancing features, the providers studied do not demonstrate active use of the EHR to improve quality. Providers indicate barriers in use of the technology because of technical and practical problems. There is also a demonstrated resistance to change. Further, providers openly engage in a cost-benefit analysis which limits use of certain features because they are deemed "not worth it". Use of the EHR also creates unintended negative quality-related consequences. Some providers find the EHR distracting, which may limit use of advanced features of the EHR. Some providers have trouble maintaining eye contact and conversation with the patient, which may have an impact on patient satisfaction. Additionally, for some providers, the use of the EHR narrows the patient experience too much in a biomedical framework and creates a sequence and logic difficult for providers to manage. Therefore, the EHR may be working against the expertise of the provider, potentially creating a disjuncture in decision-making.

CHAPTER 9

ADVANCED EHR USE FOR PROFIT

As already reported in the Miller, et al. (2005) article, the majority of the practices studied earned substantial profits from EHR use. These increases were found to be due to a combination of revenue gains and cost reductions. This chapter assesses the ways adopting an EHR affected the profit of practices.

Providers and other staff use the EHR to manage business aspects of the practice. Most practices indicated adopting for business purposes, mostly related to financial gain. Providers' opinions reflect the ideology of most major players at the national level that EHRs will reduce costs. In addition to reduction in costs, practices went into adoption believing that the EHR would increase revenues while also reducing cost. Some features in the EHR move beyond patient care and can be linked directly with billing. Utilization of these features requires a more advanced use of the EHR, beyond basic use for organization and documentation. The major specific reasons for adoption based on perceived benefits relate to economic, efficiency, quality improvements, cost reductions and legal protection. Some practices indicated a general sense of revenue generation based on improvement.

> "We were looking at our overhead, trying to find ways to be more efficient" (Practice 4, physician)… My expectation was to cut down staff, to cut down expenses on dictation, and to improve billing. All of those have been met" (Practice 4, physician).

There did not seem to be a questioning of whether practicing medicine in a way that they are able to see more patients is a beneficial practice in terms of quality of care, but did speak of it in terms of a revenue booster. Practices clearly indicated financial gain through the EHR as *a* major and sometimes *the* major reason for adoption.

> "[W]e rated cutting costs as number one. We felt like it's very important to be able to cut costs, to be able to put more money in the doctors' pockets…. If we had to try to say cost is the most important versus patient satisfaction and quality, I think we would have to say that cost was probably primary in our minds" (Practice 1, Office Administrator).

Revenue Gains

Practices increase revenue using the EHR by using it in ways that through alter provision of services, improve efficiency, and improve billing practices.

Higher Productivity

Overall, providers saw more patients and provided more services to those patients seen. At the one year mark after EHR adoption, all but two practices report seeing more patients after EHR adoption as seen in Table 3 and Figure 3.

Table 3.

Measured Change in Number of Medical Encounters per Year

Practice #	**1**	**2**	**3**	**4**	**6**	**7**	**8**	**9**	**10**	**11**
# Providers	4	1.5	6	6	1.8	4	2	5	1	2
Visits pre-Ehr	20,090	3039	21,596	40,800	5033	22,593	6145	32,000	5000	4,845
Visits after 12 month	18,418	3716	23,427	36,000*	5191	23,777	6594	32,400	6000	4,078
Change in visits	-1,672	677	-100	None	158	1,184	449	400	1000	400

*One provider left this practice, after implementation, therefore the overall practice productivity numbers remained stable

Data presented in this table are based on productivity records

Some of the reasons provided for efficiency benefits, which are revenue enhancing are: seeing more patients, time not "lost" while looking for misplaced charts, improving efficiency as time passes, elimination of dictation. As more patients are seen, more claims can go out, thus more revenue is brought in.

Other providers saw fewer patients, but maintain or increase revenue.

> "He spends more time with each patient making sure they are up to date, (he) increases coding, but doesn't see an increase in the amount of patients seen because this takes so much time" (Practice 5, Office Manager).

There are different rationales provided when providers do see fewer patients. An office administrator indicated some providers saw fewer patients because of environmental and social factors not related to the EHR.

> "The patient volume has not picked up with EMR. There are probably outside factors that have caused that. One is the road construction. Two is the economy and the general area here. Three is it's a seasonal kind of thing. Right now we're in a slow season, very typical around here. They will see fewer patients in the summertime…They can generally see 30-31 patients a day if the patients are on our appointment list. We are typically seeing that (there is) a little bit of room left on the appointment list at the end of the day. So they have a little bit more room

> for growth. If patients want to come in, we have the ability to accept them in. It's a mixed bag with the doctors too. Some of the doctors see more patients than others. I see that's a popularity standpoint. Some physicians are just more liked than other. So we see differences. The level each doctor has attained. For example, Doctor X appears to be a lot more popular with patients and sees more patients. So, it's also maybe a social thing as well because some of the doctors like to spend more time with their patients and just generally don't see as many because they are spending more time and that probably is reflected in their level of visit coding" (Practice 1, Office Administrator).

Increase in Provision of Services

Another way revenue is enhanced is through changes in the services provided. Services have been added or increased, particularly labs.

> "They (MAs) also have picked up labs. We do have an outside vendor here on Mondays and Tuesday, but my gals are able to keep up with drawing their own patients as well, whereas before we couldn't do that" (Practice 5, Office Manger).

Another specific example of increased provision of services through use of the EHR is five practices report using the EHR reminder features which prompted them to provide specific services at the point of care, thus more services were evidenced to be provided to patients.

Changes in Documentation

Sometimes revenue enhancements stemmed from differential documentation, not actual changes in provision of services. Nine of eleven practices report an increase in the

capture of services. This capture of services indicates an increase in the *documentation* of services provided, not the increase in *actual* services provided. Practices report changes in the way they bill for their services, which increase revenues. On a basic business level, practices report revenue increases because billing based on EHR information improves the billing claims process. Providers indicate capturing more billable services through EHR documentation. Additionally, practices report billing at higher code levels, which bill at increased revenue rates.

Changes in Billing Process

Other revenue enhancements came from changes in the billing process itself, not in provision of care. Ten of the eleven practices report the billing claims process as at least the same, if not better, than pre-EHR billing. Some reasons for improved billing are: 1) billing codes are available faster and in a more precise format, 2) claims are sent out quicker, 3) claims are sent out in an electronic format, reducing postal transition time, and 4) claims typically have fewer mistakes, thus are denied less often. Additively this means that turnaround time for payment decreases. As payment time improves, usable money can earn interest for a longer period of time.

Faster claims submissions. Six practices report faster claim submissions. One reason is because the codes transfer from the EHR based on provider documentation into the Practice Management system in real time, so there is not a delay in documenting in order to bill.

> "If anything, it has really helped because everything is already coded in terms of CPT codes and ICD-9 codes and it's not like she (the billing specialist) has to look up codes for things. The codes get transmitted over" (Practice 2, physician).

Another office manager describes the claims processing improvements.

But, one provider describes an opposing viewpoint, where she captured less services with the EHR and found the paper "Superbills" better.

> "I would say there's more of a chance we could not capture the services, because before when I had a paper fee ticket, it was so easy just to circle all the things I did. Now in the visit I have to consciously bring everything down. So probably less efficient" (Practice 6, physician).

Faster claims processing. Practices indicate processing the claim faster because the claims contain fewer mistakes.

> "I would say the claims are cleaner through the EMR. There is no doubt about that" (Practice 5, Office Manager).

Once the claim is processed by the billing specialist, the claim is submitted usually that day or the following day. Not only is bill processing time quicker, but since they are submitted electronically, they are received quicker as well. One office manager describes this process in the following quote.

> "We are finding that we able to get the claims out more quickly and the accuracy is better." "[I]t's pretty fast because of the way the billing goes and it goes to the EMR and the billing person is able to put all those bills in the same day and send

> it to Medicare pretty quickly. So, yeah, it's all done electronically. It's pretty quick" (Practice 1, Office Administrator).

Five practices report faster claims processing. The only practice that indicated slower claims submissions and processing indicated the slower processes was only for the first ten months of EHR use. Additionally, this practice was the only true solo provider and he had no business help in the practice to buffer some of these affects. He was left to both provide services and manage the business aspects of the EHR alone.

Faster reimbursement. Another reason provided for the quicker turnaround leading to enhanced revenues is an overall reduction in denied claims when using the EHR to process billing codes. Practices describe electronic claims as "clearer", "much clearer and simpler", "better availability of documentation". These improvements lead to less denied claims where the billing specialist anticipated denied claims and fixed them before were set out.

> "[O]ur person can go in this morning and check and say, 'Oh, okay. Well, it's going to deny these 5. Let me fix them now so that we don't have to wait on Blue Cross to send us an email saying we denied these five.' So that has really been a huge" (Practice 3, physician).

Less time for accounts receivable can be seen as the result of faster claim submission and faster claims processing. Seven practices reported a decrease in accounts receivable time, where reimbursement for services is described as faster. One practice was able to quantify that before using the EHR, they had 17% consistently "out" in accounts receivable. After EHR implementation, the percentage of "out" claims reduced

to 13%. In addition to improved claims filing, there is more reimbursement. This is further described by one practice seeing claim turn around time improving by 17 days. A third practice indicated prior to the EHR their accounts receivable (AR) turnaround time was around 70 days, which has reduced to 34 days since implementing the EHR. Two other practices also describe significant improvements in accounts receivable time as demonstrated in the following two quotes.

> "If you look at a snapshot of the AR over time, it will show that since 2002 the accounts receivables that's aged has gone down over time and the total AR's gone down, which means more payments are coming in within the first 30 days. So we feel like it has definitely improved the cash flow. We are seeing much better payment schedules with electronic filing" (Practice 1, Office Administrator).

Therefore, the practice receives their money faster and they have a better cash flow.

> "What we're seeing is a change in accounts receivables. I think we were working claims with about a 62-day turnaround average A/R. So $1 in A/R we're spending about 62 there. Now with the EMR system, it's dropped down to about 45 days times, which means we're filing the claims and working any rejections off of them, and we're fixing the system a lot quicker than we were before" (Practice 7, physician).

This also translates into revenue benefits because practices can earn interest for more days than before the EHR.

Higher Billing Codes (Upcoding)

Beyond the business end of claims, practices report billing at higher levels. The revenue enhancement from this change alone is significant. Ten of the practices described

increases in coding. Coding increases were measured and the revenue generated as indicated in Table 4 and Figure 4, is estimated at to be between a minimum of $13,000 in the true solo practice and up to $320,000 for a five provider practice. Six providers in two practices saw benefits over $60,000 from coding alone. Providers saw an individual benefit from $3,040 at the low end up to $66,667. One practice was able to quantify that their coding levels increased in10-12% of their encounters. Another practice quantified their estimate of increased visits as their expectation that "80 patients a month (are estimated) to be coded higher".

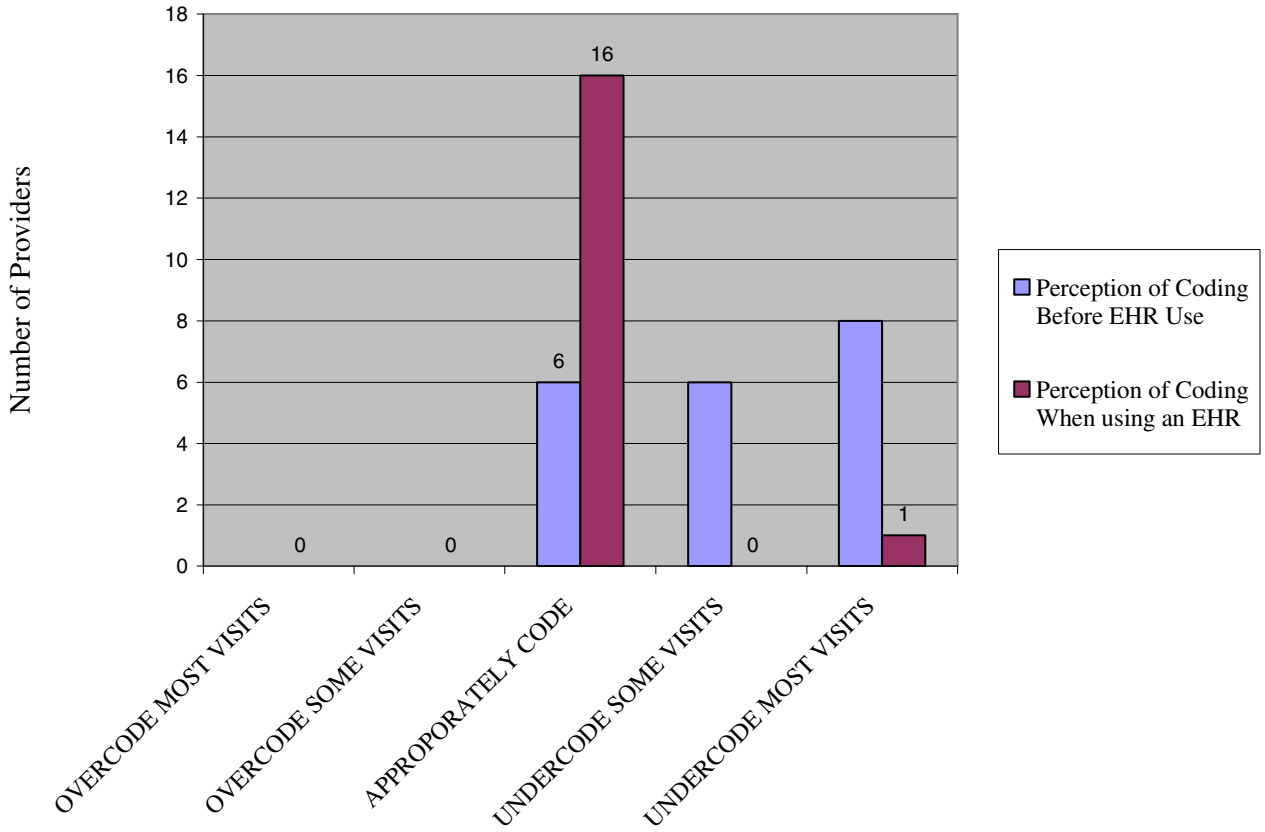

Figure 4. Physician Perception of Coding Based on EHR Use

Table 4.

Measured Increases in Coding Levels by Practice

	1	2	3	4	5	6	9	10	11
# Providers	4	1.5	6	6	2	1.8	5	1	2
#Increased coding									
Practice level	$1,51,142	$62,566	$161,191	$18,240	$91,000	$1,5000	$160,000	$13,000	$13,200
Provider level	$37,786	$41,711	$26,865	$3,040	$34,137	$8,333	$32,000	$13,000	$6,600

Figure 2. *Physician Reports of Changes in Coding When Using an EHR*

This increase can be explained by observation of three factors: 1) actual provision of more services (as prompted through EHR reminders), 2) increase in the capture of services provided through better documentation of the provided services, 3) and more comfort with EHR-generated coding level. (See quality improvement efforts for further explanation of reminder process as it relates to provision of care.)

Provision of more billable services. Some of the increased billing is attributed to provision of more services. The EHR generates a billing coding level primarily based on the information entered into the software. I am unclear as to how the program takes time into account, but according to one provider both services provided and time are factored into software-generated billing codes. Providers use the term "bumping it up" to indicate an increase in billing level.

> "The computer does it for you, though. If you're in there for 30 minutes, it's calculating that. If you're touching so many buttons, it's telling you it's automatically creating your charge for you, versus the doctors just using common sense thinking, "This is pretty routine. I'll just do a 99212 at $60," when actually

> the computer will bump it up to a 99214 because they did some more hands on. I can't give you a number, because I don't know. But I can definitely tell you I've seen our charges increase" (Practice 5, Office Manager).

Sometimes providers express that the EHR software generates a higher billing code than they would have previously charged using a paper Superbill, therefore they bill at a higher level than before the EHR. They openly express that they are "able to", "feel more comfortable", and "feel more justified" billing at higher levels, even when provision of care is seen as unchanged. This is particularly explained because they undercoded when documenting with paper.

> "(Nurse practitioner) and (physician) were low coders very routinely, because they almost become friends with their patients. They always feel like they have to down code. This takes it completely away from you, so we've definitely seen an increase in revenue, especially with our nurse practitioner" (Practice 5, Office Manager).

The software-generated code takes some of the emotional burden off providers where they feel a conflict between what they charge patients and the care they provide to their patients.

Bill at a more appropriate level. Some practices explain that they no longer undercode, but code at the correct level with the EHR. They indicate that they are better able to capture services provided using the EHR, which allows providers to bill at a higher level, as more services are documented as being provided. Nine practices report an increase in the capture of services.

> "We have seen a marked change in the mix of the office visit codes. I think the system provides confirmation and ease of tracking the level of the office visits so the doctors are more confident in their level of billing. So we're seeing a marked increase in the level for billing. The CPT code 99214 as opposed to what we were seeing before, 99213" (Practice 5, Office Administrator).

Some of the higher coding is described as eliminating missed billable services.

> "I know that because of the documentation and you have to notate if it's a billable, we catch it. I can tell you when I was doing just charge sheets from January to May, they would forget to do an MMR and that kind of stuff, whereas the system doesn't allow you to do that. If it's a billable, it's in the system" (Practice 5, Office Manager).

Use of E&M Calculator. Above and beyond computer-generated revenue enhancement, providers using A-4 software actively take advantage of a feature called the E&M Calculator, which allows them to view and change software generated billing code level. Providers describe and were observed tinkering with the E&M Calculator codes in two ways. One is through overt overriding of the software generated level. In the other, providers have learned the sensitivity of the software, whereby billing codes can be "bumped up". In this practice providers view the software generated code and then go back into the documentation portion of the software. They document more extensively. Typically, from what I observed, the providers indicate monitoring more symptoms and indicate this by checking more boxes in symptom lists. The E&M Calculator is viewed again. If the software generated billing level has increased to the satisfactory level, the provider ends the medical encounter. Many times these actions are conducted without further eliciting information from the patient, regarding the new

symptoms monitored. I am unclear if these symptoms were monitored during earlier stages in the medical encounter and not noted or if they were not monitored at all.

It appears that the E&M Calculator is used specifically to increase insurance reimbursements, as insurance companies can be seen as an outside entity separate from the patient. Only one provider was observed "downcoding". However, this provider was observed downcoding only once and it was described as being for the patient's benefit, as this was a patient without insurance. As the payment did not come from an insurance company, but from the individual patient, the billing level was seen to directly impact the out-of-pocket expenses for the patient. Therefore, if an individual patient is seen as taking the financial burden of care and has made a choice between payment and treatment, at least one provider is observed as taking some of the economic burden influencing treatment and adherence choice out of the picture for the patient, by overriding the expected payment level.

It is important to note that the provider with the highest measured coding change told us in a follow-up phone conversation that he was being audited by Medicare. Although this provider was not followed-up personally, one of the other research assistants reported this provider's audit to the team. The research assistant reported that this physician attributed the audit to his increased coding levels. Early in the study this provider specifically spoke about his upcoding behavior without prompting. He recognized his upcoding pattern.

> "I think I'm upcoding. I guess it's called upcoding. My coding is – I think I'm billing more level 5 and level 4 visits because of the EMR… You don't feel like you're cheating someone by billing them out when you sort of having something that tells you it's okay… I think you're missing less that you do because there's

> – it's been sent to the biller exactly what you did. So I think you realize more what you did and you're not missing any of those, although I think I was pretty good at doing that on paper beforehand, but… I know in (previous state practiced in) for level 5 office visits, some insurance companies require you to send a request randomly. Copies of your office notes and then were denying claims, but here it doesn't happen." (Practice 2, physician).

These quotes illustrate that he recognized that he was upcoding, felt confident and secure in his higher coding, and believed that his coding was not under surveillance. Providers express their idea that the EHR justifies the coding levels. However, they may be engaging in a false pretense. The routine practice of higher coding may make them susceptible for future audits, particularly if billing levels are so drastically different from prior billing patterns, that insurance companies see this as a red flag. One provider informed us that he was being audited at the close of the study and we were not able to follow up on the reasons for the audit or the result of the audit. However, the provider who was audited saw significant financial gains from using the EHR.

Cost Reductions

Practices saw revenue enhancements through cost reductions as well. We measured practice level cost reductions in all but two practices. Table 5 demonstrates the measured cost reductions at both the practice and provider levels. Cost reductions seen to be as little as $1,500 and as much as $127,280 at the practice level. Dividing by the number of providers, the cost savings per provider in a practice is between $1,000 and $42,500 per provider. Cost reductions stemmed from various sources. Cost reductions were identified from staff reduction costs, transcription costs, and paper costs.

Table 5:

Measured Cost Savings When Using an EHR

	1	2	3	4	5	6	7	8	9
# Providers	4	1.5	6	6	2	1.8	4	2	5
Total Savings									
Practice level	73,500	1,500	127,280	98,000	39,000	1,800	48,000	85,000	47,000
Provider level	18,375	1,000	21,213	16,333	19,500	1,000	12,000	42,500	9,400
FTE Pay+Benefits									
FTE Reductions	1	0	2	1	0.5	0	2	2	1
Practice level	30,000		50,000	32,000	14,000		48,000	60,000	18,000
Provider level	7,500	0	8,333	5,333	7,000	0	12,000	30,000	3,600
Transcription savings									
Practice level	34,000		71280	60000	23000	0	0	24,000	0
Provider level	8,500		11,880	10,000	11,500	0	0	12,000	0
Paper Supplies									
Practice level	9,500	1500	6000	6000	2000	1800	0	1000	5,000
Provider level	2,375	1,000	1,000	1,000	1,000	1,000	0	500	1,000

*Data presented in this table are based on financial records

Reductions in Staff

The practices described wanting to reduce staff once the EHR was adopted, though for all but one practice, these aims were not realized.

> "We had hoped that part of a position would be saved in data entry because the EMR would flow directly over to practice management and it would be checked and processed on that particular record. We thought we would save that because it would be automated but we find that in fact we still have to have the common sense of the trained CPT ICD-9 specialist looking at it to make sure that the doctors and nurses have in fact provided the correct information. And basically they are running a smart check on it. So we have not saved any there either…. we'll probably be able to reduce another half FTE but probably no more than that" (Practice 1, Office Administrator).

One practice additionally foresees minimal reductions in the future as the EHR process improves and the practice becomes more efficient, thus not needing as much office staff time.

> "I think in time, somewhere we'll save another half-time FTE person, whether it be her or he'll pick some other half-time position in the office. But somewhere along the way, we're going to get another half-time FTE out. If we can make this hospital interface work, a year from now we'll have a reduction of another additional half-time on top of the one I'm just talking about" (Practice 7, physician).

However, it appears that these practices did not openly lay-off or fire staff. The exception is transcriptionists, which are not construed by the practices as staff, but rather are seen as contractors. This practice identifies transcriptionist's work as separate from the practice. Though practices seem unwilling to let-go of or fire current staff, staff reductions did occur when staff left on their own accord. When these staff left, they were not replaced, as is described in the statements of four practices below.

> "We knew that when we made the move from paper records to electronic records that there would be a lot of concern. We actually had one employee retire because they did not want to deal with it. Of course that employee was 67 years old and didn't really want to deal with computers, so she decided to retire rather than stay with the system" (Practice 1, Office Administrator).

> "That was both, we didn't let them go. That was through attrition. The record room girl was part-time. She knew that's where we were headed, and she was only looking for a couple of hours a week. Our transcriptionists also came in knowing that we were going to EMR" (Practice 5, Office Manager).

> "It's probably one of the biggest things right off and then like one of my full-time equivalents – just totally blind luck on our part, but it really saved what could have been a personnel problem. We got to noticing – within about 2 to 3 months

> (we had 2 ½ full-time people working in Medical Records – well, all of a sudden they were almost kind of standing around because we weren't and one of them who had been through a nasty divorce – well, she remarried and her new husband was in Houston, so she left and saved us from having to let – her position was, she had the last seniority. She was going to be the first one to go anyway. And anyway that just – I mean we never told her but she couldn't have gotten married at a better time. It just really worked out well for us on that end" (Practice 3, physician).
>
> "The front office basically stayed the same. Actually medical records and front office were all intermingled at that time and the one person who had retired just wasn't replaced and she had been doing a lot of the assistance with medical records" (Practice 7, physician).

Seven of the eleven practices realized staff reductions of internal support staff or transcriptionists. The practices that were observed stopped using transcription services when they implemented the EHR. Several practices reduced staff. One practice reduced staff by one-half full-time equivalent (FTE). Three practices were able to reduce two FTEs. The savings from these staff reductions were between $14,000 and $60,000 at the practice level, which equates to a minimum of $3,600 to a maximum of $30,000 at the provider level. Only one practice (Practice 9) saw staff overtime reductions, which reduced staffing costs by $24,000 in the five person practice. Transcription savings at the practice level were a minimum of $23,000 and up to $71,280. At the provider level this translates into savings between $8,500 and $12,000 per provider.

Instead of reducing staff, practices typically reorganized the tasks of current staff. Most practices indicated a switch from medical records specialist duties of tracking down and filing paper charts to scanning paper information into the EHR. "The medical records person that moved to scanning and now is half-time EMR work or medical records work as a scanner, and then the other half-time she is supporting the financial

side." One practice also indicated a switch from manually processing billing codes for claims has switched to mainly dealing with denied claims.

> "It's kind of on that same line that the Business Office started realizing they had – the charges were coming across so much quicker, easier. They weren't chasing down Superbills. We didn't have anybody – we saved one step. The person who ordinarily would have gotten the Superbill, would have had to manually – you know we had - like most clinics have a very robust Superbill that had all the ICD9 – well, actually not so much ICD9 codes, but the diagnosis we still had to list, but it did have all the (information from) the office visit on the sheet but somebody still had to manually enter that. So now that step was gone and – one thing that has helped our Medicare with reimbursement is we were able to free up one office person to do nothing but work on Medicare denials" (Practice 3, physician).

However, one practice actually laid off employees. This practice "got rid of" two FTEs who were considered medical records specialists. The President of the practice referred to this change in staff as getting rid of employees. The office manager referred to the reduction in staff as "[t]hey were let go by the practice". She further qualified that the practice really did not see a reduction in staff and actually were planning on hiring another staff person to help with scanning activities and use part-time help for tasks.

> "But let's make it clear, though, that we have not been able to cut any staff out yet. We're actually getting ready to bring on a full-time person that's totally designated to be the scanning person, because even with that one full-time person in medical records, she cannot keep up with all the scanning in the facility that needs to be done. I wouldn't say it's fair to say we've cut any staff yet. I don't think that's a fair statement… I still have some part-timers that come in. So I would probably tally up their hours. Probably the amount of hours they work will equal out to a full-time person. I've got high school kids that come in every time they get time off. They'll be here in the summer. Then I'll have one full-time designated, hopefully, all day every day" (Practice 4, Office Manager).

Based on my observations, I qualify this practice as different from the other practices observed in terms of the practice culture. The other practices acted like a team, where there was cooperation and continual sharing and helping of each other. This practice was organized both by the physical layout of the practice into wings, separating the providers; organizational structure or having a formal hierarchy; and socially, where providers rarely interacted with each other, unless they were on the same "wing", and when they spoke to me of their colleagues, spoke using critical language and tone. My characterization of this practice is that the providers shared office space and office staff, but really practiced as individual providers rather than as a "practice".

Paper Savings

Additional practice cost reductions were seen in paper savings. Eight of the eleven practices saw paper reduction cost savings between $1,000 and $9,500 at the practice levels, which is between $500 and 2,375 at the provider level. Paper savings stems mostly from reductions in the cost of medical records. Other workflow changes reduced the use of paper, such as through the use of electronic transmission of prescriptions directly from the EHR to pharmacies.

Although paper was reduced through the use of the EHR and cost savings are realized by paper reductions, evidence shows that a lot of paper is still used in practices, as described earlier.

> "The paper volume has not changed, because every other avenue out there still sends us paper, except for the two lab companies. But all the pharmacies that still

> fax their requests, all the hospitals that send all of the reports, all the other physicians' offices that are in this area. So nothing has changed" (Practice 4, Office Manager).

Successes and Pitfalls

Patterns appear to exist among the practices in this study in relation to successes and pitfalls. One characteristic is the dynamics of the work environment. Practices in which the providers and staff were friends and worked in a sharing-type environment saw great financial benefits. For example, practices ho engaged in sharing behavior were more likely to pass tips on to their colleagues, for which the benefits were multiplied across providers. Additionally, when providers struggled with EHR difficulties, they appear more apt to ask for help, rather than try to go it alone and figure it out themselves.

A second characteristic is use of the EHR while in the encounter with the patient. More patients can be seen in a day with less work later in the day.

A third characteristic is the use of the E&M calculator. Providers were able to monitor their billing level and either adjust it or change the documentation in the computer.

A fourth characteristic is coding at a higher level. Providers who documented using coded features recognized in the EHR billing calculation saw higher profits.

A fifth characteristic is technical difficulties. Practices which had significant technical difficulties had to pay for consultants to fix the problem as well as had to absorb "downtime" inefficiencies. Practices which had consistent technical help saw cost

savings. Some practices saw large turnover in their technical help. In these cases, time and money were wasted as practices had to get the new person up to speed before picking up where the last person had left off.

A sixth characteristic is the elimination of paper medical records. Practices who continued using paper records in conjunction with the EHR saw less cost reduction. This may be due to duplicate activities, thus decreased efficiency, a well as the resources necessary to maintain both sets of records.

Conclusion

Most practices saw significant financial gains from using the EHR. Some of the gains required no additional work on the part of the providers and others required advanced EHR use to see benefits. Revenue enhancements not requiring additional provider work include: 1) better billing process, 2) better capture of services for provided care, 3) increased internal labs, and 4) cost reductions. Revenue enhancements requiring advanced EHR use include 1) using coded documentation methods to utilize increased billing codes, 2) providing more services to patients as health maintenance and chronic care are managed better in the EHR, and 3) knowledge of software sensitivity to be able to "bump up" codes to receive a higher reimbursement rate. They also see the EHR as a business-level protection in defense of potential law suits.

CHAPTER 10

SUMMARY AND DISCUSSION

Statement of the Problem

This dissertation provided an ethnography of electronic health record (EHR) use in solo and small group primary care practices in the United States. The aim of this study was to better understand the impact EHR use has on the structures, institutions, and practice of primary care as it relates to cost, quality of care, workflow, time, and provider-patient interactions using a grounded approach from both theoretical and practical standpoints.

To address concerns related to classical medical sociological theory related to the impact of EHRs on medicine as a profession, the following questions were posed:

1) Are providers able to maintain professional (physician) dominance or autonomy or are these features of professionalism challenged by use of an EHR?

To address concerns related to classical sociological theory on provider-patient interactions and practical issues of medical encounter management, the following questions were posed:

2) How does use of an EHR structure the medical encounter?
    a) Does the medical encounter become impersonal when the EHR is used?
    b) Do patients come to the medical encounter having researched medical knowledge actively on their own, without waiting for the provider to supply them with it?
        i) If so, what information do they bring?
        ii) From what resources?
        iii) How is it managed by the providers?
        iv) How does it change the dynamics of the power in the relationship?
    c) Are there observable issues related to language or cultural translations with EHR use?

To address practical questions focusing on the specific issues of quality and cost, and providers concern over efficiency were:

3) How is the EHR used by providers?
    a) How do providers manage and use the information stored in the EHR?
    b) What information is ignored?
    c) Who has access to the electronic medical record?
        i) Of those that have access, for what parts of the EHR do they have access?
            (1) What type of access do they have (just viewing or can they add information or change information)?
    d) Is the EHR used to improve quality?
        i) If so, how? / If not, why not?
            (1) What information is utilized in decision-making?
            (2) Are standards of care in the EHR used?
                (a) Is the use of standards of care in the EHR problematic or beneficial?
        ii) Is the EHR used as a proxy for monitoring quality?
            (1) If so, how? /If not, why not?
        iii) Do providers override system standards of care. If so, when?
    e) Does EHR use affect the cost of health care?
        i) If so, how? If not, why not?
        ii) Is the EHR used to justify reimbursement?
        iii) Do providers use the EHR to maximize profits
        iv) Do the motivations to adopt stem from a business perspective?
    f) Is the EHR used to improve workflow?
        i) If so, how?
            (1) Do providers change their workflow patterns when using an EHR?
            (2) How is the EHR used by providers to complete work tasks?
            (3) How does the EHR impact provider time?
            (4) Are providers using the EHR specifically for efficiency?

Review of the Method

I conducted case studies of eleven early-adopter solo and small group primary care practices using EHRs which focused on EHR use, productivity and economics. The case studies are comprised of ethnographic observations of billing providers, structured interviews with billing providers and office administrators/managers, surveys of billing providers, and review of practice financial and productivity records. I also conducted

five supplemental in-depth interviews of primary care providers using an EHR in various practice settings specifically focusing on the impact of the EHR on provider-patient interaction.

Summary of the Results

I analyzed the data for both macro-, meso- and micro-level phenomena which are presented below.

MACRO-LEVEL FINDINGS

1. The biomedical paradigm is reproduced and formalized
2. Provider power and autonomy are reproduced and formalized
3. The reimbursement structure is exploited

MESO-LEVEL FINDINGS

1. Providers' work remains relatively unchanged in type and content
2. *How* the EHR is used is more important than *that* it is used
3. All members of a practice are affected by use of the EHR
4. The EHR is used primarily for profit
5. The EHR is secondarily used for efficiency
6. Quality-oriented features are often unused

MICRO-LEVEL FINDINGS

1. Using the computer during an encounter strains interaction with patients
2. Management of information is the basic use of the EHR
3. Workflow patterns change
4. There are increased stages of the medical encounter

Discussion of the Results

The Biomedical Paradigm is Reproduced and Formalized

Medical providers have historically used specific medical terminologies that represent the biomedical paradigm. The biomedical paradigm is based on treating one specific problem of a specific part of the body using a discrete medically oriented treatment, such as prescriptions, surgery, or therapy. Due to this analytical way of understanding and treating health and illness phenomena in this perspective, a naming structure was developed by the medical community, specifically set up to label discrete symptoms, diagnoses and treatments. These medical terms were then turned into codes (ICD-9 and CPT) in order to bill for services based on a rubric of expertise and time suggested as necessary to diagnoses and treat specific symptoms.

The biomedical paradigm goes mostly unquestioned by providers in this study. They express their view that the EHR is beneficial in helping them practice because, "It thinks like a doctor," which in the context of their statements translates into easily working within the biomedical paradigm. Statements such as these indicate that not only is the biomedical perspective accepted as the appropriate format for managing and understanding health information, but that they expect the EHR to easily allow them to work in that format. Many providers express their intentional actions in choosing specific software that worked with their personal logic and prior decision-making processes. (These provider comments came from male physicians. This gender difference will be explored more later.) The unquestioned paradigm can also be

insinuated through silences. Providers did not want to disrupt their prior practices and decision-making processes; rather, they wanted software that worked in a way that complimented their existing behaviors. There is little evidence of reflection providers' own current practices stemming from the biomedical paradigm. The deviations indicating disruptions in the current biomedical paradigm were exposed as problematic when patients provided information for which there was not clear medical terminology, thus not neatly fitting into the biomedical paradigm. Otherwise, the biomedical paradigm was utilized unquestioningly.

The EHR software utilizes the preexisting customary biomedical model medical terminology, without a disruption or challenge. The two EHR software observed in this study are set up in a format that creates incentives for mass use of coded information in the form of recognition of medical terminology and use of coding structures which utilize these terms. This is accomplished by the EHR recognizing these codes and formal medical terms in the documentation process, which is then linked with the billing function of the EHR.

Providers are incented to use this format for multiple reasons. Using the biomedical paradigm is an efficient and effective process when using the two EHR softwares in this study. One reason is that it facilitates efficiency in documenting the visit. This efficiency allows the provider to view information in a quick recognizable more systematic format. A second reason is that the language utilized is common and understandable across providers. The EHR is observed to be used most often for finding and recording diagnosis and treatment codes. This use may indicate the rationalization of care, in which diagnosis and treatment decisions, as well as reimbursement for care are

legitimated. Further, the biomedical format is recognizable in potential legal inquiry. As "appropriate" treatment protocols entered in conjunction with diagnoses, providers are able to demonstrate appropriate medical treatment when documented in a way compatible with general current treatment protocols utilizing the same language. A third reason is that the format allows providers to link documentation with automated billing using the EHR software. Insurance companies pay based on adherence to and use of the biomedical coding structure. A fourth reason is that this format allows for use of advanced use for quality-enhancement. For example, use of coded terms allows for searches of all patients in a practice with a certain pharmaceutical treatment regimen in case of a recall. (A later section describes the financial gains seen by using this format.)

The EHR does allow space for additional information or a section on "in the patient's words," but I did not observe reviewing this detailed (free-texted) information from previous encounters. Very few providers free texted additional information on specific patient symptoms or the patient's experience generally. When they did, their colleague providers commented that it was a waste of time or quirk of the individual provider. Free texted information is not in a readily available format unless the provider takes multiple additional steps to enter or access this detail. When reviewing past history information, providers in this study mostly reviewed more generalized information of reviewing the current diagnoses lists (which is a list complied from pulling diagnosis codes from multiple previous notes) and medications lists (which is a list compiled from pulling treatment codes from multiple previous notes). These two historical pieces of information were readily available as soon as a chart was opened as the first screen, "Face Sheet", showed a panel of different information.

However, EHR use may not be effective for overall treatment of patients, even though this process may be more efficient and effective for the goals of the practice in terms of documentation and billing. The critiques of the biomedical paradigm presented in medical sociology literature are not altered with use of the EHR. This process requires use of medical terminology for diagnoses and treatments rather than patient's descriptions in laymen's terms. The embedded nature of this information in the design of the EHR software as well as its uncontested use by providers both act to instantiate the importance and use of the Biomedical Model.

Another feature observed which exposes the continued dominance of the biomedical paradigm is the framing of the medical encounter as early as the appointment scheduling process. The support staff describe what specific discrete health issue will be considered by indicating a "chief complaint" and scheduling the appointment time slot based on the time estimates that providers consider an appropriate length of time to deal with that specific issue. Therefore, the specific symptom or body part intended as the focus of the medical encounter is preset before a patient even enters the office. There is a space in the EHR for the nurse to indicate the reason for the provider visit in the patient's language (called "in the patient's words"), however, this section is primarily only utilized by the nurse or the medical assistant and is translated for the providers into medical jargon in a systematic way. During the initial clinical evaluation before the encounter with the provider, the nurses and medical assistants typically indicate "in the patient's words" either free text typing the patient's response to the question, "Why are you here today?". This information is typically translated by the clinical support staff into a separate space where the "chief complaint" is indicated. This space in the EHR utilized

documenting a brief synthesis of the patient's complaint into medical jargon. The next step is by utilizing the template feature. In some cases the template is chosen and "brought up" for the provider. The choice in template is based on discrete diagnoses and symptoms. These templates are already codified in medical language and the absence or presence of symptoms is indicated, thus narrowing the gaze of the provider into the patient as a part of a body, instead of a whole.

It is clear that patients have been socialized in this format and when they deviate they receive both nonverbal and verbal cues indicating that dealing with additional issues or multiple issues is unacceptable. In these cases they are typically cut off and told that they can schedule another appointment to deal with the additional issue. Some providers made side comments about wishing they could spend more time with the patient, but do not indicate clear behavioral changes to make this happen as a habit or structured practice. Not only do providers appear to be resistant to workflow changes which would restructure the time spent and the gaze of the medical encounter, they express frustration with patients who challenge their narrowing practices by asking questions about other issues.

Maintaining the biomedical paradigm does not lie solely on providers. The State plays a crucial role in perpetuating the biomedical paradigm by granting physicians the authority to practice medicine and by formalizing medical jargon through reimbursement structures, which makes it more possible for providers to engage in this paradigm. For example, the reimbursement coding structures used for Medicare have been adopted by other payers, thus the expectation is the use of these terms and codes, which are highly

biomedical. This format continues and is made easier through EHR use by easy searchability and utilization of codes representing biomedical phenomena.

Provider Power and Autonomy

Study observations indicate that providers are able to preserve their power and professional autonomy while using the EHR, and in some cases, they are able to enhance and formalize their status through EHR use.

Professional power. Providers are able to continue their professional power. They continue professional tasks as engaged in when using paper records, such as:

- Maintenance of higher ranking status through ownership and oversight of lower ranking workers
- Training of new professionals coming into the field
- Maintenance of their personal certification status
- Maintenance of the monopoly over services.
- Maintenance of the dominant biomedical paradigm

Power through ownership. The physicians in this study all had a vested interest in the success of EHR use as all were co-owners of their practices. The physicians had added tasks of overseeing the work of lower ranking workers. But, in actuality, the oversight was mostly a formality of signing off on nurse practitioner and physician assistant charts rather than actual oversight where the overseeing physician actually engages in the

medical encounter with a patient and lower ranking staff. As described later, as owners, thus business leaders, the physicians make decisions over the type and content of work the office support and clinical support staff engage in.

Power through training function. A few practices engaged in training of medical students, but this was mostly absent in this study sample of practices. When medical students were present this was due to the affiliations the practice had with local hospitals and whether the local hospitals had a link with medical training programs. Of those practices that had medical students, I observed the medical students conducting much of the basic bureaucratic tasks.

Power through use of Biomedical Paradigm. One way the EHR software companies help maintain the power of providers at the structural macro-level is through use of medical knowledge, specifically medical jargon and codes. As described earlier, the EHR is set up in a format that accepts medical terminology for diagnoses and treatments. This terminology is recognized in the form of either searching formal diagnosis and treatment names, made up by the medical community, or by using ICD-9 and CPT codes, which are decided upon at the national level by physicians. These codes are systematically embedded into EHR software. Thus, this forces providers to continue practicing using the biomedical paradigm through the utilization of medical jargon as the basis of their documentation. Patients do not typically have access to this medical knowledge, nor do they have access to utilizing the EHR. This practice then perpetuates the medical model

and power of medicine as the ideal, most powerful health care profession as outsiders typically do not have access to or understand this terminology.

In many cases, to be considered active participants in the maintenance of their own health information, patients need to understand the terminology in order to have access to what their providers were doing, unless the provider chooses to decide the information for the patient into laymen's terms. More and more patients are taking it upon themselves to actively learn the medical language. But, even with patients' attempts to learn this terminology, much of the language providers' use in diagnosis, documentation, and billing remain unclear to patients. This is coupled with inaccessibility to entering and viewing (thus maintaining) information in their own chart.

Beyond the autonomy over work, the professional status of providers is increased when using EHRs in ways that are likely to improve status and wealth. This dissertation shows that using an EHR is profitable. Most practices saw significant savings and profit. The billing structure which keeps physicians at the top of the pay structure among all health care workers is maintained, perpetuated, and exploited through EHR use. Providers across the board were able to code at increased billing levels. (The reasons are presented later in the discussion on EHR use for profit.) The profit was seen even more drastically for physicians, who are legally and historically capable of billing at higher levels due to assumed use of higher-level medical knowledge and training, whereby physicians are able to bill at higher coding levels than nurse practitioners and physician assistants. These codes are associated with higher reimbursement rates. Therefore, physicians more than other providers profit the most from demonstrated EHR use.

Power over support staff. Providers also structurally maintain their power and autonomy based on how many and which types of licenses to purchase or lease the EHR technology. It appears that these organizational structural decisions were rooted in business decisions related to cost and not intentionally related to power and autonomy. However, the consequence of such decisions is maintenance of power and autonomy. Many practices opted for less software licenses. In these cases, providers always have a license designated for them alone, but support staff had to share licenses where only one support staff person can be logged on and using the license at a time. This organizational decision leads to support staff needing to coordinate the sharing of licenses. The providers did not immediately feel the impact of this decision since they had their own licenses and did not have to share or coordinate use. The decision to limit licenses leads to the implicit expression of power and autonomy, in which providers are the top of the hierarchy in the practice, with the most freedom and power, which is mimicked by the access to and use of software licenses.

In addition to the number of licenses, the type of license is also important. The level of access is dependent on the type of license. Software companies are responsible for allowing certain levels of access based on the type of user, which allows providers to maintain the highest level of access to the EHR. The EHR software companies have developed a tiered system of access related to viewing and input of information which is associated with the type of license. The hierarchy of access is commensurate with the level of legal medical expertise. In addition, the cost of a license is dependent on the type of license. Not only is there a structural level of power stemming from the software company in the form of tiered access to patient charts, but also business decision of cost,

because licenses with more access cost more money, thus encouraging practices to opt for cheaper licenses, thus limiting access to certain people and certain parts of the chart. As access is tied to the type of provider, physicians have the most power to access and enter information into the chart because of the licensing structure.

The traditional hierarchy remains in tact and is perpetuated. Unrelated to the EHR, providers are able to independently bill for their work, whereas other support staff, such as nurses and medical assistants cannot. However, some nurse services are billable, but only under the supervision and name of a physician. Therefore, the emphasis of the medical encounter is mostly based on the work of the billing provider. This leads to a strict division of labor that was seen in all practices and is based on the level of billability which is regulated by the legal structure of the State in place for providing services and billing for those services. The EHR formalizes this hierarchy based on who has access to bill for services, under what name, and how much they can bill. Providers continue their monopoly over the provision of services and billing for those services based on the division of labor mirrored in the EHR.

Autonomy over Work

One indication of the maintenance of power and autonomy is that providers' work remains relatively unchanged in type and content. (The type of activities will be described further in a later section.) Providers using EHRs continue to engage in patient care, business, and professional activities which mostly mirror those activities they engaged in when using paper records. Providers also maintain their power through individual actions beyond the scope of practice-level decisions such as those mentioned

above. Providers use the EHR to maintain their power and autonomy based on the way they structure the completion of these work tasks and carry out each actual task. The differences in how time is utilized varies by provider, which indicates their autonomy in deciding how, when and where to accomplish their tasks.

Power exerted by when to use the EHR. Another indication of the maintenance of power and autonomy is through providers' use of time. Providers decide when to see a patient and for how long. The medical encounter begins when the provider enters the exam room, which is scheduled based on a general provider-agreed upon rubric for appointment scheduling. The providers could opt to change the time of each medical encounter, but almost all opted for and worked toward maintenance of the same appointment schedule used prior to EHR adoption. In some cases, they strive to see more patients in a work day.

Power exerted by where the EHR is used. Beyond the use of time in scheduling appointments as described above, providers also use place to manage the medical encounter. Most choose to review some parts of the chart before entering the exam room. When the provider enters and leaves the exam room is at the discretion of the provider, not the patient. Many providers left the patient in the exam room while leaving the exam room to complete other tasks during the scheduled medical encounter. Some providers truncate the medical encounter to engage in documenting activities, while other providers utilized time when in the exam room with the patient to document. These behaviors

demonstrate the power providers exert over patients as a consistent unquestioningly unproblematic practice.

Power exerted by how the EHR is used. As mentioned earlier, due to the EHR and other licensing practices, providers enjoy the highest level of access to patient charts. Providers actively perpetuate their power through their protected access to patient charts. Even though HIPPA rules indicate that the record kept by the provider is technically owned by the patient, patients never had access to enter information into their own chart. This task was completed by nurses, medical assistants, and providers. Occasionally, patients were able to view the screen, and what was included in their chart and what was entered. There are restrictions and limitations on computer screen viewing by the patient. First, the provider had to allow the patient to view the screen. This was accomplished in two main ways. The first is based on where the computer was set up in the room and where the patient was allowed to sit based on the furniture configuration already in place before the medical encounter started. Sometimes if the screen was angled toward the patient, the patient could view the screen throughout portions of the exam. The second way is when providers actively and intentionally turned the computer screen in a way so that the patient could view the screen. This action appears to be patient- and diagnosis-specific. For example, child growth charts were shown to the parents of young patients; in some cases graphs of blood levels or cholesterol levels over time were also shown to patients. In these cases, the computer screen was only visible for the specific purpose of showing a specific screen. When the achieved viewing was complete, providers typically repositioned the computer which viewing access by the patient was again blocked.

One way providers are able to maintain their autonomy is by selecting the features they want to use in the EHR. The way providers conduct their tasks mirror paper-based methods of documentation with little overall change to workflow or work processes. (There were two exceptions in which the practices consciously and effectively over-hauled their practice routines.) This was observed by providers ignoring or not utilizing decision-support features in the EHR. This is of particular importance because the EHR was not observed to be actively used for clinical decision-making. Some providers commented on the benefit of being able to "customize" their notes in the EHR, which indicates their preference for and utilization of their own knowledge over standards of care embedded in the EHR. What they include in the note is at the discretion of the providers. When the EHR creates dissonance with their own way of practicing medicine, they assert their own autonomy and override the EHR decisions, coding, documentation style, coding, and billing.

Providers also perpetuate their power and "expert" status by using the computer in ways which leads the patient to accept their opinion. This can be referred to the "it's in the computer" effect in which the provider asserts the assumption that what they say should be accepted as true and accurate by the patient by virtue of being able to be demonstrated using the computer. They used both the actual EHR and other internet sources of information with the computer in the exam room in order to indicate to patients that their ideas are correct, and thus implicitly should not be challenged. When patients would bring in information, providers would sometimes briefly show the patient the computer screen to indicate that the provider's proposed view is correct which implicitly argues the provider's unstated position, "the computer says it's right, so it must

be right" and thus, "if you don't believe me, you should at least believe the computer". This behavior assumes that patients know what to look at on the screen, are able to read what is on the screen, and are able to interpret the format for which the information is presented. (It took providers specific training to understand where information is located in the chart and on each screen. Without an explanation to the patient it is reasonably difficult for patients to understand what is on the screen even when they are allowed access to view it.)

Providers assume their authoritative status by how they position themselves in the exam room. Providers' physical proximity to the patient is dictated by the provider, not the patient. Patients did not move their physical position in the room unless instructed to do so by the provider. However, the providers moved freely within the exam room based on what position suited their needs in accomplishing the immediate task they are engaging in. Provider's power may be exerted in ways providers believe are individual preferences in practice style, but those ways are systematic across providers in this study.

The position of providers as autonomous and powerful is perpetuated by the State, which not only allows, but continues to protect and perpetuate physician autonomy and power. This is carried out through unquestioned laws relating to who can practice what type of healthcare, who is able to own practices, who is able to document information into the health chart, as well as who is able to bill for services. Although the potential exists for new professions, such as nurse practitioners and physician assistants, to gain more authority, power, and autonomy through use of an EHR, this was not observed and did not appear to be a consideration for either physicians or nurse practitioners and physician assistants. I expected the potential for nurse practitioners to take on an

expanded role and use the EHR as a legitimizing resource in the allowance of expanded practices. But, what I found was that clear distinctions between physicians and nurse practitioners or physician assistants continue to exist, in which physicians remain at the top of the hierarchy and have final sign-off privileges built into the software, and where the nurse practitioner processes and signs off the chart, which then has a second physician sign off. Sometimes this sign-off was based on the legal standing of nurse practitioners and physician assistants in the particular state and other times it appears to be a customary sign-off that is unchallenged by either party. The EHR formalizes this practice by requiring a second sign-off by a physician as indicated by the physician's sign off password before the chart is officially signed off. In many cases the providers did not conduct true oversight of nurse practitioner or physician assistant work, rather it was a symbolic practice. Nurses and medical assistants were described as having more responsibility in charting behavior, but this was still limited, and did not appear to be a threat to provider power and autonomy, and rather, was seen as an aid in efficiency.

The practice of entrepreneurial medicine is also perpetuated through use of EHRs generally. The State and state affiliated agencies provide grants and subsidies for EHR use. Currently most grants and agencies are given with little or no emphasis on cost containment as a goal embedded in these grants and subsidies. In actuality, how EHRs are implemented and used are at the discretion of the individual practices and providers.

The push for EHRs by the State allows, protects, and perpetuates the medical-industrial complex. The most immediate and direct link between the State and EHRs is the creation of the Office for the National Coordinator for Health Information Technology (ONCHIT). This office was created as an initiative to increase health

information technology adoption across the U.S. Rather than using the formal legislative process, President Bush used his executive privilege to form this office.

Although the office was created without legislation, Congress enacted multiple laws authorizing money for research, education, and training, with a current focus on the advancement of the adoption of health information technologies, such as EHRs. Currently government, its agencies and affiliated organizations, such as NIH and AHRQ are developing initiatives and conducting research related to health information technology.

Providers in this study evidence the acceptance of entrepreneurial medicine and the medical-industrial complex. These structures favor market approaches to adoption over legislation. Therefore, the perpetuation of the ideology of entrepreneurial medicine is the main approach to health information technology policies. For example, the Centers for Medicare and Medicaid (CMS) is developing initiatives to incent providers to adopt through higher reimbursement rates intended to spur EHR adoption rather than mandating EHR use. This approach to adoption proposes to expend more money for EHR adoption which appears to conflict with other CMS goals of decreased health care system costs through EHR use.

Exploitation of the Current Reimbursement System

The exploitation of the current reimbursement system occurs in that many times no additional services were rendered, but more money was charged. Though the EHR process is designed to benefit the practices and providers with increased profits, observed

EHR use for profit is not cost-effective for the system. This occurs through a process in which providers "bump up" their codes on a consistent basis with patient after patient, an average of $35 increase due to the increased coding level, which turns into significant additive profits.

The way these providers use their EHRs to carry out their patient-care tasks is highly related to the business aspects of providers' work. The EHR software allows for increased billing in multiple ways. The EHR increases the billability of provider claims by utilizing this payment structure to their advantage by allowing more savvy use of the EHR to produce the most financially advantageous documentation and use of ICD-9 and CPT codes..

One EHR software had a capability, called the E&M Calculator, which developed a calculation of the "appropriate" billing code based on the type of diagnosis, number of diagnoses, and treatments provided. There was an indication by one provider that the amount of time the EHR was active while with a patient during an appointment was also factored in, but this information is unconfirmed and the impact of this information on the code is unclear. This capability allowed providers to check the software-generated code before closing out a chart to see if they accepted or denied the code. Providers indicated that they were billing at higher levels instantly without significantly changing what they were doing with patients. I suggest that there are three ways in which this exploitation occurs.

I observed providers tinker with the code-generation feature to increase their billing level. Many providers review the calculation and go back into the medical record checking additional boxes (coded fields linked with billing structure in some way) and

then reviewing the software-generated code again. Sometimes this process was repeated multiple times until the desired software-generated coding level was achieved. My critique of this method is that many times it appeared that this activity was engaged in without providing additional services to the patient. Two examples indicating this assumption are, 1) when the provider checks more boxes while the patient is still present, but without asking any additional questions of the patient to illicit more information before checking more boxes; and 2) when providers engage in this activity following the patient visit while closing out a chart at a later time. Patients were not available to ask additional questions about symptoms, yet, additional symptoms were marked as inquired about.

Third, the data for this dissertation show that providers analytically decide how much they should be reimbursed for specific appointments. When the coding level the provider assumes is appropriate is achieved, their documentation and billing processes end. When providers achieve a lower level than expected, they either outright override the system to match their desired code or they manipulate the EHR to create a software-generated code to match their desired code. The providers learn the sensitivity of the software and which additional boxes they need to check in order to achieve the desired outcome of a higher billing code. When the system codes higher than they anticipate, they utilize the higher code, rationalizing that the code must not only be correct, but more accurate, because it is software generated. Therefore, the software-generated codes are accepted as accurate *only* when the software generates a desired or higher code, but they utilize strategies to manipulate the software or outright override the EHR when the level is not high enough to match their anticipated billing level.

Providers claim that this is not exploitation, but rather that they were "undercoding", thus undercharging when using paper records and paper billing forms. They assert that they are coding at more appropriate levels with the EHR and are getting paid what they have deserved all along. They argue that the EHR allows them to capture and give them credit for more services rendered, which were absent in prior billing methods. An example is that providers report being able to quickly review more diagnoses with the patient as a check-up with less time and effort while using the EHR, thus they were able to account for checking-in on prior diagnoses, which registers in the rubric as attending to more health issues, thus is reimbursable at a higher rate.

Providers' Work Remains Relatively Unchanged in Type and Content

Much of the providers' work remains relatively unchanged in type and content. Providers using EHRs continue to engage in patient care, business, and professional activities which mostly mirror those activities they engaged in when using paper records.

Continued patient care activities

- Viewing known patient information (including notations in the patient's record, lab and procedure reports, and consultant notes)
- Inquiring about current health status indicators (ask questions)
- Conducting the physical exam
- Ordering procedures and tests
- Making a clinical decision
- Documenting current health status indicators and treatment plans
- Prescribing treatments (including prescriptions and procedures)
- Interacting with the patient and/or caregiver(s)
- Coordinating the activities of others (internal nursing, medical assistant, and lab staff, external laboratories, external specialists, hospitals, nursing homes, family members and caretakers, and reimbursers (insurance companies)

Continued business activities

- Managing the overall operation of the practice
- Documenting current health status indicators and treatment plans by using CPT and ICD-9 codes
- Coordinating the patient care and billing activities of others (internal nursing, medical assistant, and lab staff, external laboratories, external specialists, hospitals, nursing homes, family members and caretakers, reimbursers (insurance companies)
- Formally indicating what should be billed for services provided (which for the most part are then actually billed by office support staff, not the actual provider).
- Protection from law suits through documentation

Continued professional activities:

- Maintain status
- Train new professional
- Maintain personal certification
- Maintain monopoly over services

Although most of what providers do is the same as when using paper records, the way they carry out their routines has been altered somewhat with the EHR.

New provider activities involving the computer:

- Point-and-click using a mouse or touch-screen pointer/typing to document the visit instead of handwriting or dictating
- Increased use of templates (though most are then customized)
- Some use of health maintenance/chronic care tracking
- Increased knowledge and use of billing codes by providers themselves
- Electronic billing (sometimes in addition to us of paper billing form/sometimes in place of paper billing forms)
- More documentation during a visit while with patient and just after the medical encounter rather than at the end of the day
- More documentation of between-visit communication (phone calls, email) rather than lost or untracked phone messages

The biggest change for providers in carrying out their tasks is where and when they document. Providers reported documenting by dictation at the end of the day with use of brief notes taken during the medical encounter when using paper records.

Providers are the focus of this study, but the work of their clinical and office support staff is critical in the efficiency and effectiveness of the providers. Support staff activities have also remained mostly the same.

Continued office support staff activities:

- Scheduling of appointments (including assessing appropriate length of appointment time)
- Processing patient phone messages (per provider preference, sometimes nurses are responsible for this activity)
- Processing patient charts (pulling and filing)
- Checking out patients
- Processing billing claims for provider activities

New office support activities:

- Point-and-click using mouse/typing
- Scanning incoming documents into the EHR (such as consultant reports, student physical forms, workmen's compensation forms, etc.)
- Reduction in paper chart filing
- More shredding
- Maintaining the network and server (usually done by administrator/manager)
- Updating software (usually done by administrator/manger as needed, sometimes provider does this)
- Running reports on specific patient populations (i.e. diabetics, patients on certain medications)

Clinical support staff engages in mainly the same activities as well; however, some providers have allowed their nurses and MAs to engage in more advanced clinical work.

Continued clinical support activities:

- Rooming the patient
- Patient in-take (vitals, patient chief complaint)
- Drawing blood for lab tests
- Conducting EKGs
- Obtaining brief patient history (in some cases per provider's preference)
- Updating patient medication and allergy lists (in some cases per provider's preference)
- Putting together prescription sample bags (in most cases per provider's preference)
- Management of patient phone calls (sometimes done by office support staff)

Just as for the providers, office and clinical support staff engage in new ways of conducting their tasks when using the computer. For the office staff, the changes are less

related to the actual EHR and more with the computerized practice management (PM) system, which is linked up with the EHR. The following briefly describe the new processes in which office support staff engages.

New clinical support activities:

- Point-and-click using mouse or pointer on touch screen/typing
- Processing prescription renewals (entered into the EHR for provider sign-off)
- Bring up templates for provider to use during a medical encounter (in some cases per provider preference)
- Filling in health maintenance and chronic care information into flowsheets (in some cases)
- Scanning/shredding of paper (sometimes done by office support staff)

The major difference in the overall work of providers and staff is the shift from handwriting to mostly point-and-click and free text typing. Some handwriting still occurs and some handwriting still occurs when using sticky notes instead of the internal EHR messaging system.

How the EHR is Used is More Important than That it is Used

This dissertation clearly demonstrates that how the EHR is used is more significant than that an EHR is used. The way the EHR is used varies greatly from provider to provider. Most providers recognize and report differences between themselves and their colleagues in the same practice as different; however, these differences are not viewed as problematic. Overall, most providers use the EHR in much the same way that they used paper records, without overhauling workflow processes to accomplish quality benefits. Most providers describe and are observed using the EHR for cost and efficiency.

Use by All Practice Members is Important for Benefits

In one practice, a single provider refused to use the EHR after implementation. This practice, therefore, had to maintain two sets of records, one paper-based and one electronic. There were significant inefficiencies and frustrations observed and reported in this situation.

The Basic Uses of the EHR is for Managing Information

All providers in this study (except the one provider who after adopting refused to use the EHR and went back to paper records) use the EHR for managing information, including viewing, documenting, and billing activities. Providers and office administrators and managers descriptions of the purpose for having a health record appears to be based on the management of information, which appears to be unchanged. The record is seen to be an aid for potential future clinical decision-making, to legitimize billing, and to protect providers against potential lawsuits. There is little overt reflection on why providers engage in these activities or why a record is even needed at all.

Providers document the same information they documented in a paper chart, although they overwhelmingly describe the EHR as being in a more organized accessible format, making the EHR efficient for viewing information. The information documented includes medication lists, allergy lists, symptoms, diagnoses, lab test results, procedure results, and consultant notes. Some providers also maintained health maintenance lists (such as dates of immunizations, PAP smears, mammograms, etc.), and communication

notes between office visits. Most practices had incorporated tracking of these items in the EHR. How this information was utilized was highly variable across practices and providers within practices. One described benefit of the EHR is that in-between visit communications were more formally documented, whereas before messages were either thrown out and not documented or were taped in an inefficient manner in the paper chart. Another described benefit of basic EHR use is access to a quick face sheet including the patient's current active diagnoses and medication list, containing a quick overview without having to access prior encounter notes to find the information embedded in the note.

There are two major differences in using the EHR compared to using the paper record. One is the use of templates to indicate symptoms. Second, providers are more responsible for knowing and using CPT and ICD-9 diagnosis and billing codes.

By using templates embedded in the EHR, not only are the presence of symptoms indicated as was the standard format of notation described in the paper record, but also the absence of symptoms indicated. This is evidenced in the providers reflections on their prior non-documentation of the absence of symptoms. This indicates a shift in documentation from only the presence of symptoms to include the absence of symptoms as just as important. Additionally, documentation of absence of symptoms indicates that these symptoms were checked which could potentially increase their billing code and act as a protection for following protocols in the case of malpractice suits. As described earlier in the biomedical paradigm section, the use of templates in the absence/presence of symptoms format may be problematic in narrowing the provider's perspective about a

patient in which the patient is seen as a body part needing to be fixed rather than as a whole being of interrelated parts and as a person to interact with.

Providers have become more active in using CPT and ICD-9 codes. Before the EHR providers used Superbills which they circled a diagnosis name which had a corresponding code next to the name. When using the EHR, providers more readily know the code, as they are able to look up the code easily and efficiently using the search feature of the EHR.

When looking proportionally at the time spent on documentation, it is clear that documentation is the primary activity of providers. Documentation is a taken-for-granted activity that does not appear to be questioned by providers. Providers describe documentation for later use in decision-making, to back up billing, and for protection in the case of lawsuits. It is argued that the EHR a way to improve quality of care, specifically through improved documentation. An argument may be made that providers documenting at the point of care may benefit the quality of care through improved documentation resulting from "real time" documentation rather than reliance on memory for documentation at a later point-in-time, providers must engage in this behavior.

Providers in this study engage in a mixture of documentation during the medical encounter, shortly after the medical encounter, and later in the day (and in rare cases on another day). If we use the argument that documenting closer to the point of care improves documentation quality, thus provides more quality information for future decisions, thus improves quality of care, then for the most part providers are improving quality by changing documentation to occur closer to the point of care, rather than at the end of the day, which was the typical practice when using paper charts and dictation.

However, a question may be raised to the criticalness of the record in the first place, as many providers appear to utilize only specific parts of historical information (mostly diagnosis, medication, and allergy lists) without utilizing much of the information documented in prior encounters. This raises a question of why there are health records at all. If most of the information documented is unutilized, what is the purpose of spending so much time, energy, and resources into documentation.

The EHR is Used Primarily for Profit

The evidence in this dissertation shows that providers are entrepreneurs, who work in a business format. They are very conscious of their profit margin. The providers, office administrators, and managers in all practices made comments relating to one of their reasons for adopting the EHR as profit. Many described the advertising and pitch from the software companies containing messages of profit enhancement. They demonstrate an awareness and understanding of how they compare with other providers in the practice in generating revenue. The EHR is intentionally used to increase revenue and decrease practice costs. Profit is realized for most practices in this study through decreased practice costs and greater efficiency; allowing providers to see more patients and improve billing.

I observed multiple occasions in which providers spent more time documenting the visit for purposes of billing than they actually spent in actual patient care itself, indicated by comments such as “I can’t find that code”, creating a period of silence or interrupting patient accountings in order to document while in the exam room with the

patient, and leaving the exam room to document the visit in place of face-to-face time with the patient. The code itself is not critical for patient care, rather it is critical for being able to account for and bill for actions providers take in care provision. This is not to say that the providers do not genuinely care about their patients. But, it is to say that providers are not only aware of the business side of practicing medicine, but that they direct much of their activity, time, and resources to revenue generation, even when it does not directly impact actual patient care.

My argument that providers are primarily interested in revenue enhancement is based on my observation that the largest proportion of provider and support staff time and resources are spent engaging in billing activities. These activities are fruitful. The importance of profit to these practices is demonstrated by the way the practices are structured, based on the formal division of labor in each practice. The structure of the division of labor emphasizes this point in that each practice but one has a designated billing specialist on staff. This position formally demonstrates the importance of billing activities within the maintenance of the practice. Additionally, one of the main tasks of the practice administrator/manager was to manage billing issues. Although this structure is not related to the EHR directly, the previous ways of conducting business utilizing this structure are continued. In the different practices studied, many spoke of their initial belief that they would not need a billing specialist once they adopted the EHR; however, what they envisioned in this respect did not come to fruition with this set of observed practices. Though some practices had been able to or were making plans to reduce the hours for which they needed a billing specialist, since EHR claims sent by the providers are seen as cleaner, they still had a formal check on billing claims by a specialist before a

claim was sent out. The fear of mistakes was enunciated as a reason for not eliminating the position. This position and structure further the idea that these practices take billing very seriously and do not want to leave opportunities for profit missed.

When using the EHR the practices in this study were able to decrease many of their practice costs between $1,500 and $127,280, which is between $1,000 to $21,213 per provider from decreases in transcription, paper supply, and staff costs. Much of the savings stems from eliminated transcription costs and reduced paper costs needed to maintain a paper chart. Practices indicated that when they made the decision to adopt an EHR they anticipated reductions in full time equivalent (FTE) support staff work. In reality, the practices did not actively downsize. Much of the reduction in FTEs was based on not refilling a position once a support staff worker left the practice for personal reasons. Therefore, the aim to reduce system costs by reducing personnel is limited, as social factors may be at play, where there is a reluctance to let go members of support staff, but a willingness not to replace staff that leave on their own.

Practices are also able to enhance their revenue by improving their billing process. Information is sent electronically through the EHR to the Practice Management system to an in-house billing specialist to manage in real time. The former process of solely using a "Superbill", the paper billing form with standard codes on them that the provider circles during an encounter in altered as the codes are linked with documentation of diagnoses and treatments by the provider during the medical encounter. The Superbill is still used by many practices, but this is seen as a "back-up" to the EHR-generated bill. Now, the providers build the bill, rather than the billing specialist, and the billing specialist "double checks" the providers' codes. The billing specialist now acts as

a check-and-balance rather than as the primary coder. This allows claims to go out faster and "cleaner". The quicker billing process results in faster payment turnaround time, as the claims are sent electronically, eliminating the postal mail time, and they have less rejections. The result is more usable money for the practice, which can accrue interest in some cases, generating more profit.

Not only does the structure of the division of labor indicate the emphasis on revenue generation, but the providers' comments and behavior further exemplify the importance of finances on the types of care provision and work activities of the providers.

The revenue enhancement documented in this dissertation conflicts with the rationale given by policymakers and experts that EHRs will save the system money. Part of the idea that EHRs will save money is true. As demonstrated, using EHRs does cut down on paper supply costs, transcription services, and in some cases decreases costs for personnel. But, these cost savings remain insular to each individual practice and become profit for the practice and thus individual providers. The cost savings are not passed on to the system. In fact, the system is more highly taxed when providers use an EHR because they code differently, thus they bill at higher rates, and the cost to the system is actually higher. Therefore, policymakers need to reevaluate their idea that EHRs are cost saving at a system level. If EHRs are adopted quickly and future providers utilize the same upcoding features of the EHR, the cost crisis of the U.S. health care system will only worsen with EHR adoption, not get better as predicted.

Further, this study shows that practices are reluctant to downsize because of their personal relationships with their support staff. However, if other practices who have adopted or will be adopting EHRs are more willing to downsize their practices than those

in this study, there could be a large impact on our economic structure and labor force. As most office support staff tends to be female, there could be a gendered displacement of workers as these positions are eliminated through improved efficiency. Additionally, this population of workers may only have an untransferrable skill set specific to medicine, which may become obsolete with increased EHR use. Additionally, if providers continue billing at higher rates, there may be an impact on health insurers, medical care coverage, patient costs, and the economy as insurance rates escalate further. Using basic economic logic, as health care prices increase, consumers have less money to spend in the general market, which could have a widespread economic impact.

The EHR is Used Secondarily for Efficiency

EHR adoption was intended to produce efficiency by both providers and staff, but this study provides conflicting results relating to the perception of actual efficiency when using the EHR.

When looking at evidence of actual efficiency, it appears that, overall, practices *are* more efficient when using the EHR. All but one practice saw increases in number of patients seen when using the EHR than before adopting the EHR. Providers and support staff both describe significant efficiency benefits from the ability to access charts without having to “track them down”. Billing procedures are described as more efficient. Providers are more involved in the billing process by creating an electronically developed bill based on their electronic documentation of the visit, which allows the bill to be formulated faster with less work on the part of the billing specialist to find and double

check codes. Additionally, the claims are said to have less errors, thus turnaround time is faster; payments are more efficient as the bills can be sent electronically, reducing postal mail time.

When looking at productivity, the majority of the practices in this study saw the same number or patients or more patients than before the EHR across providers. Most providers consistently closed out their charts on the day the patient was seen which is described as an improvement over paper and dictation documentation and paper billing. These efficiency benefits can be seen to mainly derive from changes in when and how retrieval and documentation of patient information occurs. Many providers multitask and shift their retrieval and documentation and follow-up activities during the scheduled appointment time. Providers describe easier, more organized, thus more efficient access to information in a patient chart. Providers create the primary detailed notations for the medical encounter note, check lab values for multiple patients (not only the one who's scheduled appointment is in that time frame), and check messages from other providers or support staff. Providers are more easily able to look up diagnosis names and codes using the EHR instead of searching through a code book. I observed the providers document more throughout the day, mostly during the scheduled time of the patient's scheduled appointment, rather than one designated time spent only on documenting. Although I did not observe the providers when they used paper records to contrast this with prior documentation and workflow practices, the providers describe the process with the EHR as more efficient as they eliminated dictating at a designated time at the end of the day or a later day. Further evidence is that providers describe leaving for home earlier in the day than when using paper records and dictation practices, thus suggesting

that they are more efficient during the day which allows them to leave the office earlier. An unexpected efficiency benefit described by providers is that providers are able to manage the medical encounter when children are present easier using the EHR because the EHR entertains the child, thus creating an efficiency effect of not having to manage behavioral issues of the child during the encounter.

The increased number of patients seen is more impressive when considering the level of activity documented is higher. Higher coding levels indicate more complicated or more extensive provision of services. It appears as if providers are seeing more patients and providing more services in the same time frame as before using the EHR, thus there is evidence of higher productivity both in quantity of patients and services provided to each patient. However, as described in the section on upcoding, providers may not necessarily be doing the additional work showing up in the encounter documentation. The capture of previously provided services may consequentially show higher productivity on paper, when in actuality little or no change to provision of care is made. One way this can be evidenced is by providers copying and pasting information from prior encounter notes into the new encounter note when seeing a patient, without directly assessing new patient information, or assessing new information and more easily documenting new information by changing information in the pasted note without having to rewrite the entire note content. Therefore, these indications of productivity may be misleading.

Even though there is evidence to suggest that providers are more efficient, providers also indicate that the EHR "takes more time". Providers' sense of time is interesting because time is not described in a cumulative fashion. Time for providers is

set in terms of “staying on schedule”. Though providers are completing more tasks during the scheduled appointment time, they have not increased their appointment times. There appears to be no indication that they have contemplated allotting time to manage cases in the new format when documenting more proximally to the point-of-care.

Although many efficiency benefits are observed, other inefficiencies still exist or are created through EHR use. One example of continued inefficiencies is the continued use of a paper phone message logs. Another example is staff time in waiting for a shared EHR license to become freed up in order to access and work in a chart. One example of new inefficiencies is time spent looking for scanned documents and retrieving printed material from locations other than the exam room during the scheduled medical encounter time frame. Another example is spending time setting up the EHR in the exam room, such as plugging in the power chord and signing on to the EHR.

Additionally, the level of skill and efficiency in using the EHR is shown to affect profit, efficiency, the division of labor, and quality. Providers and support staff who have more skill and speed in using the EHR engage in a higher number of tasks, more complex tasks, and experience higher profits than those who struggle with the technical aspects of using the EHR. Most often providers with more skill were also able to document while in the room with the patient.

Additionally, though providers do create efficiencies, sometimes these routines have negative consequences. Provider efficiency practices also lead to provider’s engaging in much of their work in semi-public places, which leave them susceptible to distraction and privacy breeches. Also, the impact of these efficiency changes on actual patient care can be questioned. I do not have evidence of outcome data to show

substantial health impediments, however, some efficiency practices have the potential to cause harm to the patient and stress the relationship between the provider and the patient. One example of the possibility of causing harm stems from the activities of one provider who would type in one patient's chart while in the exam room with a different patient. In such cases, it would be possible to put information in the wrong chart, miss information, or hear information incorrectly. Examples of efficiency practices straining the provider-patient interaction are the new silences created while providers document in the EHR, cutting off the patient's descriptions of their symptoms for a more dichotomous (absence/presence) of symptoms format in order to efficiently fill out EHR templates, and the provider's truncating the medical encounter in order to engage in documentation activities, sometimes even leaving the room to do so. (See later section on strains on the provider-patient interaction.) I was unable to assess patient satisfaction related to provider EHR use or to assess the impact of patient perceptions related to the interaction and relationship with their patients.

Another consequence of the focus on time and efficiency is that providers choose not to engage in activities which distract them from the immediate task at hand. For example, many times providers would not engage in discussions on additional health issues, specifically chronic issues, not directly related to the stated reason for the visit. This is evidenced by providers stating, "we'll talk about that next time you come in".

Quality-Oriented Features are Often Unused

This study demonstrates that although providers have good intentions regarding quality-enhancement, in action quality is not a priority. Quality in this study refers to the use of advanced features built into the EHR software, specifically designed for quality-enhancement. Providers indicate quality as a reason for adopting an EHR; however, there were mixed results relating to use of the EHR for quality. All but one practice indicate a general agreement that quality of care has improved. Most report a general sense that preventive care, chronic care, urgent care, and coordination of care are either the same or improved when using an EHR.

This study inquired about use of advanced features such as flowsheets, reminders, alerts, and standardized templates. When looking at use of advanced quality-enhancing features in the EHR, the results are mixed. Quality-enhancing features are often unused or used inconsistently. Only three practices actively engaged in quality-enhancement. Three practices used none of these flowhseets and an additional two only used one flowsheet. The most often used templates are those for mammograms and PAP smears. This is an interesting finding because both are specific to women's health care issues.

The practices indicate many explanations for not engaging in quality-enhancement through use of advanced EHR features. They note technical difficulties of the software being to cumbersome to navigate and learn. They indicate not having internal IT staff to help them manage the more advanced features and technical problems in using the EHR. They indicate practical difficulties, mostly relating to time.

Although providers explain non-use of quality-enhancing features as due to problems out of their control, there are multiple provider-perpetuated non-use reasons as well. I argue that the predominant reason is because providers do not feel they need to change what they were doing before. They do not believe their quality procedures need to be "enhanced", and view their provision as good already. An example of this is that one physician explained explains that the time and resource investment may not actually improve patient outcomes, therefore are not necessary. Pother research tells us that professions and institutions resist change. Although this population of physicians is obviously willing to undergo some changes, the changes they engage in appear to occur when they directly benefit the physician personally, either through extra personal time through efficiency improvements or profits from practices which increase revenue. For example, they will take additional time to find ways to upcode than to ask about a chronic health issue unrelated to the stated reason for the current visit. Additionally, providers indicate their belief that the features are not necessarily helpful in enhancing care provision. Additionally, though many of the features may produce efficiency benefits downstream in the future, they do not produce immediate efficiency benefits, and in many cases take more time, as there are more tasks involved.

Even if biomedical standards of care are followed, the standards which providers use may be suspect for multiple reasons including questioning the origin of the standards of care used, the consistent use of the standards of care in their original format, and the bias of research which develop the evidence-based standards of care in the first place. There was no clear indication by providers whether or not the standards of care were formed by evidence-based medicine in the literature. There are indications that, in some

cases, providers developed their own templates and standards of care without a clear reason other than their prior experience. This practice may be seen as very subjective and/or not evidence-based of tested quality of care improvements standards.

Even if evidence-based biomedical standards of care are followed, a relevant question concerns how those standards are developed. I do not have information on the development and origin from the software companies; however, *if* standard scientific studies are utilized, there is evidence to show that medical trials are biased in a male-oriented framework and logic. Studies show that women have historically been excluded from medical trials, thus utilization of "standards of care" on this population may be problematic. The same processes can occur for other marginalized patient populations as well.

Computer use during an Encounter Strains the Provider-Patient Interaction

Using the computer during an encounter has the potential to enhance the interaction and relationship with patients, but it may, instead, strain the interaction, creating practical and interpersonal issues. Providers report having trouble with their personal computing skills, many making comments such as, "I'm not a good typer". The problems with computer skills usually forces providers to have to "focus" on using the computer, where effort necessary to use the computer. They report having trouble concentrating. They find not only the computer distracting in terms of being able to interact with the patient, but also find the patient distracting when the provider is trying to concentrate on using the computer. They also report finding it difficult to document

certain types of patient complaints, specifically vague or nonspecific symptoms. Further, they report having trouble documenting multiple complaints presented at the same time by the patient.

In addition to the practical barriers, interactional barriers also exist beyond those of a normal encounter. Providers describe having to split their attention between "interacting with the computer" and "interacting with the patient". This demonstrated that there is an additional interactional component added to the medical encounter when using an EHR. There is the traditional interaction with the patient and an additional separate interaction with the computer, making the computer a third actor, though a nonhuman actor, within the medical encounter.

The computer interaction-patient interaction split leads to inattention of the patient, as evidenced by lulls in the conversation. Providers indicate silent periods when they are interacting with the computer and not with the patient. The lulls in conversation become a nonverbal barrier. Some providers lessened the face-to-face time with their patients as a strategy to manage documentation tasks and interpersonal aspects of the interaction by not documenting in the presence of the patient. This strategy eliminates some of the silence, small talk, and interruptions. But it also truncates the medical encounter. Other times the provider would leave the exam room to document and return to the room to consult with the patient before the patient leaves.

For providers more advanced multitasking and computer skills, sometimes small talk is engaged in. This could be perceived as friendly, caring or as superficial by patients. Because of the design and focus of the study, no information was collected directly from patients, but the providers describe the interaction as better than

"uncomfortable" silence. Additionally, providers were observed interrupting their patients when they are providing accounts of their symptoms and concerns. Though interruption of patients is common without EHR use (Frankl, 1998), the templated format forces providers into a biomedical gaze in which only absence or presence of symptoms are used as a strategy to document efficiently.

An interesting pattern is that nurse practitioners, all of whom are women, tend to document outside the room more after the encounter than the physicians and to express unsolicited concern about the interactions with their patients. One nurse practitioner explained that she threatened to quit if they scheduled her patients in shorter appointment times because she cannot engage appropriately with the patient otherwise. It is unclear as to whether this is a gendered socialization effect where women are socialized to be caring and sensitive to nonverbal cues, a difference in training, in which nurse practitioners are trained in a more caring-oriented holistic nursing perspective than a biomedical perspective, or some other effect. This is a good area for future research.

Providers phrase their descriptions in a way that indicates that using paper records allows providers to give their full uninterrupted attention to the patient. This is made as a comparison to descriptions of the EHR has distracting and difficult. An actual comparison cannot be confirmed or denied, but are reported as perceptions of the contrast between paper documentation methods during an encounter and documentation using an EHR during an encounter.

The practical and interactional barriers reported in this study are primarily from the perspective of the provider, where the provider is in the position of control and power. As previous studies show that the interaction during the medical encounter is the

basis of the relationship between the provider and the patient and affects outcomes such as patient compliance, patient satisfaction, and return visits, the strain on the interaction observed in this study could have an effect on patient outcomes as patients may get frustrated with their treatment by providers and is an area for future research.

Changes in Workflow Patterns

The activities providers engage in remain mostly the same, but the sequence of these tasks has changed. Providers continue to review basic information on patients before entering a room, but detailed documentation used to occur primarily at the end of the day, with brief indications about presence of symptoms made during the actual encounter by handwriting shorthand notes on paper. Now, providers document throughout the day.

Using Goffman's (1959) theory of the presentation of self, people act in both the front stage and the back stage to carry out their daily activities. Providers in this study work in the front stage and the back stage. In this dissertation, the back stage refers to both private space (personal office, empty exam room, away from the office at home) and semi-private space (nursing station, personal work station, hallway). Many times a template is pulled up before a provider enters the exam room, usually while at the nursing station or while walking down the hallway to the exam room. Providers have added detailed documentation as part of their medical encounter routine. During the scheduled appointment time, detailed documentation occurs both in the room with the patient during the office visit and outside the exam room in either a private backstage area or semi-

private backstage area. Sometimes this time is supplemented with continued work between patient encounters, during lunch, before leaving the office for the day, at home after leaving the office, and in one case while in the exam room with another patient. In rare cases, providers continue documentation on another day. (Only one provider consistently documented on the weekend following an office visit.) Described in the section on efficiency, providers engage in more work spread throughout the day rather than in the exam room. As a way to increase efficiency, providers engage in most of their documentation and access of information work in the hallways, in makeshift offices, and at the nursing station during times when they are not in the exam room with a patient. Sometimes, providers opted to work in empty exam rooms over their formal offices.

Increased stages of the medical encounter. The medical encounter using paper records can be described as including a greeting, combined fluid verbal and physical information gathering and brief documentation, counseling, and a closing. The reconstructed stages of the medical encounter when using the EHR include the greeting, counseling, and closing stages as before, but they now also include distinct stages of information gathering as a separate activity from the physical exam where there is a laying-on-of-hands, and followed by a separate stage in which the information is processed and documented. Eye contact, body position, and physical proximity between the provider and the patient are all indications of which stage of the encounter in which the provider is engaging.

Interpretation of the Findings

The main take-home messages of this dissertation are:

1) EHRs help providers make money; maintain, enhance, and formalize their power, and autonomy; improve efficiency; and improve their lifestyles.
2) The trade-off of efficiency and profit is strained provider-patient interaction.
3) Having an EHR is not important in-and-of-itself, rather the way the EHR is used is the critical feature.
4) EHR adoption itself does not ensure quality improvements.

Recommendations

Current policy appears to be focused on issues of adoption, privacy, and confidentiality, without much critical analysis of what adoption actually means carrying out the practice of health care and what unintended consequences may be produced through EHR use.

The EHR is described as a way to manage both quality and cost, where it is assumed to be a mechanism for quality-enhancement and cost control and reduction. But, this study clearly shows that quality is not automatic with EHR adoption. Therefore, the use of increased adoption as the main strategy to attain these aims is incomplete.

As new information recently came out reporting that quality is either not improved and in some cases hindered by EHR use (Bankhead, 2007; Fiscella & Geiger,

2006; Lindler, Ma, & Bates, 2007), this study is useful in understanding how the EHR is used and not used for quality aims, which may explain why quality outcome measures are not indicating significant improvements as expected. Providers do not use the features which ere developed for the specific purpose of quality-enhancement.

In further exploring issues of quality, research is needed to identify ways to ensure providers use the EHR in ways that improve quality. A first step is to make quality the *primary* focus of EHR use. Attention is needed to develop strategies for use of quality-enhancing features.

Policy makers and providers must take into consideration that EHR use alone is insufficient as it does not automatically produce quality improvement. The focus of policies and its implementation needs to take into account that the EHR *user* is the crucial factor is the EHR. *How* the EHR is used needs to be the focus of resources and energyin moving forward with quality improvement. Resources are needed to encourage to help providers learn how to use the computer in a quality-enhancing way and incentives are needed to encourage them to do so.

One step is to focus on initiatives aimed at changing provider attitudes about their role in the structure of their work. A major step needs to be taken in assessing and convincing providers that their personal practices are not necessarily best practices. Mechanisms are needed to increase providers awareness of their practices as it relates to quality. The assumption that they already provide good care needs to be challenged and explored. We need to find ways to create a culture within health care of openness to change. There has historically been strong resistance to change among the providers and practices in the medical community. Adoption of EHRs provides the opportunity to

rethink practices, workflows, and structures. We need to explore ways to get the health care industry as a whole to question what a medical encounter actually means, what role the health record plays in the encounter, and to rethink how interaction and provision of care affect both the patient experience and outcomes.

Beyond helping providers engage in a critical reflection and dialogue about quality and their relationship to it, an infrastructure is needed to help aid them in devising practical solutions to engage in quality-enhancement. Providers suggest that they have technical difficulties with EHR use which prevent barriers and no in-house information technology personnel to help them in an area where they are forced to become pseudo-experts in computers. Two possibilities are the creation of an information technology specialist position either in-house or shared by a network of practices to reduce the provider's burden in managing the technical aspects of learning and using advanced features in the EHR.

Further, practices indicate difficulty because the data is not in the appropriate format to be able to engage in the advanced use of the EHR for quality. I suggest a few possibilities to alleviate this issue. One suggestion is a specified division of labor which includes a data entry specialist. For established practices that previously used paper charts, data entry of paper chart information needs to be entered into the EHR in a usable format. Many practices struggle with their format of former information. They used processes which allowed for immediate use of information rather than long-term comprehensive use of this information. To improve the use of information for quality by improving the usability of the information, a specialist could be used to format current information into a usable format, such that population analyses and individual tracking

can be completed by eliminating incomplete or inappropriately formatted health information. This could be implemented by designating an in-house or external nurse or medical assistant to enter previously known information, such as that in the paper chart, which needs to be transferred over to the electronic chart and new incoming information, such as consultant notes. This approach could allow staff not needed in former roles, such as medical records specialists and billing specialists, to shift into a different labor role. The impact of eliminating many female concentrated positions as EHRs are adopted and office positions are eliminated could displace many current office support staff workers. A more extreme suggestion would be providing a format that allows someone outside the practice to enter information into the chart, which could save individual practices money and become a niche market outside the work of the actual practices. However, this could shift finances from current reimbursement embedded in the reimbursement providers receive which includes overhead office support in addition to reimbursement for the actual work of the individual provider to a private sector benefit. One concern is that if an outside entity enters information on a patient and the payment for that service shifts to the patient rather than the insurance company reimbursing the provider, the shifted cost to the patient could disadvantage lower and middle class people by reducing access to managing one's health information. Another possibility is to have patients become responsible for entering information into their electronic record themselves. This could take place either at a computer station set up in the practice itself, where patients could come in and enter information. It could also occur through an interoperable mechanism that is web-based. This process would give patient's control over their health information in practice, not only in ideology. A potential problem for

this policy option is the knowledge necessary to understand and interpret current health information and developing a format understandable and usable for patients. To do this, patients would either need to become knowledgeable in medical jargon to access the current system or a paradigm shift would need to occur which requires information to be collected and documented in more accessible language. This would require a shift in provider perspective of patient-provided information as suspect as being reliable.

To move toward a more holistic approach which allows patients and providers to efficiently manage longitudinal comprehensive information about the patient and could be very time consuming for providers or paraprofessionals to enter and maintain. This burden could be alleviated by using programs, such as the Video Doctor (2007) already being used which allow patients to enter information about themselves. The Video Doctor is a program developed to engage in harm reduction of lifestyle risk factors. The Video doctor is a computer oriented program which assesses patient risk factors and customized risk reduction based on the answers the patients provide. This program simulates an interaction with a provider without utilizing the financial and time resources of physicians. Currently the Video Doctor prints an analysis which is put in the paper health record, however, it is reasonable to foresee the possibility for interoperability with this patient-provided history gathering, while alleviating part of the responsibility of providers for all patient evaluation and education. It also allows the opportunity for patients to be interactive with their health and to remove some of the power barriers to create a more collaborative effort between the patient and the provider. A criticism of having patients use computers to document their history is health literacy and computer literacy. The design of the Video Doctor takes both literacy issues into account and

provides a video process with audio to illicit information, where patients can touch the screen by pushing on a green check to indicate an answer of yes and a red X to indicate an answer of no, so people who cannot read can understand and use such a program. This process does not move out of the biomedical paradigm, but allows patients to be more involved in the management of their health information, while taking some of the financial burden of the system which pays for history taking by either the provider or paraprofessional. This would shift into unpaid labor by patients, with patients benefiting from having more control of their own information. As patients presumably have a vested interest in accurately reporting information, the patient monitored information may become a catalyst for improving quality of care through improved information and higher compliance because patients are part of the process.

Another suggestion is the creation of a data analyst to manage and interpret population-level information in ways that increase quality through increased monitoring of the provision of services for specialized categories of patients to ensure best practices are implemented over time. Either an outside or internal entity could provide feedback to providers on how they are doing on quality measures. A mechanism which mimics the monitoring and reporting feature of provision of care, a proxy for one dimension of quality could work to improve quality and work toward the aim of transparency being pushed by the government.

CHAPTER 11

CONCLUSION

This dissertation provided an ethnography of electronic health record (EHR) use in solo and small group primary care practices in the United States using a grounded theory approach. The aim of this study was to better understand the effects of the use of EHRs on the structures, institutions, and practices of primary care as they relate to cost, quality of care, workflow, time, and provider-patient interactions. This dissertation builds upon and is relevant to medical sociology theory at the macro, meso, and micro levels.

Macro-Level Medical Sociology Theories

Macro-level medical sociology focuses on the health care system, including the institution of medicine. Included in this literature are theories of the political-economy of medicine and medical care, the structure of health care, critiques of the biomedical paradigm, and analyses of the scope, nature, sources, and effects on patients of physician dominance and autonomy.

Biomedical Paradigm

One of the central and defining features of Western medicine is the use of the biomedical paradigm (Cohen, 1998; Armstrong, 1987) to conceptualize, define, diagnose,

and treat disease "The biomedical paradigm emphasizes the etiology, clinical treatment, and management of diseases (of the elderly) as defined and treated by medical practitioners, while giving marginal attention to the social and behavioral processes and problems (of aging)" (Estes, Wallace, & Linkins, 2001, p. 48). This model implies thatan an expert (such as a physician) is required to fix problems, usually after they occur. This model also supports society's growing investment in medical care and technology as the primary determinant of good health (McKeown, 1978), despite the growing body of research that substantiates the significant effect on health of behavior, environment, and social inequalities, and other factors (Estes, et al., 2001).

The biomedical paradigm has often been criticized by contemporary sociologists as being "reductionistic" because it narrowly conceives of disease as objective, discrete, organic or cellular pathology thus ignoring the social and cultural dimensions and contexts of health and illness (Conrad & Schneider, 1992; McQueen, 1989; Ventegodt, Morad & Hyam, 2004). Biomedicine is the dominant paradigm of American medical practice (Conrad & Schneider, 1992).

EHRs reproduce and expand the knowledge, structures, relations, and practices of biomedicine in a number of significant ways. The first indication that the biomedical paradigm continues to be dominant is based on the organization of medical work according to the provision of care based on primarily dealing with one major health issue at a time. This organization sets up a situation in which patients set-up appointments based on discrete problems.

The "reason for visit" section in the EHR is filled in using a basic biomedical diagnostic category. The basic diagnosis is first used to set the time needed to manage the

specified problem. When the patient is seen by the nurse, the "chief complaint" is indicated, also primarily using basic biomedical diagnoses. The basic diagnosis is then used to pull up a template the provider uses when documenting the visit.

The medical encounter note is primarily documented using biomedical terminology. The naming structure developed by the medical community, in which labels are given biomedical terms to describe discrete symptoms, diagnoses and treatments are utilized in the EHR. These medical terms are associated with codes (ICD-9 and CPT) in order to bill for services based on a rubric of expertise and time suggested as necessary to diagnoses and treat specific symptoms. The way the EHR is used, the biomedical paradigm is formalized by promoting documentation of the encounter through use of these terms and codes. Most of the observed documentation revolved around finding and using these codes.

The symptom lists in the templates for an absence or presence of symptoms logic, thus narrowing the patient experience into a biomedical framework. In this framework no symptom is indicated as more important than the other. There is a demonstrated difficulty in documenting symptoms for which there is no recognized biomedical term.

The critiques of the biomedical paradigm as being reductionistic, and taking too little of the patients experience into account, are not alleviated when an EHR is used. The process of documentation in this manner limits the understanding of the patient into absence or presence of symptoms.

Physician Dominance and Autonomy

Physician dominance was described by Freidson in 1970, whereby physicians are at the top of the medical hierarchy, and at that time, were the only health care workers considered professionals. Part of their professional status included their ability to prescribe medication, order lab tests, and conduct treatments, all of which lie within the structural legal monopoly of health care professionals. Physicians enjoy much autonomy with little formal oversight.

However, more current theories have constructed the idea that professional dominance and autonomy are decreasing. In the 1970's Oppenheimer (1973) described a process of proletarianization in which physician power and autonomy were believed to be declining due to increasing division of labor within medical settings, increasing administratrative oversight of the work of physicians, ,increasing patient empowerment as medical consumers as demonstrated by doctor-shopping, and the diminishing influence of physician associations, which were perceived to not represent the interests of the individual provider. In the 1990's, arguments made by Light, Hafferty, McKinlay, Marceau, Mechanic, and Rochefort (Hafferty and Light, 1995; Light, 2000; Light and Hafferty, 1993; McKinlay & Marceau, 2002; Mechanic, 1996; 2000; Mechanic & Rochefort, 1996) contended that professional dominance was declining in part due to countervailing powers (including the State, employers, other providers, insurance companies, patients, medical-industrial complex), whereby physicians were only one of many powers working in conjunction with and against each other to maneuver within the health care system.

Despite the conclusions of these researchers, the data in this study suggest nevertheless that providers maintain dominance and autonomy. The providers in this study are solo and small group practices, which have no outside governing body. Oversight of physician colleagues appeared to be relatively nonexistent. The only observed oversight of physician colleagues was one physician asking me what features of the EHR another physician colleague was using. Even then, there was not a question as to the provision of care, rather only to the documentation of care. A little oversight was observed for the work of nurse practitioners and physician assistants. The degree of oversight varied greatly by practice, where at most, the documentation of a nurse practitioner or physician assistant was looked over before the physician sign-off and at minimum, providers automatically signed off as a legal formality without reading the chart. In no cases did a provider enter the exam room of a clinical colleague for purposes of formal oversight.

Providers are observed working in very individualized ways. Even though providers believe they are practicing in a more standardized way when using the EHR, they use the EHR in very individualized ways. In addition, providers do not perceive this as problematic. They perceive of individualization across providers as merely a different "style", which appears to go unchallenged.

The use of templates is highly variable. The origin of the templates varies from software provider, to physician-built, to office administrator-built. What information is used in developing the standards of care embedded in the templates is unclear. Therefore, the starting point of template use may be held suspect.

Regardless of the initial starting point of templates, providers use the templates in a way that backs up their personal judgments, and when the EHR conflicts with their personal logic, the EHR logic is abandoned. First, the providers in this study were all instrumental in choosing the specific software used. The software chosen was typically described as already matching what they were doing before EHR use. Second, most of the providers were instrumental in developing the templates used. Third, even when providers used templates, they frequently "customized" the templates to suit their own needs. Fourth, when the EHR conflicted with their judgment, they opted to use their own judgment and abandoned the EHR, using the rationale that they, "know the patient better than the computer".

Turner (1987) suggests that even with the pressures of proletarianization, bureaucratization, and countervailing powers, one way professional dominance is maintained is through the production and maintenance of knowledge. Professional dominance based on the maintenance of knowledge is maintained by use of the EHR because patient access to electronic patient records, just like paper medical records, is limited .

The EHR may be seen as a way to change the power structures which place physicians at the top of the hierarchy as the knower of medical information by providing evidence-based information in the form of templates into the structure of the EHR software, which would enable health care workers with less experience to manage more health care-related tasks, previously managed solely by physicians. However, a hierarchy determining access to the electronic record is built into the design of both EHR software packages observed in this study. Based on the type of license (and corresponding sign-in

and password), access to the electronic record is allowed or blocked. The pre-existing hierarchy where physicians are at the top, then nurse practitioners and physician assistants, then nurses, then medical assistants, and finally, office staff, is maintained and formalized when using an EHR through access to viewing and entering information into the electronic chart. Physicians enjoy the highest level of access to and data input into the EHR, access which progressively decreases along the division of labor hierarchies described in the past. Previously, non-physicians had more access to patient chart information and could add or view information with unlimited access. Nurse practitioners and physician assistants needed a physician sign off to close out a chart, nurses have access to entering limited information, and front office staff has limited access to add attachments to records without accessing the main content of the actual record.

Beyond physical access to the record, intellectual access to the electronic record is also limited through not only knowledge of how to use the software, but also by the language utilized within the software. The two EHR software programs observed in this study structured the format of documentation based on biomedical language, and specified reimbursement coding labels. The majority of observed documentation utilizes this format.

On the other hand, the EHR can be said to be more accessible across viewers because most documentation occurs in a format that is understandable to all providers. Therefore, those who view the electronic record and understand the medical jargon and associated codes may have more access to electronic information than the handwritten notes of the paper record. The EHR may be seen to be more accessible for three main reasons. First,

the electronic record is more legible in a typed format than in a handwritten format. Second, most documentation is based on the use of templates in which standardized biomedical terminology and codes are used. Third, documentation is seen to be more extensive when using an EHR than when using handwritten notes and dictation. One benefit of the observed electronic documentation in the EHR is that documentation includes not only presence of symptoms, but also absence of symptoms. Therefore, more of the activities of providers in decision making can be reviewed, which might reduce replication.

However, when providers do not document using templates and codes (point-and-click), they free text (typing) information instead, the uncoded documentation occurs in an individualized manner. When not using coded documentation, providers continue to use abbreviations and words understandable to the individual provider, but which may not be meaningful to other providers. This localized use of the EHR may only be used by providers in solo and small group settings where there is little oversight by others and where language issues can be resolved easily among close colleagues. This situation may not be seen in settings in which multiple providers consistently share information between providers and thus attention and practices may have been developed to limit the localization of information.

Previous theories, such as the sick role (Parsons 1951), also describe the asymmetrical power differential between the provider and the patient, in which patients are passive in the interaction. Based on my observations, when providers' authority was subtly challenged by patients, providers utilized the computer as a defense to neutralize questions of their authority. For example, when patients brought in literature or

verbalized their concerns during office visits, providers directed their patients to selected sites on the internet that corroborated and legitimated their professional judgments.

The State

The state is critical in the organization, financing, and delivery of virtually every aspect of medical care. The state ensures and protects the monopoly of physicians over the practice of medicine and assures their autonomy (e.g. through little formal oversight and choice in EHRs when funded through federal grant money) (Alford & Freidland, 1985; Castells, 1989; Ehrenrenreich & Ehrenreich, 1971; Estes, 1979; 1999; Estes, Harrington, & Pellow, 2000; Estes, et al., 1984; McKinlay, 1985; O'Connor, 1973; Offe & Ronge, 1983; Relman, 1980; Waitzkin, 1983). The State is made up of not only political institutions, such as the legislative, executive, and judicial branches of the government, but also social and economic institutions such as the military, criminal justice system, educational, health, and welfare systems (Waitzkin, 1983). The state is using it influence through these different entities to protect the establishment of medicine as the dominant health care profession and to spur adoption of EHRs.

Through licensure laws, the State is able to maintain control over who is able to legally practice medical care by indicating what types of equipment they are able to access and use and what procedures they are able to engage in. They maintain control over what categories of providers are legally able to own practices, what types of businesses practices may be lawfully established, what is reimbursed, and to what type of providers the reimbursements may be paid (Shi & Singh, 2001).

The push for EHRs by the State allows, protects, and perpetuates the medical-industrial complex. Estes, Harrington, and Pellow assert that, "The government has been playing and continues to play a crucial role in the development of the medical-industrial complex" (2001, p. 178). Using Estes' political economy perspective, public spending has an effect on private economy "in terms of ensuring and maintaining a flow of capital for profits and investments" (2001, p. 7-8). This effect of public money on increasing private profits can be predicted when using the current reimbursement structure and use of the EHR to code higher within that reimbursement structure.

The most immediate and direct link between the State and EHRs is the creation of the Office for the National Coordinator for Health Information Technology (ONCHIT). This office was created as an initiative to increase health information technology adoption across the U.S. Rather than using the formal legislative process, President Bush used his executive privilege to form this office.

Although the office was created without the legislative branch, this is not to say that the legislative branch was not involved. Congress enacted multiple laws that authorized money for research, education, and training, with a current focus on the advancement of the adoption of health information technologies, such as EHRs. Currently government and government affiliated organizations, such as NIH and AHRQ are developing initiatives and conducting research related to health information technology.

Providers in this study demonstrated their acceptance of entrepreneurial medicine and the medical-industrial complex. These structures favor market approaches to technology adoption rather than legislative action. The State is largely subsidizing the

technological explosion, which includes adoption of the EHR. Therefore, the perpetuation of the ideology of entrepreneurial medicine is the main approach to health information technology policies. The state is the guarantor of the right to profit in the provision of that care. The State has been instrumental in developing the reimbursement standards used by not only State-sponsored insurers (Medicare, Medicaid, Department of Defense, Veteran's Administration, and governmental employee insurance), but also adopted and used by other insurance companies as well. This reimbursement structure allows providers to earn substantial incomes, which may then be linked with the power providers employ on an individual level. The State supports the expansion of high cost procedures, equipment, medical and health related technologies and services through a reimbursement system financed largely through governmental money. Practices and individual providers see significant financial benefits stemming from this governmental support. For example, the providers in this study are demonstrated to exploit the current reimbursement system. Additionally, more governmental support of the medical-industrial complex and entrepreneurial medicine are being developed. For example, the Center for Medicare and Medicaid (CMS) is developing initiatives to encourage providers to adopt EHR technology through higher reimbursement rates rather than by mandating its use. This approach to adoption proposes to expend more money for EHR adoption, which appears to conflict with other CMS goals of decreased health care system costs through EHR use.

The State allows, protects, and perpetuates entrepreneurial medicine. Currently, grants and subsidies to increase the adoption and use of health information technologies, such as the EHR, are supported by funding from numerous governmental and

government-affiliated entities. This support promotes the use of EHRs as an entrepreneurial venture. In addition, there is currently little cost containment. Providers in this study used EHRs to exploit the current reimbursement structure put in place by the State for Medicare and adopted and used by other insurers. This system is based on utilization of codes that are proxies for the expertise needed and amount of time spent providing services to a patient. As providers are more efficient, thus reducing the time the codes are based on, and they code using higher level codes indicating provision of more complicated services, they make more money per patient than they did when using paper records. Within the current structure of reimbursement, the demonstrated use of EHRs by providers in this study suggests that this enhanced reimbursement system increases total costs the health care system.

Meso-Level Medical Sociology Theory

Meso-level medical sociology focuses on institutions and the practice of medicine. Included in this literature are theories about organizational behavior and professional practice.

The rise of managed care exposed the idea that providers are not purely altruistic as proposed by Parsons (1954), but also have business agendas as well, as demonstrated through theories of entrepreneurial medicine (Fielding, 1999; Light & Levine, 1988; Turner 1987).

The providers in this study use the EHR in ways that suggest that profit is a high if not their number one priority. All practices utilized the computer-generated billing codes instead of the paper Superbills used previously..

Providers were observed spending the majority of their work time engaged in documenting evidence to support their billing level. In one extreme example, a provider was observed spending more time searching for theappropriate billing code for a workman's compensation claim than it took for her to actually fill out the form.

Providers knowingly code at higher levels with EHRs than with paper records. Some utilize the system intentionally to maximize their billing levels. In the one software program that had the capability to view the computer-generated codes, all but one provider intentionally accessed the feature in the EHR which allowed them to view the billing code before closing out a chart. When the viewed code was not deemed appropriate, providers engaged in various activities to "upcode" (generate a higher billing code). Most often, providers went "back-in" to the electronic record and documented more (usually checking a few more symptom boxes) and reviewed the new EHR-generated code. This process was usually continued until the higher billing level was achieved. In some cases, providers overrode an EHR-generated code and manually entered a higher code. Only one provider was observed intentionally "downcoding," in one specific instance, for which a patient was paying for the visit out-of-pocket.

The general tasks of providers have remained mostly the same when using an EHR as when using paper records whereby providers are responsible for provision of care, business, and professional work. Providers engage in the same activity set when using the EHR. These activities include,

- Viewing known patient information (including notations in the patient's record, lab and procedure reports, and consultant notes)
- Inquiring about current health status indicators (ask questions)
- Conducting the physical exam
- Ordering procedures and tests
- Making a clinical decision
- Documenting current health status indicators and treatment plans
- Prescribing treatments (including prescriptions and procedures)
- Interacting with the patient and/or caregiver(s)
- Coordinating the activities of others (internal nursing, medical assistant, and lab staff, external laboratories, external specialists, hospitals, nursing homes, family members and caretakers, and reimbursers (insurance companies)
- Managing the overall operation of the practice
- Documenting current health status indicators and treatment plans by using CPT and ICD-9 codes
- Coordinating the patient care and billing activities of others (internal nursing, medical assistant, and lab staff, external laboratories, external specialists, hospitals, nursing homes, family members and caretakers, reimbursers (insurance companies)
- Formally indicating what should be billed for services provided (which for the most part are then actually billed by office support staff, not the actual provider).
- Protection from law suits through documentation
- Maintaining status (CLARIFYING)
- Training new professionals
- Maintaining personal certification
- Maintaining monopoly over services

The way providers carry out these tasks include:

- Point-and-click using a mouse or touch-screen pointer/typing to document the visit instead of handwriting or dictating
- Increased use of templates (though most are then customized)
- Some use of health maintenance/chronic care tracking
- Increased knowledge and use of billing codes by providers themselves
- Electronic billing (sometimes in addition to us of paper billing form/sometimes in place of paper billing forms)
- More documentation during a visit while with patient and just after medical encounter rather than at the end of the day
- More documentation of between visit communication (phone calls, email) rather than lost or untracked phone messages

Providers use the EHR in a ways that increase profit, manage information, and improve efficiency. Although the capability exists, the EHR is not systematically used to improve quality. For example, the EHR has the capability to track and create warnings

and alerts for allergies to medications, drug-to-drug interactions, laboratory values out of the normal range, health maintenance tests and procedures completed, and immunizations; and to provide standardized protocols through use of templates based on evidence-based research. Quality itself is not necessarily provided by use of the EHR. Rather, the way the EHR is used by providers and their staff may enhance quality of care.

The most obvious change in provider work is when and where the work is carried out. Most providers shifted from detailed documentation occurring through dictation at the end of the day to detailed documentation during the time of the medical encounter, either in the room with the patient, in a designated workspace, or in their office. Many providers also worked from home, thus blending their home and work lives.

Two new phases arise out of use of the computer during the face-to-face medical encounter. One is the distinction between information gathering or information processing and the physical examination. Previously, these two clinical functions were viewed as being more fluid and integrated. Using the computer both physically and interactionally separated out time spent working in the EHR from time spent working on or with the patient.

Micro-Level Medical Sociology Theory

Micro-level medical sociology focuses on, among other topics, the provider-patient relationship, the social construction of difficult patients, and the social construction of health and illness through interaction. (Baruch, 1981; Bury, 1986; Brown, 1996; Freund, 1990) Provider-patient interaction theories have described problems with the provider-patient relationship. Studies have shown that providers hold the power in the relationship and control the interaction. Social scientists have attempted to bring more social aspects into the provider-patient interaction. The style providers practice is is an important feature of medical care (Beckmann & Frankel, 1984; Huang, et al., 2005; Szasz & Hollendar, Toop, 1998). The recognition of the importance and value in lay persons' perspectives has become increasingly important in understanding how patients understand and cope with health conditions (Bury, 1988; Charmaz, 1983; Lawton, 2003). In addition, studies have shown links between provider-patient interactions and patient satisfaction, compliance, and health outcomes (Erger, Grusky, & Mann, 2000.; Wartman, Morlock, & Malitz, 1983).

This study shows that the EHR produces another layer of difficulty in the provider-patient interaction. Using the EHR creates both a described and observed strain on the provider-patient interaction. There is a described dual interaction, one between the provider and the patient and another between the provider and the computer. Some of the consequences of EHR use are: doctors' focus on the computer instead of on the patient, distance and alienation between the provider and the patient, decreased eye contact between the provider and the patient, changed proximity between the provider and patient, shifted body positioning, directed questioning in order to fill out the template, and truncated face-to-face time between providers and patients.

Future Research Needed

Further research is needed to indicate the impact the EHR is having on provider autonomy and dominance. This study was only a handful of providers in a very specific setting of solo and small group primary care practices. Some observational data in this dissertation suggest that nurse practitioners may use the EHR differently than male physicians. This difference may be due to gender socialization or due to philosophical and training differences between the professions. Is the EHR used differently in different practice settings, by different specialties, and by different types of providers? Secondly, does provider autonomy and dominance change over time with EHR use as the State becomes more involved in financing adoption, research, and changes in reimbursement. Is the role of other providers increased over time to allow primary care physicians to become even more specialized? Does the organization of health care altered as EHRs become more highly adopted and interoperable? Will office staff decrease to the point where it becomes a burden on the U.S. economic system whereby semi-skilled staff is displaced? Is a new role formed to manage the record itself across providers?

More research is needed to provide a comparative analysis and more depth analyses of how the EHR affects the provider-patient relationship. This dissertation demonstrates a perceived strain by providers. What are the long-term implications of this shift in interaction?

This dissertation does not take the perspective of the patient. Studies inquiring about how patients view the EHR as positive and negative are needed. As patients are

historically passive in the provider-patient interaction, it is interesting to see if patients have strong opinions about EHRs but are not open to telling their providers their ideas because of the power structure of the relationship. Although patients have historically been passive, there are contemporary movements advocating for patients' rights and patient empowerment that suggests that patients may be willing to change providers if they are not happy with their interaction and relationship with the doctor. It would be particularly interesting to talk with patients who have specifically chosen a provider or left a provider because the provider used an EHR.

Additional research is needed to understand the relationship between how the EHR is used by physicians who own the practice and have a direct financial stake in how the EHR is used for productivity and billing practices. As shown in this dissertation, providers use the EHR primarily for entrepreneurial business reasons of profit. Research is needed to address whether providers in other settings using the EHR in the same way or do they have different motivations, aims, and practice patterns? The process of working towards efficiency strains the provider-patient relationship. Providers in this study did not make many extreme changes in their practice patterns. The ones who did had the benefit of starting a practice with the EHR rather than trying to change an existing practice. Further inquiry as to what motivates the providers who work to engage in a thoughtful reflection on their workflow and practice patterns is important.

We also need more information regarding how providers and EHRs can improve quality of care. Studies looking at the impact of EHR use on quality outcomes, such as health indicators, patient satisfaction, and compliance are needed to understand the practical long-term impact of EHR use on the health of the population.

Studies are needed to investigate how providers make their clinical decisions. This includes looking at what information providers actually use to come to a clinical decision. This raises issues of why providers maintain a chart in the first place. What information is actually critical and useful in clinical decision making. If the system of error control were to undergo a complete overhaul on the order of that of the airline industry where pilots' errors became safely reportable and did not jeopardize their careers, the documentation in this manner might not be necessary.(I'm not sure this is a realistic scenario, or even if it were, whether it result in the outcome you suggest). If we move to a single payer system or a salaried payment of providers, the emphasis on documentation to legitimate billing practices may also change. Clinical decision-making might become the critical engagement of a health record. Observational data indicate that much of the information in the chart was ignored with the main emphasis on documenting current information with a limited viewing of information. If viewing of the mass of information that is documented is not actually necessary then why is this ritualistic and customary behavior maintained?. If these assumptions of the need for a health record shift, the emphasis of certain work tasks may shift to bring about a new way of practicing health care which puts the patient at the center. Currently, patients are assumed to be at the center of provider work, but in action, the document of the health record is at the center.

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APPENDIX A

INITIAL CHR AND CONSENT FORMS

COMMITTEE ON HUMAN RESEARCH: INITIAL SUBCOMMITTEE REVIEW APPLICATION FORMAT (The Shorter Format)

1. Study Aim, Background, and Design

Aim. Electronic medical records (EMRs) have the potential to improve quality of care. However, physicians must see evidence of EMR benefits exceeding EMR costs or else they will be slow to adopt EMRs and use them to improve quality. Solo/small group practices (10 physicians or less) face the most obstacles in implementing EMRs and achieving benefits. This project aims to help policy-makers to understand costs and benefits of EMRs and complementary physician practice changes that are needed in order to develop policies to hasten EMR use for quality improvement.

Background. Electronic medical records provide clinicians with the capability to electronically conduct all basic outpatient tasks. A solo/small physician group has 10 physicians or fewer.

Questions addressed include the following:

- What are EMR costs, benefits, use, time spent, and changes made in solo/small groups using EMRs?
- What are patterns of relationships among the above variables (e.g., between physician use of EMRs and benefits)?

Design. We will obtain data from staff and managers in 15 participating solo/small groups. In each practice we will: conduct semi-structured interviews of selected physicians and staff leaders of the EMR effort; conduct structured surveys of physicians and selected staff; review clinic reports from accounting, payroll, scheduling, and billing systems on EMR costs, and on pre- and post-EMR implementation productivity, utilization, and revenue; and observe physician use of EMR capabilities in the exam room.

2. Subject Population: Inclusion/Exclusion Criteria, Use of Special Subject Groups, And Methods of Access

Two to three vendors will assist us in identifying potential physician practices willing to volunteer for the project. Two vendors have agreed to participate (**see attached letters of agreement and vendor emails**). They are GE Medical Systems, which sells the Logician EMR, and PMSI, which sells the Practice Partner EMR. We are seeking the participation of a third respected vendor (e.g., NextGen), in case too few practices (that use the first two vendors' EMRs) agree to participate. The vendors have no role in sponsorship of the study. Their role is to identify practices potentially appropriate for the study.

We asked vendors to identify all practices that were using their product and that began EMR implementation during 04.01 to 02.03, then to send us a list of descriptive information on the practice, including contact persons. From each list, we will randomly select practices. We then will initiate contact with the contact person, asking for the participation of the practice. Usually the contact person will be the EMR champion, who is the physician that takes the lead in the practice in implementing the EMR. The EMR champion almost always is the key contact person with the vendor, and the vendor will supply that person's name. If the contact person is not the physician EMR champion, the researchers will ask the contact person to identify the physician champion.

We will continue this process until we have selected 12 practices from each of 2 vendors, or 8 practices from each of 3 vendors: of 24 practices agreeing to participate, we assume that at least 15 will provide needed data. The EMR champions will identify other physicians in the practice. We will contact each physician and their staff, seeking their participation. Respondents include physicians, nurse practitioners, and information systems, human resources/payroll, accounting, and billing managers and staff. We will schedule telephone or in-person interviews and provide interviewees with the **"Provider Consent Form".** We will obtain data from approximately 100 physicians and staff.

We will ask EMR champions and their office managers to provide aggregate data from existing reports on clinic operations—e.g., data on staffing levels or IT hardware and software expenses. We will ask prospective interviewees (or staff they designate) to clarify such reports. The medical anthropologist will follow each physician for a half-day, from office to hallway to exam room to unit station to hallway and so on, in order to observe the physician's use of the EMR. While outside the exam room, the physician will

use her knowledge of patients to recommend which patients are appropriate to approach. For patients the physician thinks are appropriate for the study, physician will enter the exam room with the anthropologist, and introduce the anthropologist as a researcher UCSF interested in observing how the physician uses the EMR.

3. Procedures to Be Done for Purposes of the Study

We have attached a draft of the questions that we will ask physicians and staff in our semi-structured interview protocol and structured survey. The PI and research associate will conduct the interviews in-person or by phone, and will review data reports, and ask staff to clarify aspects of the reports. No questions are controversial. We have a draft "**Survey of Physician Practice Use of EMRs" and "Questionnaire of Physician Practice Use of EMRs".** We may revise the questionnaires after initial interviews, but not substantively; we will provide any changes to the CHR.

4. Risks: Potential Risks/Discomforts to Subjects, Including Possible Loss of Confidentiality, and Methods of Minimizing These Risks

Risks and discomfort to physician and patient respondents are expected to be negligible. No medical treatment is involved, and no personal health information is collected. For physician participants, the survey questions elicit the respondents' professional judgment about topics directly related to their areas of professional interest and expertise. Researchers do not request information or opinions about their personal conduct or about any topic outside their area of professional responsibilities. Interviewee time will be 20-60 minutes.

For patient participants, in the exam room, the medical anthropologist will focus on how physicians use the EMR, not on the exam. The researcher will position herself in the exam room in order to see how the physician uses the EMR. She will not collect any personally identifiable patient data, and will not focus on observing the exam. Nevertheless, she will be in the exam room during the exam, and could observe everything that takes place in the exam room. If asked to leave at any point, she'll do so immediately.

Names of all physician practices and physicians provided by EMR vendors will be kept strictly confidential. We will not link the names of physician interviewees and the data they provide to any publicly available documents, nor use direct, attributed quotations in reports without prior, specific, and written consent from the person quoted. We will not use protected patient health information.

Completed interview protocols, any tapes, email correspondence and any other interviewee related materials or reports will be stored in a locked file cabinet or on a secure server that is password protected and that only the researchers can access. The researchers will erase interview tapes after the interview transcript has been reviewed, and not release any written, taped or computerized research materials to outside individuals or organizations.

5. Benefits: Potential Direct Benefits to Subjects and General Benefits to a Subject Group, Medical Science and/or Society

The study provides physicians with an opportunity to offer their insights, suggestions and criticisms about EMR implementations. The study may help some participants understand how to achieve greater benefits from their EMRs—including quality benefits that benefit patients. Such a study will benefit other clinicians, managers, policy makers, policy analysts, researchers attempting to increase EMR use in solo/small groups. Society as a whole stands to benefit from this study, as information from this study may accelerate EMR adoption, and EMRs may improve the delivery of care patients receive and ultimately overall patient and population health.

6. Consent Process and Documentation

Physician and patient participation is entirely voluntary. For physicians, the researchers will email the questionnaire and consent form, and ask interviewees that agree to participate to fax back a signed copy of the consent form. For patients, the physician will introduce the anthropologist (explained above), then the anthropologist will explain the project, using the attached "Patient Script", and provide the Consent Form to the patient that outlines the methods that we will use to protect confidentiality. The anthropologist will ask if the patient is willing to participate, while making it very clear that: a) the patient can say "no" to participation, or b) even if the patient consents, the patient can still stop the observation at any point, and the anthropologist will leave. For patients, email will not be used for any part of the consent procedure. At the outset of each interview or observation, the researcher will ask if the participant has any questions concerning collection and use of interview data.

7. Qualifications of Investigators

The investigator is *Robert H. Miller, Ph.D.*, Associate Professor of Health Economics in Residence, Institute for Health & Aging, Institute for Health Policy Studies, and Department of Social and Behavioral Sciences, School of Nursing, UCSF. He has led numerous projects requiring the maintenance of the privacy and confidentiality of respondents, including studies on EMRs in physician practices that use methods similar to those in this study. Dr. Miller also has conducted numerous studies on the effects of managed care. The co-investigator is *Ida Sim, M.D., Ph.D.,* who is Assistant Professor of Medicine in the Department of Medicine at UCSF, and Associate Director of Medical Informatics for the Program in Biological and Medical Informatics at UCSF. Dr. Sim has collaborated with Dr. Miller on two previous, similar projects. The *UCSF Research Associate* and *Research Assistant* are to be named.

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

PRACTICE CONSENT FORM

Costs and Benefits of Electronic Health Records in Solo/Small Groups

A. PURPOSE AND BACKGROUND

Research investigators at the University of California, San Francisco (Robert Miller, Ph.D. and Ida Sim, M.D.) are conducting a study to help understand the costs and benefits of electronic health records (EHRs) in solo/small group practices. The Commonwealth Fund is funding the study. The researchers aim to study the financial and physician time costs of EHRs, financial and quality benefits, and what factors increase benefits derived from EHR use.

Your practice is being asked to participate in this study because your practice is using an EHR.

B. PROCEDURES

If the practice agrees to be in this study, the following will happen:

1. We will collect practical practice data, i.e. economic and workflow.

2. We will take digital photographs of EHR work stations to see how the EHR is used. No patient data will be on any screen during photographing, nor will any employees be in the photos. This is only for understanding of EHR use and workflow.

C. ALTERNATIVES

The alternative is not to participate in this study.

D. RISKS/DISCOMFORTS

1. The interview questions about economics, productivity and workflow are unlikely to produce uncomfortable feelings. Nevertheless, you may stop answering the questions at any time if you feel too uncomfortable.

2. Confidentiality: Participation in research may involve a loss of privacy, but information about you will be handled as confidentially as possible. Only members of the research team will have access to your study records, audiotapes, and tape transcripts (if any). Any tapes of your interview will be erased after notes have been taken or the tapes have been transcribed. Photographs will be digital in nature and will not contain any personally identifying information of staff or patients, nor any practice

identifying information. Nevertheless, complete confidentiality cannot be guaranteed. On rare occasions, research records have been subpoenaed by a court. No individual identities will be used in any reports or publications that may result from this study without your additional, explicit, signed permission.

E. BENEFITS

There will be no direct benefit to you for participating in this study, other than the payment for participation. However, the information that you provide may help your practice, the Commonwealth Fund, as well as clinicians, managers, policy-makers and researchers better understand the potential costs and benefits of EHR implementations in CHCs and similar clinics.

F. COSTS

There will be no costs to you as a result of taking part in this study.

G. PAYMENT

Your practice will receive a $500 honorarium for providing the financial/productivity/workflow data on the practice.

H. QUESTIONS

You have had your questions answered by either Dr. Miller or the person who sent you this Consent Form. If you have any further questions about the study, you may call Dr. Miller at (415) 476-8568, or his associate, Tiffany Martin, at (415) 514 0497.

If you have any comments or concerns about participation in this study, you should first talk with the researchers. If for some reason you do not wish to do this, you may contact the Committee on Human Research, which is concerned with the protection of volunteers in research projects. You may reach the committee office between 8:00 and 5:00, Monday through Friday, by calling (415) 476-1814, or by writing: Committee on Human Research, Box 0962, University of California, San Francisco/San Francisco, CA 94143.

I. CONSENT

PARTICIPATION IN RESEARCH IS VOLUNTARY. You have the right to decline to participate or to withdraw at any point in this study.

If you agree to participate, you should sign below.

_____ _____

Signature of Study Participant Date

_____ _____

Signature of Person Obtaining Consent Date

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

EHR CHAMPION CONSENT FORM

Costs and Benefits of Electronic health records in Solo/Small Groups

A. PURPOSE AND BACKGROUND

Research investigators at the University of California, San Francisco (Robert Miller, Ph.D. and Ida Sim, M.D.) are conducting a study to help understand the costs and benefits of electronic health records (EHRs) in solo/small group practices. The Commonwealth Fund is funding the study. The researchers aim to study the financial and physician time costs of EHRs, financial and quality benefits, and what factors increase benefits derived from EHR use.

You are being asked to participate in this study because you are using an EHR in your clinic and/or are knowledgeable about data reported from your clinic's accounting, billing, human resources/payroll, or other information systems.

B. PROCEDURES

If you agree to be in this study, the following will happen:

1. We will schedule a time for *two* 60 minute interviews that are convenient for you and will send you the interview questions at least 24 hours prior to the interviews. We will also ask you to participate in a shorter follow-up interview. This procedure will be done either in-person or by phone and will be taped.

C. ALTERNATIVES

The alternative is not to participate in this study.

D. RISKS/DISCOMFORTS

2. The interview questions are unlikely to produce uncomfortable feelings. Nevertheless, you may stop answering the questions at any time if you feel too uncomfortable.

2. Confidentiality: Participation in research may involve a loss of privacy, but information about you will be handled as confidentially as possible. Only members of the research team will have access to your study records, audiotapes, and tape transcripts (if any). Any tapes of your interview will be erased after notes have been taken or the tapes have been transcribed. Nevertheless, complete confidentiality cannot be guaranteed. On rare occasions, research records have been subpoenaed by a court. No individual identities will be used in any reports or publications that may result from this study without your additional, explicit, signed permission.

E. BENEFITS

There will be no direct benefit to you for participating in this study, other than payment for your participation. However, the information that you provide may help your practice, the Commonwealth Fund, as well as clinicians, managers, policy-makers and researchers better understand the potential costs and benefits of EHR implementations in CHCs and similar clinics.

F. COSTS

There will be no costs to you as a result of taking part in this study.

G. PAYMENT

You will be paid an honorarium up to $200 for the interviews (and for helping to recruit other providers into the study).

H. QUESTIONS

You have had your questions answered by either Dr. Miller or the person who sent you this Consent Form. If you have any further questions about the study, you may call Dr. Miller at (415) 476-8568, or his associate, Tiffany Martin, at (415) 514 0497.

If you have any comments or concerns about participation in this study, you should first talk with the researchers. If for some reason you do not wish to do this, you may contact the Committee on Human Research, which is concerned with the protection of volunteers in research projects. You may reach the committee office between 8:00 and 5:00, Monday through Friday, by calling (415) 476-1814, or by writing: Committee on Human Research, Box 0962, University of California, San Francisco/San Francisco, CA 94143.

I. CONSENT

PARTICIPATION IN RESEARCH IS VOLUNTARY. You have the right to decline to participate or to withdraw at any point in this study.

If you agree to participate, you should sign below.

_____ _____

Signature of Study Participant Date

_____ _____

Signature of Person Obtaining Consent Date

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO
PROVIDER CONSENT FORM

Costs and Benefits of Electronic health records in Solo/Small Groups

A. PURPOSE AND BACKGROUND

Research investigators at the University of California, San Francisco (Robert Miller, Ph.D. and Ida Sim, M.D.) are conducting a study on the costs and benefits of electronic health records (EHRs) in solo/small group practices. The Commonwealth Fund is funding the study. The researchers aim to study the financial and physician time costs of EHRs, financial and quality benefits, and what factors increase benefits derived from EHR use.

You are being asked to participate in this study because you are a provider using an EHR in your clinic.

B. PROCEDURES

If you agree to be in this study, the following will happen:

1. We will send you a URL for a secure online survey via e-mail for you to fill out at your convenience with a unique identifying code only you will be able to use.

2. We will schedule a time when we can observe how you use the EHR in your daily work, including in the exam room with 4-10 patients. We will observe you in your office, exam room, and other places where you use the EHR.

C. ALTERNATIVES

The alternative is not to participate in this study.

D. RISKS/DISCOMFORTS

3. The survey, interview questions and observation of how you use your EHR are unlikely to produce uncomfortable feelings. Nevertheless, you may stop answering the questions or stop the observation at any time if you feel too uncomfortable.

2. Confidentiality: Participation in research may involve a loss of privacy, but information about you will be handled as confidentially as possible. Only members of the research team will have access to your study records, audiotapes, and tape transcripts (if any). Any tapes of your interview will be erased after notes have been taken or the tapes have been transcribed. Nevertheless, complete confidentiality cannot be guaranteed. On rare occasions, research records have been subpoenaed by a court. No individual identities will be used in any reports or publications that may result from this study without your additional, explicit, signed permission.

E. BENEFITS

There will be no direct benefit to you for participating in this study, other than the payment for participation. However, the information that you provide may help your practice, the Commonwealth Fund, as well as clinicians, managers, policy-makers and researchers better understand the potential costs and benefits of EHR implementations in CHCs and similar clinics.

F. COSTS

There will be no costs to you as a result of taking part in this study.

G. PAYMENT

You will be paid an honorarium up to $200 for participating in the study.

- $50 for completing the survey
- $150 for the observation of how you use the EHR

H. QUESTIONS

You have had your questions answered by Dr. Miller or the person who sent you this Consent Form. If you have any questions about the study, you may call Dr. Miller at (415) 476-8568, or his associate, Tiffany Martin, at (415) 514 0497.

If you have any comments or concerns about participation in this study, you should first talk with the researchers. If for some reason you do not wish to do this, you may contact the Committee on Human Research, which is concerned with the protection of volunteers in research projects. You may reach the committee office between 8:00 and 5:00, Monday through Friday, by calling (415) 476-1814, or by writing: Committee on Human Research, Box 0962, University of California, San Francisco/San Francisco, CA 94143.

I. CONSENT

PARTICIPATION IN RESEARCH IS VOLUNTARY. You have the right to decline to participate or to withdraw at any point in this study.

If you agree to participate, you should sign below.

_____ _____

Signature of Study Participant Date

_____ _____

Signature of Person Obtaining Consent Date

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

PATIENT CONSENT FORM

Costs and Benefits of Electronic Medical Records in Solo/Small Groups

A. PURPOSE AND BACKGROUND

Robert Miller, Ph.D. and Ida Sim, M.D., at the University of California, San Francisco are conducting a study to help understand the costs and benefits of electronic medical records (EMRs) in solo/small group practices. The Commonwealth Fund is funding the study. You are being asked to participate in this study because your physician is using an EMR in your clinic and we want to understand how your physician uses the EMR in the exam room.

B. PROCEDURES

If you agree to be in this study, the following will happen:

1. We will observe how your physician uses the EMR in the exam room during your visit. Our focus is on how your physician uses the EMR, not on the exam, and we will take notes while your physician is using the EMR. Nevertheless, the researcher will be in the exam room during the exam, and could observe everything that takes place in the exam room. You may ask the observer to leave at any time.
2. We will not ask for your name or for any other personal health information, and will not ask you any questions during the visit.
3. The total time will be the length of the visit to your physician (i.e., 10-30 minutes).

C. ALTERNATIVE.

The alternative is not to participate in this study.

D. RISKS/DISCOMFORTS

4. The observation of how your physician uses the EMR is not likely to produce uncomfortable feelings. Nevertheless, you will be able to stop the observation at any time if you feel too uncomfortable.

2. Confidentiality: Participation in research may involve a loss of privacy; however, in this research we will not collect any personal health information, and any records of this visit will be handled as confidentially as possible. Only members of the research team will have access to the records of the observation of this visit. No individual identities will be used in any reports or publications that may result from this study.

3. Participation in the study will take a total of 10-30 minutes for the observation of physician use of the EMR in the exam room.

E. BENEFITS

There will be no direct benefit to you from participating in this study. However, the information that you provide may help your physician, the Commonwealth Fund, as well as health professionals, managers, health policy-makers and researchers better understand the potential costs and benefits of EMR implementations in CHCs and similar clinics.

F. COSTS

There will be no costs to you as a result of taking part in this study.

G. PAYMENT

There will be no payment for your participation in this study.

H. QUESTIONS

You have talked to Dr. Miller or the person who signed below about this study and have had your questions answered. If you have any questions about the study, you may call Dr. Miller at (415) 476-8568, or his associate at (415) 514 0497.

If you have any comments or concerns about participation in this study, you should first talk with the researchers. If for some reason you do not wish to do this, you may contact the Committee on Human Research, which is concerned with the protection of volunteers in research projects. You may reach the committee office between 8:00 and 5:00, Monday through Friday, by calling (415) 476-1814, or by writing: Committee on Human Research, Box 0962, University of California, San Francisco/San Francisco, CA 94143.

I. CONSENT

PARTICIPATION IN RESEARCH IS VOLUNTARY. You are free to decline to be in this study, or to withdraw from it at any point. Your decision as to whether or not to participate in this study will have no influence on your present or future status as a patient.

If you agree to participate, you should sign below.

_____ _____

Signature of Study Participant Date

_____ _____

Signature of Person Obtaining Consent Date

APPENDIX B

RENEWED CHR AND PATIENT INFORMATION SHEET

COMMITTEE ON HUMAN RESEARCH: PROTOCOL

1. Study Aim, Background, and Design

Aim. Electronic medical records (EMRs) have the potential to improve quality of care. However, physicians must see evidence of EMR benefits exceeding EMR costs or else they will be slow to adopt EMRs and use them to improve quality. Solo/small group practices (10 physicians or less) face the most obstacles in implementing EMRs and achieving benefits. This project aims to help policy-makers to understand costs and benefits of EMRs and complementary physician practice changes that are needed in order to develop policies to hasten EMR use for quality improvement.

Background. Electronic medical records provide clinicians with the capability to electronically conduct all basic outpatient nonmedical tasks. A solo/small physician group has 10 physicians or fewer.

Questions addressed include the following:

- What are EMR costs, benefits, use, time spent, and changes made in solo/small groups using EMRs?
- What are patterns and of relationships among the above variables (e.g., between physician use of EMRs and benefits)?

Design. We will obtain data from staff and managers in 15 participating solo/small groups. In each practice we will: conduct semi-structured interviews of selected physicians and staff leaders of the EMR effort; conduct structured surveys of physicians and selected staff; review clinic reports from accounting, payroll, scheduling, and billing systems on EMR costs, and on pre- and post-EMR implementation productivity, utilization, and revenue; and observe physician use of EMR capabilities in the exam room.

2. Subject Population: Inclusion/Exclusion Criteria, Use of Special Subject Groups, And Methods of Access

Three EMR vendors have assisted us in identifying potential physician practices willing to volunteer for the project (**see attached letters of agreement and vendor emails**). They are GE Medical Systems, which sells the Centricity EMR; and PMSI, which sells the Practice Partner EMR; and A-4, which sells Healthmatics EMR. The vendors have no role in sponsorship of the study. Their sole role is to identify practices potentially appropriate for the study.

We asked vendors to identify all practices that were using their product and that began EMR implementation during 04.01 to 02.03, then to send us a list of descriptive information on the practice, including contact persons. From each list, we will randomly select practices. We then will initiate contact with the contact person, asking for the participation of the practice. Usually the contact person will be the EMR champion, who is the physician that takes the lead in the practice in implementing the EMR. The EMR champion almost always is the key contact person with the vendor, and the vendor will supply that person's name. If the contact person is not the physician EMR champion, the researchers will ask the contact person to identify the physician champion. We aim to identify 15 practices that can provide us with complete data.

The EMR champions will identify other physicians in the practice. We will contact each physician identified and their staff, seeking their participation. Respondents include physicians, nurse practitioners, and information systems, human resources/payroll, accounting, and billing managers and staff. We will schedule telephone or in-person interviews and provide interviewees with the **"Provider Consent Form".** We will obtain data from approximately 100 physicians and staff.

We will ask EMR champions and their office managers to provide aggregate data from existing reports on clinic operations—e.g., data on staffing levels or IT hardware and software expenses. We will ask prospective interviewees (or staff they designate) to clarify such reports. The medical sociologist will follow each physician or mid-level for a half-day, from office to hallway to exam room to unit station to hallway and so on, in order to observe the physician's use of the EMR. While outside the exam room, the physician will use her knowledge of patients to recommend which patients are appropriate to approach. For patients the physician thinks are appropriate for the study, physician will

enter the exam room with the sociologist, and introduce the sociologist as a researcher from UCSF interested in observing how the physician uses the EMR.

3. Procedures to Be Done for Purposes of the Study

We have attached a revised draft of the questions that we will ask physicians and staff in our semi-structured interview protocol and structured survey. The PI and research associate will conduct the interviews in-person or by phone, and will review data reports, and ask staff to clarify aspects of the reports. No questions are controversial. We have a draft "**Survey of Physician Practice Use of EMRs" and "Questionnaire of Physician Practice Use of EMRs".** We revised the questionnaires after initial interviews, but not substantively; we will provide any changed questionaires to the CHR.

4. Risks: Potential Risks/Discomforts to Subjects, Including Possible Loss of Confidentiality, and Methods of Minimizing These Risks

Risks and discomfort to physician and patient respondents are expected to be negligible. No medical treatment is involved, and no personal health information is collected. For physician participants, the survey questions elicit the respondents' professional judgment about topics directly related to their areas of professional interest and expertise. Researchers do not request information or opinions about their personal conduct or about any topic outside their area of professional responsibilities. Interviewee time will be 20-60 minutes.

For patient participants, in the exam room, the medical sociologist will focus on how physicians use the EMR, not on the exam. The researcher will position herself in the exam room in order to see how the physician uses the EMR. She will not collect any personally identifiable patient data, and will not focus on observing the exam. Nevertheless, she will be in the exam room during the exam, and could observe everything that takes place in the exam room. If asked to leave at any point, she'll do so immediately.

Names of all physician practices and physicians provided by EMR vendors will be kept strictly confidential. We will not link the names of physician interviewees and the data they provide to any publicly available documents, nor use direct, attributed quotations in reports without prior, specific, and written consent from the person quoted. We will not use protected patient health information.

Completed interview protocols, any tapes, email correspondence and any other interviewee related materials or reports will be stored in a locked file cabinet or on a secure server that is password protected and that only the researchers can access. The

researchers will erase interview tapes after the interview transcript has been reviewed, and not release any written, taped or computerized research materials to outside individuals or organizations.

5. Benefits: Potential Direct Benefits to Subjects and General Benefits to a Subject Group, Medical Science and/or Society

The study provides physicians with an opportunity to offer their insights, suggestions and criticisms about EMR implementations. The study may help some participants understand how to achieve greater benefits from their EMRs—including quality benefits that, in turn, benefit patients. Such a study will benefit other clinicians, managers, policy makers, policy analysts, and researchers attempting to increase EMR use in solo/small groups. Society as a whole stands to benefit from this study, as information from this study may accelerate EMR adoption, and EMRs may improve the delivery of care patients receive and ultimately overall patient and population health.

6. Consent Process and Documentation

Provider and patient participation is entirely voluntary. For physicians and Nurse Practitioners, the researchers will email the questionnaire and have the providers sign a written consent form, and ask interviewees that agree to participate to fax back to the researchers a signed copy of the consent form if conducted by phone, and obtained in person if conducted in the field.

For patients, having been introduced by the physician, the medical sociologist will explain the project, provide to the patient and summarize the attached Patient Information sheet that explains the methods that we will use to protect patient confidentiality. The sociologist will ask if the patient is willing to participate, while making it very clear that: a) the patient can say "no" to participation, or b) even if the patient consents, the patient can still stop the observation at any point, and the anthropologist will leave. We will request verbal consent from patients. For patients, email will not be used for any part of the consent procedure. At the outset of each interview or observation, the researcher will ask if the participant has any questions concerning collection and use of interview data.

7. Qualifications of Investigators

The investigator is *Robert H. Miller, Ph.D.*, Associate Professor of Health Economics in Residence, Institute for Health & Aging, Institute for Health Policy Studies, and Department of Social and Behavioral Sciences, School of Nursing, UCSF. He has led numerous projects requiring the maintenance of the privacy and confidentiality of respondents, including studies on EMRs in physician practices that use methods similar to those in this study. Dr. Miller also has conducted numerous studies on the effects of managed care. The co-investigator is *Ida Sim, M.D., Ph.D.,* who is Assistant Professor of Medicine in the Department of Medicine at UCSF, and Associate Director of Medical Informatics for the Program in Biological and Medical Informatics at UCSF. Dr. Sim has collaborated with Dr. Miller on two previous, similar projects. The *UCSF Research Associate* and *Research Assistant* are to be named.

The Field Research Associate, Tiffany Martin, M.A. is a Medical Sociology Ph.D. student who has been trained in and previously employed both interviewing and participant observation methods.

The Field Research Associate, Chris Ganchoff is a Medical Sociology Ph.D. candidate who has been trained in field methods.

The technology-based Research Associate, Chris West, B.A. is a Health Informatics Ph.D. student.

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

PATIENT INFORMATION SHEET

Costs and Benefits of Electronic Medical Records in Solo/Small Groups

A. PURPOSE AND BACKGROUND

Robert Miller, Ph.D. and Ida Sim, M.D., at the University of California, San Francisco are conducting a study to help understand the costs and benefits of electronic medical records (EMRs) in solo/small group practices. The Commonwealth Fund is funding the study. You are being asked to participate in this study because your physician is using an EMR in your clinic and we want to understand how your physician uses the EMR in the exam room.

B. PROCEDURES

If you agree to be in this study, the following will happen:

1. We will observe how your physician uses the EMR in the exam room during your visit. Our focus is on how your physician uses the EMR, not on the exam, and we will take notes while your physician is using the EMR. Nevertheless, the researcher will be in the exam room during the exam, and could observe everything that takes place in the exam room. You may ask the observer to leave at any time.

4. We will not ask for your name or for any other personal health information, and will not ask you any questions during the visit.

5. The total time will be the length of the visit to your physician (i.e., 10-30 minutes).

C. ALTERNATIVE.

The alternative is not to participate in this study.

D. RISKS/DISCOMFORTS

5. The observation of how your physician uses the EMR is not likely to produce uncomfortable feelings. Nevertheless, you will be able to stop the observation at any time if you feel too uncomfortable.

2. Confidentiality: Participation in research may involve a loss of privacy; however, in this research we will not collect any personal health information, and any records of this visit will be handled as confidentially as possible. Only members of the research team will have access to the records of the observation of this visit. No individual identities will be used in any reports or publications that may result from this study.

3. Participation in the study will take a total of 10-30 minutes for the observation of physician use of the EMR in the exam room.

E. BENEFITS

There will be no direct benefit to you from participating in this study. However, the information that you provide may help your physician, the Commonwealth Fund, as well as health professionals, managers, health policy-makers and researchers better understand the potential costs and benefits of EMR implementations in CHCs and similar clinics.

F. COSTS

There will be no costs to you as a result of taking part in this study.

G. PAYMENT

There will be no payment for your participation in this study.

H. QUESTIONS

You have talked to Dr. Miller or the researcher conducting the observation _____ about this study and have had your questions answered. If you have any questions about the study, you may call Dr. Miller at (415) 476-8568, or his associate at (415) 514-0497.

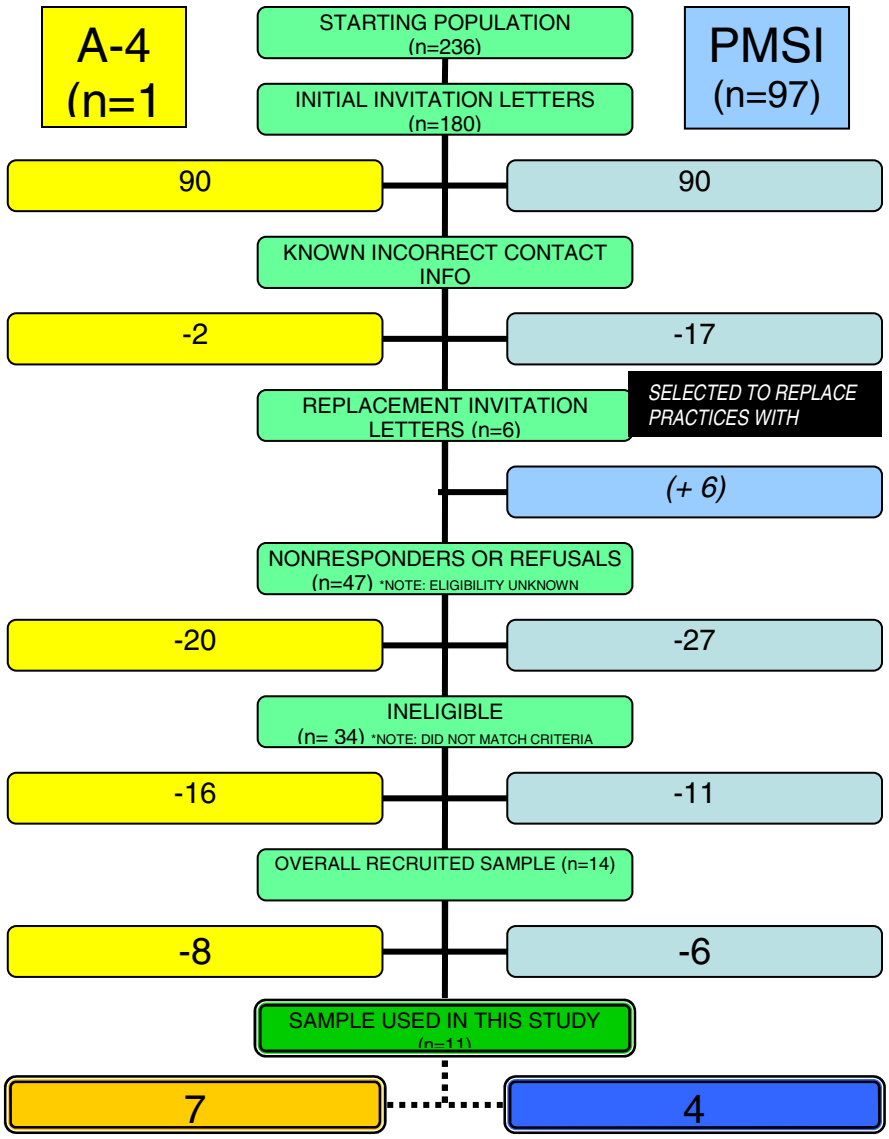
If you have any comments or concerns about participation in this study, you should first talk with the researchers. If for some reason you do not wish to do this, you may contact the Committee on Human Research, which is concerned with the protection of volunteers in research projects. You may reach the committee office between 8:00 and 5:00, Monday through Friday, by calling (415) 476-1814, or by writing: Committee on Human Research, Box 0962, University of California, San Francisco/San Francisco, CA 94143.

I. CONSENT

PARTICIPATION IN RESEARCH IS VOLUNTARY. You are free to decline to be in this study, or to withdraw from it at any point. Your decision as to whether or not to participate in this study will have no influence on your present or future status as a patient.

APPENDIX C

SAMPLING PROCEDURE



APPENDIX D

RECRUITMENT LETTER

August 16, 2004

Name of contact
Practice address

RE: UCSF/Commonwealth Fund study of costs and benefits of Electronic Health Records (EHRs)

Dear *name of contact*:

My colleague, Ida Sim, MD, PhD, and I invite your practice to participate in a study on the costs and benefits of EHRs in solo and small primary care practices. We will examine factors that decrease costs and increase benefits for users of A4, GE, and PMSI EHRs. Your name was provided to us by (name of vendor practice is using), but this is a completely independent academic research study that is conducted by UCSF researchers and is funded and supported by The Commonwealth Fund.

We wish to collect the following data on your practice's EHR use:

- EHR-related practice costs and benefits (e.g., hardware/software costs)
- Provider satisfaction with the EHR (25-minute survey of each provider)
- How the EHR was selected, implemented, and is used, and your perception of the effects of EHR use (Two 60 minute interviews with you, as EHR champion, plus a shorter follow-up interview)
- How you and other providers use the EHR (via observation of provider EHR use)

The products of this research will be at least 2 papers submitted to peer-reviewed journals to provide much-needed evidence on EHR costs and benefits in small practices. The evidence will help other physicians that are considering EHR adoption and will help policy-makers that are developing financial incentives for EHR use.

This study can provide several *benefits* to you and your colleagues. It can:

- Enable you to better understand the costs and benefits of your own EHR use
- Compare your practice's EHR-related costs and benefits to other small practices in the study, and provide examples of how other small practices increased benefits
- Reimburse you and your practice for participating (Up to $*amount calculated based on number of billing providers in the practice*

All study protocols have been approved by the Committee on Human Research at UCSF. We will keep the names of all practices and interviewees strictly confidential.

We urge you and your colleagues to participate in our study and share your experiences using EHRs. Please respond by mailing the attached card, or contact me or my associate, **Tiffany Martin** at **(415) 514-0497** or **tmartin9@itsa.ucsf.edu**. If we haven't received your reply within 10 days, we will call to follow-up with you and answer your questions.

Sincerely,

Robert H. Miller, PhD
Associate Professor of Health Economics

Ida Sim, MD, PhD
Assistant Professor of Medicine

UCSF/Commonwealth Fund Study on the Costs and Benefits of EHRs

What we are asking of your practice

1) Completion of a secure online survey by providers at their convenience; the survey takes 20-30 minutes

2) Interviews with the EHR Champion to answer a series of open-ended questions about the EHR implementation; we will conduct two 60 minute interviews and a shorter follow-up interview

3) Help in determining the financial costs and benefits of the EHR to your practice.

We need already existing:

- Accounting/financial information, to determine the cost of hardware/software and related purchases
- Billing information, to determine changes in provider productivity
- Payroll information, to determine what staff you added for the implementation, and what staff you reduced (if any) after implementation

4) Observation of how the providers in your practice use the EHR in their daily work-- in the office, exam room, and other places where the EHR is used; a trained medical sociologist will "shadow" each provider for a typical half-day session; the observation will have NO effect on your visit volume

What we want to determine

- Use of EHR capabilities
- Costs of using EHR in primary care practices
- Benefits of using the EHR
- Factors that affect those costs and benefits
- Satisfaction with the EHR

What we plan to do with the data

- We expect to publish the results in peer-reviewed journals
- Help policy-makers create incentives that can financially reward practices that use EHRs
- Help you understand how other, similar practices use their EHRs to obtain benefits
- Help other physicians decide whether or not to purchase EHRs

How we address potential concerns

- **Strict confidentiality is our policy--**your identity and the practice's identity will be confidential.
- **We will *not* collect personal health information; patients must consent to the observation**
  We will NOT collect any personal information about your patients when we observe your use of the EHR. HIPAA personal health information regulations do *not* apply. We will ask patient consent to permit a researcher to observe provider use of the EHR during the medical encounter; if a patient does not consent, we will not observe that encounter.

Who we are

Robert H. Miller, Ph.D., the Primary Investigator, is an economist and Associate Professor in the Department of Social and Behavioral Sciences at the University of California, San Francisco. His expertise is in health economics; economics of electronic medical records and e-prescribing in physician practices; organizational innovation in physician practices; and the effects of managed care.

Ida Sim, M.D., Ph.D., the Co-Primary Investigator, is an Assistant Professor in the Department of General Internal Medicine and Associate Director for Medical Informatics at the University of California, San Francisco. Her expertise is in decision support systems for evidence-based practice; publication and registration of randomized trials into structured knowledge bases (trial banks); and economics of health information technology.

Tiffany N. Martin, M.A., the Project Manager, is a Medical Sociologist. Her expertise is in provider-patient interaction and health disparities.

Chris Ganchoff, M.A., a Research Associate, is also a Medical Sociologist. His experience is in workflow of medical settings.

Chris West, is a Medical Informaticist. His expertise is in the technical aspects of the EHR and research project.

Participation/Questions/Concerns

If you have decided to participate or would like any questions or concerns about participating in our study addressed, please contact **Tiffany Martin** at **(415) 514-0497** or **tmartin9@itsa.ucsf.edu or** Chris West at **(415) 514-4342** or **cwest@itsa.ucsf.edu**.

APPENDIX E

OVERVIEW OF SAMPLE

TYPEOF PRACTICE	Observation	Interview(s)	Economic Records	Study Data Associated with
Practice 1 Location: South Atlantic Providers: 2 MD (full-time) 2 FNP (share 1 FTE) Payer Mix: 69% Private insurance >10% Medicare 22% Self-pay Does not accept Medicaid unless rollover from Medicare	ALL	Family Nurse Practitioner Office Administrator	YES	*Costs and Benefits of Implementing Electronic Medical Records in Solo/Small Group Practices* Funded by: Commonwealth Foundation
Practice 2 Location: West South Central Providers: 1 MD (full time) 1 NP (50%) Payer Mix: 25% Private insurance 65% Medicare 5% Medicaid 5% Self-pay	ALL	Physician	YES	*Costs and Benefits of Implementing Electronic Medical Records in Solo/Small Group Practices* Funded by: Commonwealth Foundation
Practice 3 Location: West South Central Providers: 4 MD (full-time) 2 NPs (full-time) 1 PT (full-time) *One MD left Payer Mix: 54% Private Insurance 30% Medicare 6% Medicaid 10% Self-pay	ALL	Physician Office Administrator	YES	*Costs and Benefits of Implementing Electronic Medical Records in Solo/Small Group Practices* Funded by: Commonwealth Foundation
Practice 4 Location: West North Central Providers: 4 MD (full-time) 1 NP (full-time) Payer Mix: 30% Private Insurance 20% HMO 30% Medicare 20% Self-pay	ALL	Physician/CEO Office Manager Billing Specialist	YES	*Costs and Benefits of Implementing Electronic Medical Records in Solo/Small Group Practices* Funded by: Commonwealth Foundation

Practice 5 Location: Rocky Mountain Providers: 2 MD (full-time) 1 NP (full-time) Payer mix: 80% Private insurance 7% Medicare 3% Medicaid 10% Self-pay	ALL	Physician Office Manager	YES	*Costs and Benefits of Implementing Electronic Medical Records in Solo/Small Group Practices* Funded by: Commonwealth Foundation
Practice 6 Location: South Atlantic Providers: 1 MD (full-time) 1 NP (80%) Payer Mix: Unclear information	ALL	Physician Office Manager	YES	*Costs and Benefits of Implementing Electronic Medical Records in Solo/Small Group Practices* Funded by: Commonwealth Foundation
Practice 7 Location: East South Central Providers: 3 MD (full-time 1 PA (full-time) Payer mix: 65% Private insurance 25% Medicare 2% Medicaid 8% Self-pay	ALL BUT ONE PROVIDER NOT USING EHR	Physician/President Office Manager	YES	*Costs and Benefits of Implementing Electronic Medical Records in Solo/Small Group Practices* Funded by: Commonwealth Foundation
Practice 8 Location: Pacific Providers: 1 MD (Full-time) 2 NP (Full-time; One leaving practice) Payer Mix: 54% Fee-for-service private insurance 46% Capitation	2 OF 3	Physician Office Manager	YES	*Costs and Benefits of Implementing Electronic Medical Records in Solo/Small Group Practices* Funded by: Commonwealth Foundation
Practice 9 Location: East North Central Providers: 1 MD (95%) 3 DO (95%) 1 PA (95%) Payer Mix: 35% Private insurance 20% Medicare 20% Medicaid 25% Self-pay	ALL	Physician Office Manager	YES	*Costs and Benefits of Implementing Electronic Medical Records in Solo/Small Group Practices* Funded by: Commonwealth Foundation

Practice 10 Location: Pacific <u>Provider:</u> 1 MD (full-time) <u>Payer Mix:</u> Unclear information	ALL	Physician Wife (Office Manager part-time)	YES	*Costs and Benefits of Implementing Electronic Medical Records in Solo/Small Group Practices* Funded by: Commonwealth Foundation
Practice 11 Location: South Atlantic <u>Providers:</u> 2 MD (full-time) <u>Payer Mix:</u> 56% Private insurance 34% Medicare 10% Self-pay	ALL	2 Physicians Office Manager	YES	*Costs and Benefits of Implementing Electronic Medical Records in Solo/Small Group Practices* Funded by: Commonwealth Foundation
INTERVIEW 1	NO			*Medical Providers' Views of the Effects of Electronic Health Records on Provider-Patient Interactions* Unfunded
INTERVIEW 2	YES			*Medical Providers' Views of the Effects of Electronic Health Records on Provider-Patient Interactions* Unfunded
INTERVIEW 3	NO			*Medical Providers' Views of the Effects of Electronic Health Records on Provider-Patient Interactions* Unfunded
INTERVIEW 4	NO			*Medical Providers' Views of the Effects of Electronic Health Records on Provider-Patient Interactions* Unfunded

INTERVIEW 5	NO			*Medical Providers' Views of the Effects of Electronic Health Records on Provider-Patient Interactions*

APPENDIX F

PROTOCOL VIOLATION FORM INDICATING ACCEPTED PROTOCOL CHANGE

PROTOCOL VIOLATION or INCIDENT REPORTING FORM
CHR Guidance on *Reporting Violations and Incidents In Research Protocols* is posted on the CHR website.

CHR Approval # and Study Title:
H7010-23846-01
Costs and benefits of implementing electronic medical records in solo/small group practices

Principal Investigator: Robert H. Miller	Person Completing Form: Robert H. Miller and Tiffany Noelle Martin
Date of Protocol Violation or Incident: 8/31/04-9/15/04	Date Form Completed:09/22/04 Subject ID #: N/A

Type of Protocol Violation:
[ ] Randomization of ineligible subject
[ ] Eligibility criteria exception approved by the Sponsor
[ ] Screening procedure/lab work required by protocol not done
[ ] Screening or on-study procedure/lab work done outside the protocol required time
[X] On-study procedure required by protocol not completed
[ ] Incorrect research treatment or intervention given to subject *
Type of Incident
[X] Problem with the informed consent process *
[ ] Breech of confidentiality *
[ ] Participant Research-related Concern *
[ ] Staff Research-related Concern *
[ ] Other:_____ *
**Please provide explanation for each event in the Narrative section below*

Narrative (all narratives ***must*** include brief responses to the following four questions):

1. How did the violation or incident happen?

Tiffany Martin is a Graduate Student Researcher on the project, who has been conducting on-site interviews. This is her account of how the violation happened. Please keep in mind that the project collects NO personal health information from patients.

"In most cases, the consenting procedure occurred as outlined in the protocol—patients either gave me written consent or refused to participate. The violation occurred in cases

when patients received a verbal (and not written) explanation of the project and/or gave a verbal (and not written) consent to participate. There are two ways that the violation occurred:
1. At one practice (site), the physician in charge wanted to do verbal consents as to not disrupt workflow. The physician said that the patients are used to having residents in the room all the time and it would be better just to verbally explain about the study, and ask patients if it was okay for me to be in the room.
2. At some of the practices, the physician in charge agreed to written consents: either the front office staff and/or the nursing staff were to consent the patient, using the informed consent form, before I entered the room. The violation occurred when the front staff and/or nurse would forget to give the patient a consent form before the physician entered the exam room. The providers would then complain that it was disrupting their flow for me to give the patients the form, have them read it, and then sign and give consent while the physician was present--it took up the physician's time and made them fall behind in their schedules. Therefore, the providers at some practices opted to verbally consent the patient as soon as they entered the exam room for the medical encounter—sometimes I would provide the patient the written consent form at the point of the medical encounter, but sometimes that did not occur.

Ex. Incident 1 (8/31/04) The provider walked in the room (I followed) and started talking before I could look for the consent form. At the first pause in the exchange between the patient and provider, I asked if the patient had gotten a consent form. The patient said no. The physician then told the patient that I was shadowing him in order to look at how he used the "computer thingy"—and that I didn't care about information about the patient. The physician asked the patient if it was okay if I stayed and that the patient could ask me to leave at any point. The patient agreed."

2. What are the consequences of the event (if any).
"Providers saw this process as inefficient and time-consuming—it put the physicians behind in their schedules and made patients wait for their appointments and potentially shortened the visit as the provider was trying to catch up

A negative consequence to the provider (physician or nurse practitioner) was they wasted time during an encounter trying to determine if the patient had in fact consented in writing, and if not, then had to take time to obtain a written consent from the patient; they also complained about having to (between patient visits) go to remind the front office/nurse staff to give the written consents to future patients; meanwhile, I had to walk back and forth between the front office and exam rooms, to also remind staff to do the consenting. In some cases, the current written consenting process created frustration and tension between the providers, administrator (if there was one at that specific practice), nurses, and the front office staff."

3. What did you do in response to the violation or incident occurring?
"In every case, if the physician or nurse did not ask for written consent, I would briefly

explain the project verbally, ask if it was okay for me to be in the room, and tell them that they could ask me to leave at any time. Some patients did refuse (this occurred multiple times), showing that patients did feel comfortable to say "no; when patients refused, I immediately left the room, and waited for the provider either in the physician's office or at the nurse's station. Other patients consented, but asked that I leave during the physical exam portion, which I did. Most patients consented and did not ask me to leave during the physical exam. In all cases when a physical examination portion of the encounter was conducted and I was in the room, I turned and faced away from the patient in order to give the patient as much privacy as possible."

4. What measure(s) have you taken to assure that the violation or incident does not happen again?
"While in the field, I gave the paper consent forms to both the front office and to the nurses to give to the participants and continually asked the nurses to check to make sure they received one. I also tried to carry copies with me into the exam room.
After returning from the field, at the suggestion of CHR staff, we are proposing to modify our protocol and consenting process, so that we give the patients an information sheet, and ask patients for verbal consent."

Is a study protocol or informed consent document modification needed? [X] Yes [ ] No
If yes, please attach modification
(http://www.research.ucsf.edu/chr/Guide/chr07_ModApp.asp)

Consequence/Action Taken (may check more than one response):

- [ ] Study treatment has been permanently stopped
- [ ] Study treatment has been temporarily stopped
- [ ] Approved study data analysis plan modified
- [ ] Sponsor or cooperative group Study Chair notified (whichever is applicable)
  date:_____
- [ ] Other: _____

Other comments (optional):
The patient consenting process in the original protocol was disruptive to the patients and the staff. It added more work for the staff, took physician time away from treatment, as well as drew more attention to the researcher being an outsider as an observer, hence our request to modify the consenting procedure.

This form is being filed later than the 10 day period from the time of the first incident because the observer/researcher was in the field for 6 weeks before returning to San Francisco; however, the form has been filed within 10 days of the researcher's return.

Principal Investigator's Signature: _____ Date: _____

APPENDIX G

STRUCTURED SURVEY AND SURVEY MONKEY LAYOUT

UCSF-Commonwealth Survey on EHRs in Solo/Small Groups

1. Background Information and Demographics

1. What is your gender?
Male
Female

2. What is your specialty?
Family Medicine
Internal Medicine
Other (please specify)

3. In what year did you complete your residency? (Please choose from drop-down menu)
1950-2004 (listed by year)
Other, please specify

4. What year were you born? (Please choose from drop-down menu)
1930-2004 (listed by year)Other, please specify

5. How long have you been using an EHR? (Please choose from drop-down menu)
12 months – 36 months (3 years) (listed by number of months with years in parentheses)
Other, please specify

6. Before starting to use the EHR, was your practice already full?
Yes**7. Is your practice full now?**
Yes
No

8. Where is your primary professional practice?
This office
Another clinic site of the same practice
Hospital
Community Health Center
Another small group office
Other (please specify)

2. Hours per week on activities

Please indicate hours per week spent on each of the following...

9. Working in the office
Free text answer

- **10. Conducting home or Skilled Nursing Facility visits**
- Free text answer

11. Working at home (related to patient care)
Free text answer

3. EHR Use

12. BEFORE THE EHR, how did you document progress notes?

	Always	Very often	Fairly often	Sometimes	Almost never	Never
Hand-wrote notes						
Dictated						
Used paper forms (templates)						
Other						

13. Other (Please specify)

14. CURRENTLY, how do you document progress notes?

	Always	Very often	Fairly often	Sometimes	Almost never	Never
Hand-write notes						
Dictated						
Type free text into EHR						
Use structured data entry						

forms in the EHR (templates)						
Use paper forms (templates)						
Other						

15. Other (Please specify.)

16. How often do you document...

	Always	Very often	Fairly often	Sometimes	Almost never	Never
While the patient is present						
Immediately after the patient has left						
Later in the day at the office						
Later in the day, after leaving the office						

17. Other. Please specify.

18. How do you document when the patient is present?

Do you...

	Always	Very often	Fairly often	Sometimes	Almost never	Never
Hand-write notes						
Dictate						
Type free text into EHR						
Use structured data entry						

forms in the EHR (templates)						
Use paper forms (templates)						
Other						

19. Do you use handwriting recognition software?
Always
Very often
Fairly often
Sometimes
Almost never
Never

20. Do you use voice recognition software?
Always
Very often
Fairly often
Sometimes
Almost never
Never

21. For approximately what % of your visits do you currently obtain a paper chart?
0-20%
21-40%
41-60%
61-80%
81-100%

22. How many different structured data entry forms (i.e. templates) do you use at least once a week?

1
2-5
6-10
11-15
15-25
>25

23. What templates do you use most often (e.g., for certain diseases, visit-types etc)? (Please type in your answer. If none, type none)
Free text box provided

24. Do you use templates that... (check all that apply)

	YES	NO
Came with the program or from a 3rd party vendor		
You modified yourself		
Other colleagues modified		
Have checkboxes that produce coded and searchable data		

25. What is your preferred way of documenting? (Please mark one method)

Hand-write notes
Dictate
Type free text into the EHR
Use structured data entry forms
Use paper forms
Other (please specify)

26. How often do you use the EHR to …

	Always	Very often	Fairly often	Sometimes	Almost never	Never
Review your schedule						
Access patient charts						
View past visit data						
Document the visit						
View lab test results						
View consultant reports						
View information from other facilities						

(e.g., hospital, nursing home)						
Check past medications						
Prescribe medications						
Access information on drugs and diseases						
Order referrals						
Order lab tests						
Respond to/follow-up with lab test results						
Document phone calls						
Document services provided at other facilities						
Record CPT codes						
Record ICD-9 codes						
Charge for services provided in the office						
Provide patient educational material						
Message with other providers						
Message with patients						

27. When patients are in the room, how often do you use the EHR to …

	Always	Very often	Fairly often	Sometimes	Almost never	Never
Review your schedule						
View past visit data						
Check medications						
View lab test results						
View consultant reports						
Prescribe medications						
Order referrals						
Order lab tests						
Document the visit						
Record CPT codes						
Record ICD-9 codes						
Provide patient educational material						
Send chart to billing						
Message with other providers						

1. Background Information and Demographics

*** 1. What is your gender?**

Male
Female

*** 2. What is your specialty?**

Family Medicine
Internal Medicine
Other (please specify)

Add Question | Add Page

Edit | Delete | Copy/Move | Add Logic

*** 3. In what year did you complete your residency? (Please choose from drop-down menu)**

Add Question | Add Page

Edit | Delete | Copy/Move | Add Logic

*** 4. What year were you born? (Please choose from drop-down menu)**

Add Question | Add Page

Edit | Delete | Copy/Move | Add Logic

*** 5. How long have you been using an EHR? (Please choose from drop-down menu)**

Add Question Add Page

Edit Delete Copy/Move Add Logic

*** 6. Before starting to use the EHR, was your practice already full?**

Yes No

Add Question Add Page

Edit Delete Copy/Move Add Logic

*** 7. Is your practice full now?**

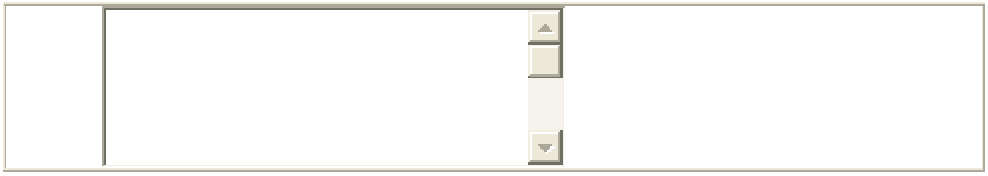
Yes No

Add Question Add Page

Edit Delete Copy/Move Add Logic

*** 8. Where is your primary professional practice?**

- This office
- Another clinic site of the same practice
- Hospital
- Community Health Center
- Another small group office
- Other (please specify)



2. Hours per week on activities

Edit Page | Delete Page | Copy/Move | Add Logic

Please indicate hours per week spent on each of the following...

Add Question | Add Page

Edit | Delete | Copy/Move

*** 9. Working in the office**

Add Question | Add Page

Edit | Delete | Copy/Move

*** 10. Conducting home or Skilled Nursing Facility visits**

Add Question | Add Page

Edit | Delete | Copy/Move

*** 11. Working at home (related to patient care)**

Add Question | Add Page

3. EHR Use

Edit Page | Delete Page | Copy/Move | Add Logic

Add Question | Add Page

Edit | Delete | Copy/Move

*** 12. BEFORE THE EHR, how did you document progress notes?**

	Always	Very often	Fairly often	Sometimes	Almost never	Never
Hand-wrote notes						
Dictated						
Used paper forms (templates)						
Other						

Add Question Add Page

Edit Delete Copy/Move

13. Other (Please specify)

Add Question Add Page

Edit Delete Copy/Move

*** 14. CURRENTLY, how do you document progress notes?**

	Always	Very often	Fairly often	Sometimes	Almost never	Never
Hand-write notes						
Dictate						

Type free text into EHR						
Use structured data entry forms in the EHR (templates)						
Use paper forms (templates)						
Other						

Add Question Add Page

Edit Delete Copy/Move

15. Other (Please specify.)

Add Question Add Page

Edit Delete Copy/Move

16. How often do you document...

	Always	Very often	Fairly often	Sometimes	Almost never	Never

APPENDIX H

INTERVIEW PROTOCOL

Name of practice: _____

Name of respondent: _____

Name of interviewer: _____

Date: _____

Phone / In-person

PRE-interview

- ❑ Email/Fax PDF file of questions to respondent
- ❑ Email/Fax consent to respondent
- ❑ Make sure you have received fax of signed consent back from respondent. (If not, at minimum get verbal consent first thing during the interview.)
- ❑ Make sure tape recorder is working and on the correct settings
  - VOR OFF (not ON)
  - TAPE SPEED 2.4cm (not 1.2cm)
  - LOCK OFF
  - CONF (not DICT)
- ❑ Make sure microphone is plugged in the correct slot
- ❑ Make sure microphone is turned on
- ❑ Have extra tapes/batteries readily available
- ❑ Label the first tape with practice name, name if respondent and date and # of tape used (i.e. 1st tape- label 1)
- ❑ Speak on the first tape introducing the practice number, practice name, name of respondent, who conducted the interview and date.
- ❑ Check to make sure the tape recorder is working properly (based on intro)

During interview

- ❑ Obtain verbal consent for participating (if was not able to obtain written consent by fax)
- ❑ Obtain verbal consent for taping
- ❑ Let respondent know who else is listening in on the conversation (if applicable)
- ❑ Set up time to continue interview (if necessary).
- ❑ Set up/Confirm date of observation

At end of interview:

- ❑ Make sure tape recorder turned off
- ❑ Make sure microphone turned off
- ❑ Label tape(s) with practice #, name of practice, name of respondent, date.

- Put note on tape(s) used telling Practice #, name of practice, respondent, person who interviewed, date and rubber band the note to the tape(s)
- Put tapes either in locked cabinet or on Bob's desk. (Can not be left out in cubicle b/c of confidentiality/security of data.)
- Let Bob know, so it/they can be transcribed.

APPENDIX I

ORIGINAL SEMI-STRUCTURED INTERVIEW QUESTIONS

Electronic Health Records in Ambulatory Care
University of California, San Francisco

Background

1. When did you start using the EHR? ___/___ (mo/year)
   - Did all providers start at the same time? Yes/No
   - Did you phase in functionality over time? Yes/No
2. How many billing providers and billing provider FTEs do you have?

Provider Type	# Providers now	#Provider pre-EHR	# FTEs now	# FTEs pre-EHR
Family medicine				
Internal medicine				
Pediatrics				
Other primary care				
Specialists: Type _____				
Nurse practitioners				
Physician assistants				
Other				

3. How many sites in your practice? ____ (#)
4. How many <u>medical</u> encounters did your practice have in 2003? ____ (#)
   - How many medical encounters did you have in the year BEFORE the EHR? ____ (#)
   - How many medical encounters in the year AFTER starting to use the EHR? ____ (#)
5. What proportion of your patients have private, Medicare, Medicaid, no, or other insurance?

• Private insurance ____ %	• Self-pay/uninsured ____ %
• Medicare insurance ____ %	• Other ____ % (specify)
• Medicaid ____ %	

6. What proportion of income comes from non-patient revenue sources (e.g., grants, trials)?
7. What percentage of your patient revenues come from fee-for-service or capitation?

• Discounted fee-for-service? ___ %	• Quality bonus? ____ %
• Flat rate per visit? ____ %	• Other ____ % (specify)
• Primary care capitation? ____ %	

8. How are providers paid? What % of provider salary is:

• Straight salary? ___ %	• Panel based? ___ %
• Performance based? ___ %	• Other ___ % (specify)

Software, hardware and support

9. What information systems software do you have NOW and PRE-EHR?

Information system	Software (if any) before EHR	Software after EHR	When acquired?
EHR			
Practice management			
Laboratory			
Payroll			
Accounting			
Other			

10. What is your practice management system? Name _____
    - Did you install it when you installed the EHR? Yes/No
    - Do you have a **two-way** exchange of data between EHR & PMS? *Yes/No* *If yes:*
        - Is it real-time? *Yes/No*
        - What data flows from the PMS to the EHR?
        - What data flow from the EHR to the PMS?
    - Do you have a **one way** exchange of data from the PMS to the EHR? *Yes/No* *If yes:*
        - Is it real-time? *Yes/No*
        - What data flows from the PMS to the EHRs?
    - How difficult was it to implement a data exchange interface between the EHR & PMS?
    - How would you improve the exchange of data between the PMS and EHR?
11. Do you have an internal lab system? *Yes/No* *If yes:*
    - Does data flow from the lab system into the EHR through an interface?
12. Do you receive electronic data from external labs? *Yes/No* *If yes:*
    - Which external lab(s)
    - Do you have an interface between the lab(s) and your EHR? *Yes/No*
    - How much time and money did it take to obtain the interface?
13. Do you receive electronic data from other external sources (hospitals, consultants)?
    - Which external sources?
    - What interfaces did you create?
    - How much time and money did it take to obtain the interface(s)?
    - What data exchange would you like?
14. Have you had any problems with breaches of security or confidentiality of data? *Yes/No*

EHR selection and implementation

15. What is your organization's overall governance & EHR governance?
    - Who (or which governing body) gave the go-ahead to purchase the EHR?
    - Who (or which governing body) regularly reviews EHR implementation and use?
    - What your legal and contractual relationships to affiliated entities, if any?

16. What was the EHR selection process?
    - When did you select the EHR? ___ (year/month)
    - How did you select the EHR (demonstrations, site visits)?
    - How long did it take to select it? ___ (# months)

17. What was the EHR contracting process?
    - When did you sign the contract? ___ (date)
    - How long did it take to negotiate? ___ (# months)
    - Were you satisfied with the contracting process?

18. What was the EHR implementation process?
    - When did you start and finish actual implementation From _____ to _____
    - Did you have an EHR project team? *Yes/No*
        - IF YES: What did it do?
    - Did you have a pilot site? *Yes/No*
    - Did you implement site by site? *Yes/No*
    - Did you implement all functionality at once or function by function?
    - How did you implement the EHR? Describe what you did for each of the following:

Activity	**What you did**
Hardware/software setup	
Clinician/staff training	
Workflow redesign	
Pre-populating EHR database (abstracting)	
Templates	
Interfaces	
Onsite support during implementation	
Post-implementation support	
Software customization	
Other	

Be sure to describe all workflow redesign, and how you achieved it.

- What would you do differently now?

19. What was the EHR leadership?
    - Which leaders championed getting the EHR?
    - Which governing bodies (if any) had to approve major EHR-related decisions?
    - How supportive was the practice leadership for the EHR?
    - Were EHR leaders different from other clinic leaders?
    - What were their roles in selecting and implementing the EHR?

20. Why did you adopt an EHR?

We adopted an EHR because we expected:	**1 = important, 5= not important**
To cut costs	
To improve patient satisfaction	
To improve quality	
To increase our billing capability	
Other (specify)	

    - Did you meet your expectations? *Yes/No*

21. How did you finance the EHR?
    - How did you finance initial EHR costs? (e.g., bank loan, reserves, windfall, hospital).

EHR costs

22. What were your EHR-related hardware costs—*initial* and *on-going*?

Type of hardware	**Initial cost**	**% cost specifically for EHR**	**On-going cost**	**% cost specifically for EHR**
Workstations—e.g.: --desktops --notebooks --monitors --related workstation equipment (batteries				
Network equipment—e.g.: --switches --routers --cabling				
Servers—e.g.:				
Other equipment--e. --PDAs --backup and disaster recovery systems --redundant power supply --scanners --fax machines --printers --memory upgrades --mounting brackets				

Please be sure to include all costs, including those related to reconfiguring clinic rooms, offices, and other work areas.

- What proportion of the above would you have incurred anyway without the EHR?
    - What were average yearly IT costs BEFORE the start of EHR implementation?
- Do you pay for separate, remote hosting costs? *Yes/No* *If yes*, how much?
- Did you put equipment in all exam rooms? *Yes/No*

23. What were your EHR <u>software costs</u>?
    - What was the total? _____ ($)
    - Did these include practice management system costs? *Yes/No*
    - What were your **initial** EHR software costs? _____ ($)
        - Do you pay an upfront "per seat" license fees? *Yes/No*

        If YES
        - how many licenses? ____ (#)
        - what's the cost/license ____ (#)

        IF NO:
        - how did you pay for your initial EHR software costs?
            - separately for each software module? *Yes/No*
            - by amount of use? *Yes/No*
            - another method? *Yes/No*
    - What are your EHR **on-going** software "maintenance" fees? _____ ($)
        - How is it calculated (eg, % of upfront license fee)?
    - What did other licenses costs (e.g. for:
        - Imaging
        - Interfaces
        - Databases
        - drug information _____ ($)
    - What are **on-going** other licenses costs? _____ ($)
    - What were interface programming and other costs? _____ ($)
    - What were any other software costs? _____ ($)
    - What costs would have been incurred without the EHR?

24. What are your telecommunications costs? _____ ($)
    - What were your telecommunication costs BEFORE the EHR? _____ ($)
        - How have they changed due to the EHR?

25. What were EHR installation costs?
    - By the vendor? _____ ($)
    - By another external organization? _____ ($)

26. What were application service provider costs?
    - What is the contract duration? From ____ to ____
    - What upfront fees were paid to the ASP? _____ ($)
    - What were your remote hosting costs? _____ ($)
    - What were subscription fees? _____ ($)

27. What are your information systems staffing costs?
    - What information systems staff do you have?
    - What information systems staff did you have _before_ implementing the EHR?
    - What IS staff did you add after the EHR?

Type of IS staff	**FTEs**	**Cost/year**
Managers		
Network administrators & technicians (for hardware, EHR and database software)		
Helpdesk personnel		
Other		

    - What staff did you hire specifically due to the EHR?

28. What were/are other support costs?
    - Who else provides technical support for the hardware, software, and networking?
    - Do you contract with an external organization to provide support services? *Yes/No*
    - What does each type of support cost?

Type of support	**Who provides support?**	**What's cost/year?**
Hardware (computers, printers)		
Network		
EHR software		
Non-EHR software		
Implementation support (eg, hardware/software setup, training)		
Post-implementation support (eg, additional training)		
Other		

    - Do you get the support that you need in each area? *Yes/No*
    - Have you had down-time? *Yes/No*
    - What improvements would you like to see in support services?

29. What were your training costs?
    - Cost of in-house dedicated trainers _____ ($)
    - Cost of other trainers (e.g. from vendor) _____ ($)
    - Replacement costs for personnel being trained _____ ($)
    - Other training costs (e.g. EHR vendor training course costs) _____ ($)

30. What were your extra management costs? (i.e., NET additional costs for)
    - EHR project managers _____ ($)
    - Physician champions _____ ($)
    - Senior managers and supervisory staff _____ ($)

31. What were your extra personnel costs for implementation for:

• Data abstraction ____ ($)	• Temporary medical assistants ____ ($)
• Scanning ____ ($)	• Other ____ ($) specify
• Temporary front office ____ ($)	

32. What were lost productivity costs? _____ ($)
    - What was the effect on visit productivity—over what period?

Effect on visit productivity….	**Description**
Immediately after implementation	
6 months after implementation	
Now	

    - Did you hire temporary providers (locums) to keep up visit volume? Yes/No. If yes:
        - What was the cost of hiring temporary providers?
    - What was the cost of lost revenue from patients not seen due to decreased productivity
    - Did you hire temporary providers (locums) during the implementation period? *Yes/No*

33. What was the effect of the EHR on provider time – did they work longer hours?

Effect on provider time….	**Description**
Immediately after implementation	
6 months after implementation	
Now	

    - If yes, were providers paid for the extra time at work?

34. What other EHR-related costs (money and FTEs) did you incur?

Other EHR-related costs	**Amount/comment**

EHR benefits

35. What are your EHR-related efficiency benefits (or net costs?)

Staff reductions (increases) in:	**Amount/comment**
Medical records	
Transcription	
Data entry	
Billing	
Front office	
Medical assistant	
Other	
Provider productivity increases (reductions)	
Increased total visits or RVUs/provider	
Increased use of mid-levels per provider	

Please explain how EHR use has changed the work roles of providers and support staff

36. What are your EHR-related revenue enhancement benefits?

Revenue increases through:	
Increased capture of services	
Decreased denied claims	
Faster submission of claims	
Increased level of coding per visit	
Increased # patients seen per provider	
Increased volume of visits per patient	
Increased private pay patients	

37. What are your EHR-related service utilization savings (or net costs)?

Utilization savings/costs for:	**Amount/comment**
Lab, radiology	
Pharmacy, hospital, other	

38. What are any other EHR-related financial benefits not mentioned above?

Other: for example….	**Amount/comment**
Paper-related office supplies	
Malpractice insurance premium savings	
Quality/prevention bonuses from health plans	

39. What are EHR-related quality benefits? To what extent do you agree or disagree with the following? *Please explain how EHR use has affected each*

Statement	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**N/A**
The quality of overall care has improved	*1*	*2*	*3*	*4*	*5*	*N/A*
The quality of preventive care has improved	*1*	*2*	*3*	*4*	*5*	*N/A*
The quality of chronic care has improved	*1*	*2*	*3*	*4*	*5*	*N/A*
The quality of urgent care has improved	*1*	*2*	*3*	*4*	*5*	*N/A*
The coordination of care has improved	*1*	*2*	*3*	*4*	*5*	*N/A*

EHR use

40. What paper and paper charts are used on a day-to-day basis?

- Do your providers still use paper charts? Yes/no; if yes:
  - For what % of encounters
- Why do providers use paper charts?
  - To look at historical documentation only *Yes/No*
  - To look at items that come in as paper *Yes/No*
  - For partial documentation *Yes/No*
  - For full documentation *Yes/No*
- Are providers/staff still abstracting data from paper charts? If yes: ___ (% visits)
- Does your practice plan to continue to pull patient charts? *Yes/No*
- What types of paper comes into the practice? E.g., consultant reports, workers' comp
  - What do you do with that paper?
  - How much scanning do you do?
- How important is it to cost reduction to eliminate flows of paper into the practice?
- What are you doing to reduce inflow of paper, e.g. electronic data exchange?

41. What are types of EHR users and expectations about EHR use?

- How would you characterize different types of users (early adopters, laggards)
- Does your organization set expectations (norms) for provider use? *Yes/No* If yes:
  - What are those norms? (e.g., maintaining electronic problem lists, prescribing, using templates, finishing notes, etc)
  - Does your main leadership body set the expectations? *Yes/No*
  - Is any provider use mandatory? *Yes/No*
  - How are the norms enforced (if at all)
- Did you create financial incentives to help meet practice expectations? Yes/NO;
- If yes: What were those incentives?

What is provider use of the following:

42. Ordering capabilities

A. Prescribing use

- Do providers prescribe using the EHR? *Yes/No* If yes:
  - What proportion of providers use electronic prescription ordering? ___%
  - What percentage of prescriptions do providers order electronically? ___%
  - What percentage of electronic prescriptions are faxed to pharmacies? ___%
  - Do providers enter the data themselves? ___% time
  - Are providers regularly provided with the following types of prompts?

Type of checks	**Yes/No**
Drug/allergy interactions?	
Formulary compliance?	
Drug/drug interactions?	
Other _____(specify)	

  - Are other decision support capabilities built into prescription ordering?

B. Lab test ordering use

- Can providers order labs electronically using the EHR? *Yes/No* If yes:
  - How many providers use lab order entry? ___%
  - What percentage of labs do providers order electronically? ___%
  - What percentage of lab orders are transmitted electronically to the lab ___%
  - Do providers enter the data? ___% time
  - Do you have any decision support capabilities built into the lab test ordering?

C. Other orders (e.g., pathology tests, referrals, etc)

- Do your providers order other tests/referrals using the EHR? *Yes/No* *If yes:* *describe*

43. Viewing capabilities

- How many of your providers regularly view data from within the EHR?

Type of data viewed	**# providers viewing**
Lab test results	
Radiology reports	
Progress notes	
Consultant notes	
Hospital reports	
Other clinical data (explain)	

- Could providers view any electronic data prior to the EHR? *(Specify)*_____
- Are providers more likely look at data with an EHR more than without one?

44. Documenting capabilities: electronic lists and primary documenting methods

- How many providers **usually** maintain electronic lists? Are lists coded (e.g., ICD-9)?

Type of electronic list:	**# providers maintaining…**	**List Coded?**
Problem list		*Yes/No*
Allergy list		*Yes/No*
Lifestyle list (eg, drinking, smoking, diet)		*Yes/No*
Medications -- separate from e-prescribing		*Yes/No*
Other		*Yes/No*

- How many providers document progress notes **primarily** in the following ways?

Type of documentation method	**# providers primarily using…**
Direct typing (free text)	
Templates (structured data entry)	
Dictation	
Hand-writing	
Voice recognition	
Other	

- How providers document **primarily** at the following times/locations:

Time/location for documenting	**# providers documenting primarily…**
While the patient is in the room?	
Immediately after the patient leaves	
During the day	
At the end of the day	
At home, same day	
Some other time	

- What % of documentation is done with the patient in the room?
- What shortcuts/macros do providers use for entering notes?
    - What assistance do you provide to providers to speed documentation?

45. Provider messaging capabilities

- Can providers securely message with specialists outside the practice? *Yes/No*

46. Care management capabilities

A. Care teams

- Do you have care teams? Yes/No *If yes:*
  - What is their composition?
  - How has the EHR changed their composition, functioning?

B. Chronic care and prevention programs

- Does your practice belong to a chronic care collaborative? *Yes/No* *If yes:* describe
- Do you contract with outside disease management programs? *Yes/No* *If yes:* describe
- What chronic care/prevention programs do you have now? (Describe each)
- What chronic care/prevention programs did you have before the EHR?
- Who leads the chronic care/prevention programs now?
- For which identified subpopulations do you track information over time?
  - Do you stratify subpopulations by severity of condition? *Yes/No*
- Does your organization provide the care team with lists of patients sorted according to overdue status (e.g., no HbA1c during last 6 months)? *Yes/No* *If yes:*
  - What's the follow-up process?
  - Does your organization provide telephone call lists and/or mailing labels and patient reminder letters for follow-up? *Yes/No*
- How do you identify patients that should be part of chronic care/prevention programs?
  - How important is coded provider data entry for identifying patients?

C. Templates

- What templates do providers use most often for specific types of visits or chronic care?
- Which templates are based on evidence-based clinical management guidelines?
- How did you obtain your templates?
  - Created you own clinic-wide templates *Yes/No* *If yes:*
    - Do you use specific staff to design new templates?
  - Relied on providers to create or adapt their own *Yes/No*
  - Adapted vendor's *Yes/No*
  - Purchased? *Yes/No*
- What are practice expectations (norms) for provider….:
  - Use of templates?
  - Use of documentation that results in coded data?

D. Reminders, alerts, prompts at the point of care

- What reminders, alerts, prompts do providers normally see on a day-to-day basis (list)
    - E.g., Reminders about overdue tests/due dates for a visit or a test or prompts recommending referrals to specialist/ changes in care plan
- How do the reminders appear on the screen (e.g., pop-up, bottom of screen etc)
    - Does a provider have to seek them? *Yes/No*
- Do providers set reminders patient-by-patient or does the organization set the reminders?
- What other decision support is provided to providers at the point of care?

47. Performance reporting capabilities

- Do you use your EHR to produce reports that evaluate providers on:

Type of report	**Yes/No**	**Description**
Service utilization		
Coding patterns		
Visit productivity		
Preventive care performance		
Quality performance—process, outcome		
Following national published guidelines		
Use of the EHR		
Some other criteria		

- Can providers produce these reports themselves? *Yes/No*
- How else do you use the EHR reporting capabilities?
- How difficult is it to customize reports?
- What changes do you want either in EHR reporting capabilities or your use of such capabilities?
- Is provider compensation tied to performance reporting? *Yes/No*

48. Patient/provider communication
    - Does your organization have a website? *Yes/No*
    - Can patients message with their providers using secure email? *Yes/No*

      IF yes:
        - Do patients use a program separate from the EHR (e.g., RelayHealth)? *Yes/No* *IF yes*:
            - Which program?
            - Is that program interfaced with the EHR?
        - Can patients see part of their record via the Internet *Yes/No*
        - Can patients request prescription renewals? *Yes/No*
        - Can patients request appointments? *Yes/No*
        - What percentage of patients can message providers? ___%
        - How frequently do patients send secure clinical messages ___# messages
        - What percentage of clinical messages do providers respond to themselves? ___%
        - Do you charge patients for web visits or e-consults? *Yes/No*
        - Are you reimbursed for web visits or e-consults? *Yes/No*
    - Do patients fill out electronic forms pre-/post-visits? *Yes/No*
    - Do you generate visit summaries after each visit? *Yes/No*
    - Do you generate patient self-management plans for patients? *Yes/No*
    - Do you print out education material, using the EHR? *Yes/No*

49. Practice management capabilities
    - If you have an integrated EHR/PMS, how is it helpful?
    - Is visit coding done electronically by the provider? *Yes/No*

50. AFTER the implementation period, what performance improvement initiatives did you undertake that were aided by EHR capabilities? What were your:
    - Efficiency improvement initiatives?
    - Access to care improvement initiatives?
    - Quality of care improvement initiatives? (other than those mentioned above)
    - Any other performance improvement initiatives?

Other questions

51. During implementation, what were the 3 most important barriers and facilitators?
52. NOW: what are the 3 most important barriers and facilitators to achieving benefits?
53. What are the 3 main strengths and weaknesses of:
    - the EHR software?
    - the vendor's support?
    - other support?
54. How quickly do you think EHR financial benefits could cover EHR investment costs?
55. What have you learned from other practices or organizations? (e.g., practices in the area with the same EHR, vendor User Group meetings, your professional association)
    - How important has that learning been to your practice?
56. What improvements in EHR use do you expect to make in the next 2 years?
57. Would you recommend that other organizations adopt an EHR?
    - What type of organizations do you think would succeed?
58. What incentives would encourage other practices to use EHRs?
59. What research could help you in your practice?

APPENDIX J

FINAL SEMI-STRUCTURED INTERVIEW QUESTIONS

Electronic Health Records in Ambulatory Care
University of California, San Francisco

Background

60. When did you start using the EHR? ___/___ (mo/year)
    - Did all providers start at the same time? Yes/No
    - Did you phase in functionality over time? Yes/No

61. Please list ALL providers and staff at the practice
    - That worked BEFORE the EHR?
    - That are working NOW

    Be sure to include providers and staff that may have left, or who were not working when the EHR was implemented.

Names of providers and Staff	**Title** (include specialty for physicians & mid-levels)	**% time before EMR**	**% time now**

62. How many sites are in your practice? _____ **(#)**

63. How many medical encounters did your practice have:
Please provide documentation of these numbers.

Time period	**# medical encounters**
In 2003?	
In the 12 months BEFORE the EHR?	
In the 12 months AFTER starting to use the EHR	

64. What proportion of practice revenues comes from different types of insurance?

Insurance	**%**	**Insurance**	**%**
Private insurance		Self pay/uninsured	
Medicare insurance		Other (specify	
Medicaid			

65. What percentage of income comes from non-patient revenue sources (eg, grants, trials)? _____%

66. What percentage of your patient revenues come from fee-for-service or capitation?

Reimbursement type	**%**	**Reimbursement type**	**%**
Discounted fee-for-service		Quality bonus	
Flat rate per visit		Other (specify	
Primary care capitation			

67. How are providers paid?
What % of provider salary is:

	%		**%**
Straight salary		Panel-based	
Performance/Productivity-based		Other (specify	
Medicaid			

Software, hardware and support

68. What information systems software do you have PRE-EHR and NOW?

Information system	Software (if any) before EHR	Acquired at implementation	Acquired AFTER implementation / date
EHR			
Practice management			
Laboratory			
Payroll			
Accounting			
Other			

69. For your practice management system:

- Did you install it when you installed the EHR? Yes/No

- Do you have a **two-way** exchange of data between EHR & PMS? *Yes/No* *If yes:*
  - Is it real-time? *Yes/No*
  - What data flows from the PMS to the EHR?

  - What data flow from the EHR to the PMS?

- Do you have a **one way** exchange of data from the PMS to the EHR? *Yes/No* *If yes:*
  - Is it real-time? *Yes/No*
  - What data flows from the PMS to the EHRs?

- How much time and money did it take to obtain the interface? (Was it a difficult or easy process?)

- If you could improve the exchange of data between the PMS and EHR, what would you do?

70. Do you have an internal lab system? *Yes/No*

If yes:

- What % of your labs are done internally? _____%
- Does data flow from the lab system into the EHR through an interface?

71. Do you receive electronic data from external labs? *Yes/No*

If yes:

- Which external lab(s)

- Do you have an interface between the lab(s) and your EHR? *Yes/No*
- *What % of your lab results do you receive electronically?* _____%

- When did you get the interfaces? _____mm/yy
- How much time and money did it take to obtain the interface(s)? (Was it a difficult or easy process?)
- Did you switch labs in order to get an electronic interface? *Yes/No.*

72. Do you receive electronic data from other external sources (hospitals, consultants)?

- Which external sources?

- What interfaces did you create?

- How much time and money did it take to obtain the interface(s)? (Was it a difficult or easy process?)

- If you could improve the exchange of data between the EHR and external data sources, what would you do?

73. Have you had any problems with breaches of security or confidentiality of data? *Yes/No*

- If yes, please explain:

EHR selection and implementation

74. What is your organization's overall governance & EHR governance?

- What are your governing bodies?
- Who (or which governing body) gave the go-ahead to purchase the EHR?
- Who (or which governing body) regularly reviews EHR implementation and use?
- What your legal and contractual relationships to affiliated entities, if any?

75. What was the EHR selection process?

- When did you first start thinking of having an EHR?
- How did you select the EHR (demonstrations, site visits)?
- Who selected the EHR?
- How long did it take to select it? _____ (# months)
- When did you finally select the EHR _____ (# months)
- What information sources helped you to select your EHR (i.e., journal articles, list-serves, word of mouth, conferences, professional association materials?)

76. What was the EHR contracting process?

- When did you begin negotiations with the EHR company? _____(date)
- When did you sign the contract? _____ (date)
- How long did it take to negotiate? _____ (# months)
- Were you satisfied with the contracting process? *Yes/No*

77. What was the EHR implementation process?

- When did you start and finish actual implementation From _____ to _____
- Did you have an EHR project team? *Yes/No*
    - IF YES: who was on this team?

- Did you have a pilot site? *Yes/No*
- Did you implement site by site (if applicable)? *Yes/No*
- Did you implement all functionality at once or function by function?

- How did you implement the EHR? Describe what you did for each of the following:

Activity	**Description**
Hardware/software setup	
Clinician/staff training	
Changes in work roles	
Changes in exam room/office setup or workflow or in patient flow	
Populating EHR database (abstracting)	
Template development	
Interfaces	
Onsite support during implementation	
Post-implementation support	
Software customization	
Other	

- For training, what was the process?
    - Did you send anyone to the vendor for training? *Yes/No*
      If yes, were you following the "train-the-trainer" model? (e.g., people sent to the vendor for training then train others in the practice) *Yes/No*

    - Did EHR vendor staff train you on-site? *Yes/No*
    - How did you train providers and staff?

- How do you train new personnel (i.e., personnel hired after EHR implementation)
- How do you train temporary nurses/providers/staff?
- How do you improve EHR skills of existing personnel?
- Do providers talk to each other about how they document/ use the EHR? *Yes/No*

- For workflow changes (changes in processes, roles, patient flow), what were key changes?

- What would you do differently now, if anything?

78. What was the EHR leadership?
    - Which leaders championed getting the EHR?
    - Which governing bodies (if any) had to approve major EHR-related decisions?
    - How supportive was the practice leadership for the EHR?
    - Were EHR leaders different from other clinic leaders? *Yes/No*

79. Please explain why you adopted an EHR

On a scale of 1 to 5, what is the importance of the following reasons?

We adopted an EHR because we expected:	**very important**				**not important**
To cut costs	1	2	3	4	5
To improve patient satisfaction	1	2	3	4	5
To improve quality	1	2	3	4	5
To improve the quality of our notes	1	2	3	4	5
To increase our billing capability	1	2	3	4	5
Other (specify)	1	2	3	4	5

- Did you meet your expectations in adopting an EHR *Yes/No*

80. How did you finance the initial EHR costs? (e.g., bank loan, reserves, windfall, hospital).

EHR costs

81. What were your EHR-related hardware costs—initial and on-going? Please be sure to include all costs, including those related to reconfiguring clinic rooms, offices, and other work areas.

Type of hardware	**Had prior to EHR selection process**	**Acquired for EHR implementation**	**Acquired after EHR implementation**

	#	*Cost per item*	*Total cost*	#	*Cost per item*	*Total cost*	#	*Cost per item*	*Total cost*
Workstation-related									
--desktops									
--notebooks									
--monitors									
--other (eg batteries)									
Network equipment									
--switches									
--routers									
--cabling									
--circuits									
Servers & electronic data storage									
(specify)									
Other equipment--eg									
--PDAs									
--backup & disaster recovery systems									
--redundant power supply									
--scanners									
--fax machines									
--printers									
--memory upgrades									
--mounting brackets									

- What proportion of the above would you have incurred anyway without the EHR?
    - What were average yearly IT costs BEFORE the start of EHR implementation?

- Did you put equipment in all exam rooms? *Yes/No*
- Were there major differences between the costs you were quoted and the costs incurred?

82. What were your <u>software costs</u>?

Software Costs	**Had before selected EHR?**	**Initial cost**	**Maintenance cost**
EHR software	*N/A*		
Practice Management System			
Windows software/upgrade			
Imaging software			
Scanning software			
Faxing software			
Database software			
Drug Information software			
Accounting software			
Payroll software			
Interface with lab			
Interface with other data sources (i.e. hospital)			
Other software: Please specify			

- For your **initial** EHR software costs:
  - did you pay upfront "per seat" license fees? If yes: _____amount/seat
  - did you pay upfront "per user" license fees? If yes: _____amount/user
  - how many licenses did you pay for _____ (#)
  - what was the cost/license _____ (#)
  - Did the vendor use any other method to charge for **initial** EHR software cost? eg:
    - for each EHR software module separately? *Yes/No*
    - by amount of use? *Yes/No*
    - another method? *Yes/No*

- For your EHR **on-going** software "maintenance" fees:
  - How is it calculated (eg, % of upfront license fee)?

- What costs would have been incurred without the EHR?

- Were there major differences between the costs you were quoted and the costs incurred?

83. What are your telecommunications costs?

Telecommunications costs	Cost	Description
BEFORE the EHR		
AFTER the EHR		
Change due to the EHR?		

84. What were EHR installation costs?

Installation costs	Cost	Description
By the vendor		
By another external firm		

85. What were application service provider costs?

- What is the contract duration? From ____ to ____

Type of ASP cost	Cost	Description
What upfront fees paid to ASP		
Remote hosting costs		
Subscription fees		
Other costs		

86. What internal information systems staffing costs did you incur?

- Who are the information systems staff?

Names of IS staff	Title/roles	Hourly rate	% time before EHR	% time NOW	Extra cost due to EHR

Please include _ALL_ IS staff, including managers, network administrators and technicians (for hardware and software), helpdesk personnel, and other personnel

- Which staff did you hire specifically due to the EHR and when did you hire them?

87. What costs did you incur for contractors or service firms providing technical support?

Names of contractors	**Support provided**	**Annual cost PRE-EHR**	**Cost DURING implement-tation**	**Annual cost NOW**	**Extra cost due to EHR**

Please include anyone who helped you with any type of support during/after implementation

- Which costs are specifically due to the EHR?
- Do you get the support that you need in each area? *Yes/No*
- Have you had down-time? *Yes/No*
    - If yes, describe what the practice does during down-time?
- What improvements would you like to see in support services?

88. What were your training costs?

Type of training cost	**Cost**
Going to site visits	
Training at the vendor site (include travel)	
Training at User Group meetings (include travel)	
In-house dedicated trainers (if any)	
Other trainers (e.g., from vendor or elsewhere)	
Replacing personnel being trained	
Other training costs	

89. What were your extra management costs? (i.e., NET additional costs)

Type of personnel	Extra % time	Duration	Rate	Amount	Description (including period)
EHR project managers					
Physician champions					
Senior managers and supervisory staff					

90. What were extra personnel costs (including overtime, and temp personnel) for implementation?

Type of personnel	Extra % time	Duration	Rate	Amount	Description (including period)
Locums (temporary providers)					
Nurses/RNs					
Medical assistants					
Temporary front office					
Other staff (other than IS)					

Please include extra personnel costs for pre-populating databases, scanning, reduced productivity etc.

91. What were lost productivity costs and effect on visit productivity?

Type of lost productivity cost	# visits	Rev/visit	Amount	Description (includin period)
Loss of revenue from patients not seen due to decreased productivity				

- What was the effect on visit productivity—over what period of time?

Effect on visit productivity….	Description (including time period)
Immediately after implementation	
6 months after implementation	
Now	

33. What was the effect of the EHR on time worked by various staff – did they work longer hours in preparing for the EHR or after implementing the EHR?

Effect on PROVIDER time due to EHR	Amount extra time	Description
Before implementation		
During/after implementation		
6 months after implementation		
Now		

Effect on NURSE, MA time due to EHR	Amount extra time	Description
Before implementation		
During/after implementation		
6 months after implementation		
Now		

Effect on OFFICE STAFF time due to EHR	Amount extra time	Description
Before implementation		
During/after implementation		
6 months after implementation		
Now		

34. What other EHR-related costs did you incur (eg, EHR vendor help in pre-populating database)?

Other EHR-related costs	Amount of cost	Description

EHR benefits

35. Can you think of any EHR-related efficiency benefits (or net costs?) in staffing? *Please refer to question #2 that lists staff—are the changes in staffing due to the EHR?*

For total % time, please add up ALL the % times for ALL staff of a type—e.g., if you have 1 medical records staff person at 50% time and another at 100% time, there are 2 staff and 150% time in all

Staff	**# staff BEFORE EHR**	**Total % time BEFORE EHR**	**# staff NOW**	**Total % time NOW**	**Annual full-time salary+ benefits**	**Salary savings/extra costs due to EHR (when started?)**
Medical records						
Transcription						
Data entry						
Billing						
Front office						
Medical assistant						
Nurses						
NPs/PAs						
Other						

- Did the EHR use lead to changes in work roles of physicians, mid-levels and support staff?

- Were there changes in ratios of mid-levels, nurses, MAs, or front office staff to physicians?

36. Have you had any EHR-related revenue enhancement benefits?

Revenue increases through:	**Amount of savings due to EHR**	**Description**
Increased capture of services		
Decreased denied claims		
Faster submission of claims		
Increased level of coding per visit		
Increased # patients seen per provider		
Increased RVUs per visit		
Increased volume of visits per patient		
Increase in insured patients/other		

37. Have you had any EHR-related service utilization savings (or net costs)?

Utilization savings/costs for:	**Amount of savings due to EHR**	**Description**
Lab, radiology		
Pharmacy, hospital, other		

38. Have you had any other EHR-related financial benefits not mentioned above?

Other: for example….	**Amount of savings due to EHR**	**Description**
Paper-related office supplies		
Malpractice insurance premiums		
Quality/prevention bonuses		
Other		

39. Have you had any EHR-related quality benefits? To what extent do you agree or disagree with the following? *Please explain how EHR use has affected each*

Statement	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**N/A**
The quality of overall care has improved	*1*	*2*	*3*	*4*	*5*	*N/A*
The quality of preventive care has improved	*1*	*2*	*3*	*4*	*5*	*N/A*
The quality of chronic care has improved	*1*	*2*	*3*	*4*	*5*	*N/A*
The quality of urgent care has improved	*1*	*2*	*3*	*4*	*5*	*N/A*
The coordination of care has improved	*1*	*2*	*3*	*4*	*5*	*N/A*

EHR use

40. What paper and paper charts do you still use day-to-day in the practice?

- Describe the decrease in paper chart pulls (if any) over time

- Do your providers still use paper charts now? *Yes/No*

  If yes:

  - For what % of encounters ___ (%)
  - Why do providers use paper charts?
  - To look at historical documentation only *Yes/No*
  - To look at items that come in as paper *Yes/No*
  - To document the note, in part or in full *Yes/No*

  - Are providers/staff still abstracting data from paper charts?

  If yes: ___ (% visits)

- Do *patients* fill out paper forms? *Yes/No*

  If yes:

  - what forms?
  - what do you do with the paper forms?

- Do *providers* still use paper forms (eg super-bills, patient problem checklists) *Yes/No*

- What paper comes into the practice? E.g., consultant reports, workers' comp
  - What do you do with that paper?

  - How much scanning do you do?

- Are in-coming faxes transferred electronically into the EHR? *Yes/NO*

- Are you doing anything to reduce paper inflow (eg. electronic data exchange? *Yes/No*

- How important is it to cost reduction to eliminate flows of paper into the practice?

41. What are types of EHR users and expectations about EHR use?

- How would you characterize different types of users (early adopters, laggards)

- Did you set expectations for how providers would use the system? *Yes/No*

  If yes:

  - What are those expectations? *For example…*
    --maintaining electronic problem lists
    --prescribing electronically
    --eliminating/reducing dictation
    --using templates
    --documentation that results in coded data?
    --finishing notes by a certain time

  - What governance body sets the expectations?

  - How are the expectations enforced (if at all)

- Is there mandatory provider use of any capabilities? *Yes/No*

  If yes:

  - What are those capabilities?

- Did you create financial incentives to help meet practice expectations? *Yes/No*

  If yes:

  - What were those incentives?

42. Ordering capabilities

A. Prescribing use

- Do providers prescribe using the EHR? *Yes/No* If yes:
  - What *proportion of providers* use electronic prescription ordering? _____%
  - What *percentage of prescriptions* do providers order electronically? _____%
  - What *percentage of electronic prescriptions* are faxed to pharmacies? _____%
  - Do providers enter prescriptions themselves? _____% time
  - Are providers regularly provided with the following types of prompts?

Type of checks	**Yes/No**
Drug/allergy interactions?	
Formulary compliance?	
Drug/drug interactions?	
Other _____(specify)	

  - Do you have any other decision support capabilities for prescribing? *Yes/No*

B. Lab test ordering use

- Can providers order labs electronically using the EHR? *Yes/No*

  If yes:
  - How many providers use lab order entry? _____#
  - What percentage of labs do providers order electronically? _____%
  - What percentage of lab orders are transmitted electronically to the lab _____%
  - Do providers enter lab data themselves? _____% time
  - Do you have any decision support capabilities for lab test ordering? *Yes/No*

C. Other orders (e.g., pathology tests, referrals, etc)

- Do your providers order other tests using the EHR? *Yes/No* *If yes: describe*
- Do your providers order referrals using the EHR? *Yes/No*

43. Viewing capabilities

- Could providers view any electronic data prior to the EHR? *Yes/No*
  If yes: *(Specify)*_____

- How many of your providers regularly view data from within the EHR?

Type of data viewed	**# providers viewing**
Lab test results	
Radiology reports	
Progress notes	
Consultant notes	
Hospital reports	
Other clinical data (explain)	

- Are providers more likely to look at data with an EHR than with a paper chart? *Yes/No*

44. Documenting capabilities: electronic lists and primary documenting methods

- How many providers **usually** maintain electronic lists? Are lists coded (e.g., ICD-9)?

Type of electronic list:	**# providers maintaining…**	**List Coded?**
Problem list		*Yes/No*
Allergy list		*Yes/No*
Lifestyle list (eg, drinking, smoking, diet)		*Yes/No*
Medications -- separate from e-prescribing		*Yes/No*
Other		*Yes/No*

- How many providers document progress notes **primarily** in the following ways?

Type of documentation method	**# providers primarily using…**
Direct typing (free text)	
Templates (structured data entry)	
Dictation	
Hand-writing	
Voice recognition	
Other	

- Roughly, what % of documentation is done:

When documentation is done:	**% of documentation**
With the patient in the room	
Right after the patient has left	
At the end of the day	
After leaving the office	

- What shortcuts/macros do providers use for entering notes?

45. Provider messaging capabilities

- Can providers securely message with each other within the practice? *Yes/No*
- Can providers securely message with other providers outside the practice? *Yes/No*
- *What procedures do you use for telephone messages?*

46. Care management capabilities

A. Care teams

- Do you have care teams? Yes/No *If yes:*
    - What is their composition?
    - How has the EHR changed their composition, functioning?

B. Chronic care and prevention programs

- Does your practice belong to a chronic care collaborative? *Yes/No*
- Do you contract with outside disease management programs? *Yes/No*
- What chronic care/prevention programs do you have now?
- What chronic care/prevention programs did you have before the EHR?
- Who leads the chronic care/prevention programs now?
- Do you track information on identified subpopulations over time? *Yes/No*
- Does your organization provide the care team with lists of patients sorted according to overdue status (e.g., no HbA1c during last 6 months)? *Yes/No* *If yes:*
    - What's the follow-up process?
    - Does your organization provide telephone call lists and/or mailing labels and patient reminder letters for follow-up? *Yes/No*
- How do you identify patients that should be part of chronic care/prevention programs?
    - How important is coded provider data entry for identifying patients?

C. Templates

- What templates do providers use most often for specific types of visits or chronic care?

- Which templates are based on evidence-based clinical management guidelines?

- How did you obtain your templates?
  - Created you own clinic-wide templates *Yes/No*

  If yes:
    - Do you use specific staff to design new templates?
  - Relied on providers to create or adapt their own *Yes/No*
  - Adapted vendor's *Yes/No*
  - Purchased *Yes/No*

- [If not already answered above] What are practice expectations (norms) for provider….:
  - Use of templates?
  - Use of documentation that results in coded data?

D. Reminders, alerts, prompts at the point of care

- What reminders, alerts, prompts do providers normally see on a day-to-day basis (list)
  - E.g., Reminders about overdue tests/due dates for a visit or a test or prompts recommending referrals to specialist/changes in care plan

- How do the reminders appear on the screen (e.g., pop-up, bottom of screen etc)
  - Does a provider have to seek them? *Yes/No*

- Do providers set reminders patient-by-patient or does the organization set the reminders?

- What other decision support is provided to providers at the point of care?

47. Performance reporting capabilities

- Do you use your EHR or PMS to produce reports that evaluate/provide feedback to providers?

If yes:

Type of report	Yes/ No	Use data from EHR?	Description
Service utilization			
Coding patterns			
Visit productivity			
Preventive care performance			
Quality performance—process, outcome			
Use of the EHR			
Some other criteria			

- Can providers produce these reports themselves? *Yes/No*
- How else do you use the EHR reporting capabilities?
- How difficult is it to customize reports?
- What changes do you want in EHR reporting capabilities?
- What reporting would you like to do?
- Is provider compensation tied to performance reporting? *Yes/No*

48. Patient/provider communication

- How do you and other providers think the EHR has changed patient/provider interaction?
- Does your organization have a website? *Yes/No*
- Can patients message with their providers using secure email? *Yes/No*

  IF yes:

  - Do patients use a program separate from the EHR (eg., RelayHealth)? *Yes/No* IF yes:
    - Which program?
    - Is that program interfaced with the EHR?
  - Can patients see part of their record via the Internet *Yes/No*
  - Can patients request prescription renewals? *Yes/No*
  - Can patients request appointments? *Yes/No*
  - What percentage of patients can message providers? _____%
  - How frequently do patients send secure clinical messages _____
  - What percent of clinical messages do providers handle themselves? _____%
  - Do you charge patients for web visits or e-consults? *Yes/No*
  - Are you reimbursed for web visits or e-consults? *Yes/No*
  -

- Do patients fill out electronic forms pre-/post-visits? *Yes/No*
- Do your providers generate visit summaries after each visit? *Yes/No*
- Do your providers generate patient self-management plans for patients? *Yes/No*
- Do your providers print out education material, using the EHR? *Yes/No*

49. Practice management capabilities
    - If you have an integrated EHR/PMS, is it helpful? *Yes/No*
      If yes, then how so?
    - Is level of service coding done electronically by the provider? *Yes/No*

50. AFTER the implementation period, what performance improvement initiatives did you undertake that were aided by EHR capabilities? Did you start:
    - Efficiency improvement initiatives? *Yes/No*
    - Access to care improvement initiatives? *Yes/No*
    - Quality of care improvement initiatives? (other than mentioned above) *Yes/No*
    - Any other performance improvement initiatives? *Yes/No*

Other questions

51. What are the 3 main barriers and facilitators in implementing and in achieving benefits?

	3 most important barriers	**3 most important facilitators**
Implement -ing		
Achieving benefits		

52. What are the 3 main strengths and weaknesses for each of the following:

	3 most important strengths	**3 most important weaknesses**
EHR software		
The vendor's training		
The vendor's support		
Other support		

53. What other major changes did you make in your practice when you implemented the EHR? (e.g. did you move into a new office building?)

54. How quickly do you think EHR financial benefits could cover EHR investment costs?

55. What have you learned from other practices or organizations? (e.g., practices in the area with the same EHR, vendor User Group meetings, your professional association)
    - How important has that learning been to your practice?

56. What improvements in EHR use do you expect to make in the next 2 years?

57. Would you recommend that other organizations adopt an EHR?
    - What type of organizations do you think would succeed?

58. What incentives would encourage other practices to use EHRs?

59. What research could help you in your practice?

APPENDIX K

CHR FOR UNFUNDED STUDY

UCSF **Please date form:** C
COMMITTEE ON HUMAN RESEARCH
REVISED EXPEDITED REVIEW APPLICATION
(BETA VERSION)

General Instructions | View Complete Set of Linked Instructions | Frequently Asked Questions

PART 1: ADMINISTRATIVE REQUIREMENTS

- Eligibility requirements for Principal Investigator, Co-Principal Investigator and Contact Person
- Training requirements

A. Principal Investigator:		
Name and degree Adele Clarke, Ph.D.	University Title Professor	Department Social and Behavioral Sciences
Campus Mailing Address (Box No.) UCSF Department of Social & Behavioral Sciences 3333 California Street, Suite 455 San Francisco, CA 94143-0612	Phone Number 476-0694	E-mail Address aclarke@itsa.ucsf.edu
Co-Principal Investigator:		
Name and degree Tiffany Noelle Martin, M.A.	University Title Graduate Student	Department Social and Behavioral Sciences/Institute for Health and Aging
Campus Mailing Address (Box No.) UCSF Department of Social & Behavioral Sciences 3333 California Street, Suite 455 San Francisco, CA 94143-0612	Phone Number 682-3717	E-mail Address tmartin9@itsa.ucsf.edu
Additional Contact Person (if any):		
Name	University Title	DEPARTMENT
Campus Mailing Address (Box No.)	Phone Number	E-MAIL ADDRESS
Send correspondence to (check *one*):	[ ]PI only [X]PI and Co-PI [ ]PI and Additional Contact Person	
Study Title:		Application Type:
Medical Providers' Views of the Effects of Electronic Health Records on Provider-Patient Interactions		[X]New Expedited Review Application Category No.: 7 [ ]Response to "Contingent" or "Return" letter [ ]Modification [ ]Renewal Current CHR #: __

	Expiration date: __
Sites (Check all that apply):	
[ ]UCSF [ ]SFGH [ ]VAMC [ ]Fresno [ ]Cancer Center [ ]UC Berkeley [ ]GCRC (Moffitt/Mt. Zion) [ ]GCRC (SFGH) [ ]PCRC [ ]Foreign Country [X]Other(s):	

B. Funding: If this study is eligible for "Just in Time" NIH review, do not submit your application to the CHR until you have received notification from the federal granting agency that your study appears to be in a fundable range. Check all that apply:

Type of funding	Source of funding	Funds will be awarded to/through:
[ ]Contract/Grant [ ]Subcontract [ ]Drug/device donation [X]Student project [ ]Other: __ Have funds been awarded? [ ]Yes [ ]Pending [X]No Award No.: __	[ ]Federal Government [ ]Other Gov. (e.g., State, local) [ ]Industry* [ ]Other Private [ ]Campus/UC-Wide program [ ]Departmental Funds [ ]Other: Sponsor Name: __	Dept./ORU: *Institution* — *Federal Wide Assurance (FWA) No.* [ ]UCSF ..... 00000068 [ ]Blood Centers of the Pacific ..... 00002111 [ ]Gallo Institute ..... 00000304 [ ]Gladstone Institute ..... 00000087 [ ]Goldman Institute on Aging..... 00002525 [ ]NCIRE ..... 00000256 [ ]S.F. Dept. of Public Health ..... 00000162 [ ]VA Research Office..... 00000280

*UCSF (or affiliate) financial contact person for IRB review recharge:	
Grant Title and PI (if different from above):	
Secondary sponsors: If there are multiple sources of funding for this study, please describe the additional funding:	

C. Key Personnel: All key personnel including the PI and Co-PI must be listed below along with a brief statement of their qualifications. *If the SF VAMC is a study site*, please identify the principal VAMC investigator, unless already listed as PI or CoPI above. For questions regarding the VAMC application process, please contact the VA Clinical Research Office at 221-4810 ext.4655.

Investigator (and institution):	Qualifications:
Adele Clarke	Dr. Clarke has a Ph.D. and is an expert in qualitative methods and has been employing them for over 20 years. She has also conducted medically-related research using such methods.
Tiffany Noelle Martin	Ms. Martin has a M.A. in Applied Sociology with a medical emphasis and has conducted qualitative research. She has been trained as an interviewer. Previous research included topics of provider-patient interaction issues as well as the use of technology within health care settings.

D. Other Approvals/Regulated Materials: Does this study require approval or authorization from any of the following regulatory committees, or involve the use of the regulated materials listed below? Follow the hyperlinks for more information. If "Yes," complete the applicable section(s) below.		[ ]Yes [X]No
[ ]	Biological Safety Committee	BUA #:
[ ]	Human Stem Cells	Submit stem cell supplement

E. Scientific Merit Review: This study has received or will receive scientific merit review from (check all that apply):
[ ]NIH [ ]Cancer Center* [ ]GCRC or PCRC [ ]SFVAMC [ ]Dept. Review [X]Other: UCSF School of Nursing Faculty
*Required prior to final CHR approval for oncology studies.

F. Statement of Financial Interest: Do you or the other investigators have a financial interest in the outcome of this study? If "Yes," please describe below and describe briefly in Purpose and Background section of the consent form.	[ ]Yes [X]No

G. Principal Investigator's Certification:

- I certify that the information provided in this application is complete and correct.
- I accept ultimate responsibility for the conduct of this study, the ethical performance of the project, and the protection of the rights and welfare of the human subjects who are directly or indirectly involved in this project.
- I will comply with all policies and guidelines of UCSF and affiliated institutions where this study will be conducted, as well as with all applicable federal, state and local laws regarding the protection of human subjects in research.
- I will ensure that personnel performing this study are qualified, appropriately trained and will adhere to the provisions of the CHR-approved protocol.
- I will not modify this CHR-certified protocol or any attached materials without first obtaining CHR approval for an amendment to the previously approved protocol.
- I assure that the protected health information requested, if any, is the minimum necessary to meet the research objectives.
- I assure that the protected health information I obtain, if any, as part of this research will not be reused or disclosed to

any parties other than those described in the CHR-approved protocol, except as required by law.

Principal Investigator's Signature Date

PART 2: STUDY DESIGN

Complete items A-E using clear, concise, non-technical, lay language (i.e., the type of language used in a newspaper article for the general public) wherever possible. Define all acronyms. Use caution when cutting and pasting from another application or protocol to ensure that information is complete, supplemented where necessary, is pasted in a logical order, and is relevant to the specific section.

Space limits are recommendations and should be adjusted as needed, but the total length for sections A-E should not exceed 5 pages.

For modifications and renewals, please highlight in *italics* all changes from previously approved version.

A. Synopsis (Briefly summarize the study.) Space limit: quarter page

This ethnographic study is aimed at understanding the impact using an electronic health record (EHR) system has on provider-patient interactions. One of the barriers to providers in implementing electronic health records may be their fear of not being able to interact as well with their patients, which could outweigh potential benefits from this technology. Up to 10 interviews about their experiences will be conducted with providers who have practiced both before an EHR was implemented as well as after implementation. Data will be analyzed using grounded theory techniques. The findings of this pilot research may provide for better understanding of issues related to provider-patient interactions as new technology is incorporated, as well as aid in developing future research instruments to continue study on this topic.

B. Purpose (Specify the hypotheses, aims and/or objectives.) Space limit: quarter page

The purpose of this study is to understand the experiences of having an EHR in the clinical setting and its impact on provider-patient interactions from the viewpoints of primary care providers including physicians, nurses, and physician assistants.

C. Background (Summarize previous studies. Explain rationale for the proposed investigation.) Space limit: half page

This study pursues a tentative finding of a current research project being carried out by Dr. Robert Miller and Ida Sim who are looking at the costs and benefits of EHRS in primary care solo and small group practices. The Miller-Sim study does not deal directly with the provider-patient interaction. The proposed project addresses one theme that has emerged as a barrier for providers to using technology, specifically, the EHR is its perceived influence on the interaction they have with their patients. Some providers feel discomfort, guilt, and anxiety about not being able to interact with patients as smoothly or comfortably with an EHR, compared to before using the EHR. Thus, the research question for this study stems from the expressed concerns of these providers.

Theoretically, seeing the EHR as a prop within an interaction which may hinder or facilitate

interactions, we can look to Goffman's (1959) work, *The Presentation of Self in Everyday Life*, in which he asserts that setting is an important aspect of interactions, generally. Goffman refers to the setting as involving "furniture, décor, physical layout, and other background items which supply the scenery and state props for the spate of human interaction played out before, within, or upon it" (p. 22). Although any setting may be perceived as neutral, there is some sense of "home-field advantage" when an actor is familiar with or even controls what setting is available and what within the setting is available. Thus the physician is at an advantage within an interaction because of the use of the prop of the EHR technology. The computer which houses the EHR can be seen as a prop in the definition of the situation. The actor knows what props are available within specific settings to create or maintain specific definitions of the situation. In this theory, props are used to enact an interaction between people. In the case of provider-patient interaction, the computer can be used as a prop for the physician as well as for the patient, during a medical encounter. The prop, in this case may be seen as a disadvantage to many providers. This study aims to capture this dynamic.

D. Design Please describe *general* study design: Space limit: quarter page

This is an ethnographic pilot study using a snowball sample. Dr. Miller will provide initial names of potential provider contacts who have implemented an EHR to begin the snowball sampling process. (See Appendix I for Letter of Support.) Up to 10 initial interviews will be conducted by Tiffany Noelle Martin. The initial interviews will be no longer than 1 hour. There will be a possibility for follow-up interview if the participant consents to being interviewed a second time. The follow-up interviews will be no longer than 1 hour. Each interview will be taped and transcribed. In addition, participant observation will be used.

E. Data Analysis (How and by whom will data be analyzed?) Space limit: quarter page

The data will be analyzed using coding schemes from grounded theory based on what the participants say during the interviews, as well as participant observation field notes (Schwandt, 2001). Linking codes will be generated. The Co-PI and PI, as well as other faculty will analyze the data.

PART 3: PROCEDURES

A. Check all that apply.

[ ]Biological Specimen Banking [ ] Genetic Testing

B. Please list, in sequence, all study procedures, tests, and treatments required for the study. Indicate which would be done even if a subject does not enroll in the study. Include a detailed explanation of any experimental procedures. Attach table if available.

Gain written consent for initial interview and possible follow-up.
Conduct initial interview. (Tape if consented)
Obtain verbal re-consent if follow-up interview.
Possibly conduct follow-up interview of about 1/2 hour. (Taped if consented)

C. How much time will be required of the subjects, per visit and in total for the study?

At most, the participants will be interviewed for no more than about 1.5 hours total.

D. Will any interviews, questionnaires, surveys or focus groups be conducted for the study? If [X]Yes [ ]No

"Yes," please name any standard instruments used for this study and attach any non-standard instruments.	

Please see Appendix II for the non-standard Interview Guide and Demographic Information.

E. Will any procedures or tests be done off-site by non-UCSF personnel? If "Yes," please explain.	[ ]Yes [X]No

PART 4: ALTERNATIVES

A. Describe the alternatives to study participation that are available to prospective subjects.

The alternative is not to participate.

B. Is study drug or treatment available off-study? If "Yes," discuss this in the consent form.	[ ]Yes [ ]No [X]N/A

PART 5: RISKS AND BENEFITS

A. Risks and Discomforts:

1. Describe the risks and discomforts of any study procedures.

Confidentiality: Participation in research may involve a loss of privacy.
Emotional distress: There is a possibility of becoming upset in talking about the experience of being a medical provider and the frustrations of using an EHR system.

2. Describe the steps you have taken to minimize the risks/discomforts to subjects:

Participants can end the interview or participant observation at any time.
Two passwords will protect all files in the master computer, where all electronic documents with identifying information will be stored.
The interview tapes will be kept in a locked environment (Only the interviewer/Co-PI will have access).
Participants' names will not be used in any reporting of this project.
Transcripts and field notes will be coded without any identifying information.
Tapes of interviews will be destroyed upon completion of the study.

B. Confidentiality and Privacy: Describe the consequences to subjects of a loss of privacy (e.g., risks to reputation, insurability, other social risks):

There is a social risk to participants' reputations if data with identifying information were exposed to people higher in the provider's work hierarchy, as they may be seen as complaining about or not being compliant with the EHR.

1. Identifiers: Please indicate all identifiers that may be included in the research records for the study. Check all that apply.

[X] Names	[ ] Social Security Numbers	[ ] Device identifiers/Serial numbers
[X] Dates	[ ] Medical record numbers	[ ] Web URLs
[X] Postal address	[ ] Health plan numbers	[ ] IP address numbers
[X] Phone numbers	[ ] Account numbers	[ ] Biometric identifiers
[X] Fax numbers	[ ] License/Certificate numbers	[ ] Photos and comparable images
[X] Email address	[ ] Vehicle id numbers	[ ] Any other unique identifier

[ ] None of the 18 identifiers listed above

2. Determining Whether HIPAA Regulations Apply to This Study: Please answer the questions below for the items identified in the above section. Check all that apply:	
Is any of the study data: [ ] Derived from a medical record? ***Please identify source***: [ ] Added to the hospital or clinical medical record? [ ] Created or collected as part of health care? [ ] Used to make health care decisions?	**HIPAA regulations apply.** The information identified in section B.1. above is PHI.
[X] Obtained from the subject, including interviews, questionnaires? [ ] Obtained from a foreign country or countries only? [ ] Obtained from records open to the public? [ ] Obtained from existing research records? [ ] None of the above.	**HIPAA regulations do not apply.** The information identified in section B.1. above is not PHI.
If HIPAA regulations apply, you are required to obtain individual subject authorization or a CHR-approved waiver of authorization, or both, to be allowed access to medical records. For the VA, use the SFVAMC authorization. (The one exception to these requirements is the use of a Limited Data Set along with a Data Use Agreement.)	

3. Use and Disclosure of Personal Health Information: Please indicate to whom or where you may disclose any of the identifiers listed above as part of the study process. Check all that apply:

[X] We do not plan to share any of the personally identifying information listed above outside the research team.
[ ] The subject's medical record
[ ] The study sponsor: ***please indicate***:
[ ] The US Food & Drug Administration (FDA)
[ ] Others: ***please indicate***:
[ ] A Foreign Country or Countries

4. Data Security: Please indicate how study data is kept secure. Check all that apply:

[X] Data is coded; data key is destroyed at end of study or ***provide date***: Five years after start date of study.
[X] Data is coded; data key is kept separately and securely
[X] Data is kept in locked file cabinet
[X] Data is kept in locked office or suite
[X] Electronic data are protected with a password
[ ] Data is stored on a secure network

5. Describe any additional steps taken to assure that identities of subjects and any of their health information which is protected under the law is kept confidential. If video or audio tapes will be made as part of the study, disposition of these tapes should be addressed.

Tapes will be kept in a locked environment which only the interviewer/Co-PI will have access. Tapes will not include identifying information. All personal information will be used only for contacting providers for initial and follow-up interviews and will then be destroyed. Personal information will be kept in a separate location from the tapes.

6. Reportable Information: Is it reasonably foreseeable that the study will collect information that State or Federal law requires to be reported to other officials (e.g., child or elder abuse) or ethically requires action (e.g., suicidal ideation)? If "Yes," please explain below and include a discussion of the reporting requirements in the consent form.	[ ]Yes [X]No

B. Benefits: **1.** Are there potential direct benefits to study subjects? If "Yes," please describe below.	[ ]Yes [X]No

2. What are the potential benefits to society?

The benefits to society are developing an understanding of the barriers to use of EHRs for quality improvement, so that policies and practices may be developed to help alleviate the burden of use of the EHR as a barrier to provider-patient interaction. This research may help policy makers understand providers' processes in weighing the costs and benefits of EHR use, and thus help policy-makers develop incentives to facilitate the implementation of EHRs. EHR use has many potential benefits from quality of care improvements to medical care cost reductions. Developing an understanding of barriers to implementation is crucial for developing strategies to encourage more practices to implement EHR systems.

C. Risk/Benefit Analysis: How do the benefits of the study outweigh the risks to subjects?

The risks are very minimal. Strategies may be formulated to help providers in dealing with this professional conflict of wanting to provide good interaction, improve care, and reduce costs, but seeing EHR use as a barrier to that process.

PART 6: SUBJECT INFORMATION

A. Number of Subjects: **1.** How many subjects will be enrolled at UCSF and affiliated institutions?	
2. How many subjects will be enrolled at all sites (i.e., if multicenter study)?	10
3. How many people do you estimate you will need to consent and screen here (but not necessarily enroll) to get the needed subjects?	10

B. Types of Subjects: Check all that apply. Click on links for additional instructions.	
[ ]	Minors: Complete and attach "Inclusion of Minors" Supplement
[ ]	Subjects unable to provide informed consent
[ ]	Subjects with diminished capacity to provide informed consent
[ ]	Subjects unable to read or speak English
[ ]	Pregnant Women
[ ]	Fetuses
[ ]	Neonates
[ ]	Prisoners: Complete and attach "Inclusion of Prisoners" Supplement
[ ]	Inpatients
[ ]	Outpatients
[X]	Normal Volunteers Primary Care Medical Providers
[X]	Staff of UCSF/affiliated institution

C. Eligibility Criteria:
1. General description of subject population(s):

Primary care medical providers- This includes nurses, physician assistants and physicians who see patients regularly in specialties of general medicine, family medicine or internal medicine.

2. Inclusion Criteria:

The provider must have provided medical services to patients before an EHR was implemented and must have provided medical services to patients after an EHR was implemented.

3. Exclusion Criteria:

Pediatric specialists will be excluded, as will providers who do not see patients for primary care reasons.

D. How (chart review, additional tests/exams for study purposes), when and by whom will eligibility be determined?

A screening questionnaire will be used by the Co-PI, who will ask:
What specialty is the practice you work in?
Would you consider this to be a primary care practice?
Do you currently use an EHR in providing medical care?
Did you ever provide care before an EHR was implemented?

E. Are there any inclusion or exclusion criteria based on *gender*, *race* or *ethnicity*? If "Yes," please explain the nature and rationale for the restrictions below. [ ]Yes [X]No

PART 7: RECRUITMENT

Please review CHR Recruitment Guidelines for more information about acceptable recruitment methods. Note that all advertisements, whether posted or broadcast, and all correspondence used for purposes of recruitment require CHR review and approval before they are used. Check all that apply:

[ ]	Study investigators recruit their own patients directly and/or nurses or staff working with researchers approach patients. ***Provide detail in the space below*** *(i.e., how, when and where potential subjects are approached).*
[ ]	Study investigators send a CHR-approved letter to colleagues asking for referrals of eligible patients interested in the study. The investigators may provide the referring physicians a CHR-approved Information Sheet about the study to give to the patients. If interested, the patient will contact the PI. Or, with documented permission from the patient, the PI may be allowed to talk directly with patients about enrollment.
[ ]	Study investigators provide their colleagues with a "Dear Patient" letter describing the study. This letter can be signed by the treating physicians and would inform the patients how to contact the study investigators. The study investigators may not have access to patient names and addresses for mailing.
[ ]	Advertisements, notices, and/or media used to recruit subjects. The CHR must first approve the text of these, and interested subjects will initiate contact with study investigators.
[ ]	Study investigators request a Waiver of Consent/Authorization for recruitment purposes. This waiver is an exception to the policy but may be requested in exceptional circumstances such as:
[ ] [ ] [ ]	Minimal risk studies in which subjects will not be contacted (i.e., chart review only); Review of charts is needed to identify prospective subjects who will then be contacted (explain in protocol); Large-scale epidemiological studies and/or other population-based studies when subjects may be contacted by someone other than personal physician (justify in protocol).

[ ]	Direct contact of potential subjects who have previously given consent to be contacted for participation in research. Clinic or program develops a CHR-approved recruitment protocol that asks patients if they agree to be contacted for research (a recruitment database) or consent for future contact was documented using the consent form for another CHR-approved study. ***Provide detail in the space below*** *(i.e., how, when and where potential subjects are approached).*

[ ]	Study investigators list the study on the UCSF Clinical Trials Seeking Volunteers web page or a similarly managed web site. Interested subjects initiate contact with investigators.
[X]	Study investigators recruit potential subjects who are unknown to them. Examples include snowball sampling, use of social networks, direct approach in public situations, random digit dialing. ***Please explain below*:**

Snowball sampling will be used starting with Dr. Miller's contacts of providers using EHRs and going on word of mouth recommendations. In addition, the Co-PI is doing additional work on EHRs and may be able to recruit from the network of consulting practices. The Interviewer/Co-PI will contact each potential participant (by phone when possible), will ask for consent, and will set-up a time to conduct the interview(s). (See Appendix V for script for initial contact.)

[ ]	This study does not involve subject contact for recruitment (i.e., records review, use of specimens).

PART 8: INFORMED CONSENT PROCESS

A. Check all that apply:

[X] Signed consent will be obtained from subjects (See Appendices III and IV)

[X] Verbal consent will be obtained from subjects, using an

[ ] Information sheet

[X] Script (See Appendix VI)

[ ] Signed consent will be obtained from surrogates

[ ] Informed consent will not be obtained

B. In the space below, describe *how*, *where*, *when* and *by whom* informed consent will be obtained. How much time will prospective subjects be given to consider study participation? If special subject populations will be included, be sure to describe any additional plans for obtaining consent from particular populations.

Informed consent for the first interview will be given directly before the participant starts the interview. (See Appendix III.) Consent to contact the participant for a follow-up interview will be given at the same time as the initial interview consent. (See Appendix IV.) The participant will be verbally re-consented using a script directly before the follow-up interview, as consent has been assumed by arranging for a second interview. (See Appendix VI.)

C. How will you make sure subjects understand the information provided to them?

The interviewer will directly ask the participant to read over the consent form and ask if there are any questions. Questions will be answered before the consent is signed.

PART 9: FINANCIAL CONSIDERATIONS

A. Payments to Subjects:	[ ]Yes [X]No

1. Will subjects receive payments or gifts for study participation? If "Yes," please review CHR Subject Payment Guidelines and complete the following:	
2. Payments will be (check all that apply):	[ ] Cash [ ] Check [ ] Other (describe below)
3. Please describe the schedule and amounts of payments, including the total subjects can receive for completing the study. If deviating from recommendations in Subject Payment Guidelines, include specific justification below.	

B. Costs to Subjects: Will subjects or their insurance be charged for any study procedures? If "Yes," describe those costs below and explain why it is appropriate to charge those costs to the subjects.	[ ]Yes [X]No

C. Treatment and Compensation for Injury: The investigators are familiar with and will follow the University of California policy and (if applicable) Veteran's Affairs policy regarding treatment and compensation for injury. If subjects are injured as a result of being in this study, treatment will be available. The costs of such treatment may be covered by the University of California, by the Department of Veteran's Affairs (for subjects eligible for veteran's benefits, if the SF VAMC is a study site), or by the study sponsor, if any, depending on a number of factors. The University does not normally provide any other form of compensation for injury.

PART 10: REFERENCES

Goffman, E. (1959). *The presentation of self in everyday life*. New York:Anchor.

Schwandt, Thomas A. 2001. Dictionary of Qualitative Inquiry. 2nd ed. Thousand Oaks, CA: Sage.

Szaz, T. & Hollander, M. (1956). A contribution to the philosophy of medicine: The basic models of doctor-patient relationships. *Journal of the American Medical Association*, 97:585-588.

PART 11: ATTACHMENTS

Please list Attachments, Supplements and Appendices	Version number(s) or date(s)
Appendix I – Letter of Support	August 4, 2004
Appendix II- Interview Guide and Demographic Information	August 4, 2004
Appendix III – Initial Interview Informed Consent	August 4, 2004
Appendix IV – Follow-up Interview Future Contact Consent	August 4, 2004
Appendix V – Script for Initial Contact	August 12, 2004
Appendix VI- Script for Re-consent	May 25, 2004

APPENDIX K-I: Letter of support

August 4, 2004

Dear Ms. Martin:

As the Primary Investigator on multiple studies on electronic health records (EHRs), I am pleased to write this letter of support for your proposal to study the influence of EHRs on provider-patient interaction. I believe this to be an important extension of my work. Understanding the impact that EHRs have on provider-patient interaction can help develop strategies to get around the barriers the EHR creates in to patient-provider interactions. Once you have obtained CHR approval, I will be happy to discuss the study with you and to refer you to providers that use an EHR and might be interested in participating in your study.

Sincerely,

Robert H. Miller, Ph.D.
UCSF Institute for Health and Aging

APPENDIX K-II: INTERVIEW GUIDE AND DEMOGRAPHIC INFORMATION

Introduction of myself and talk about the study
Discuss taping of interview, get consent

Proposed Questions.
If information given in answers to other questions, the question will not be asked.

1. Just so I can get an initial visualization of your workspace, please describe for me the physical layout of your exam room. (i.e. where is the computer in relation to the patient).
2. Ok, now I want you to visualize your first day using the EHR with actual patients. Describe for me what that day was like for you. (Walk me through a typical medical encounter with your patient on that day. What stands out most about your first day with the EHR? What were you feeling? What were you concerned about? What were you concentrating on? Did you discuss these feelings/concerns with anyone else? Did you come to any resolution?)
3. Tell me what your experience with the EHR has been like since then. (What is it like for you to use the EHR? Walk me through a current (typical) medical encounter with a patient.)
4. What were things like with patients before you started using the EHR. (Walk me through a typical medical encounter with a patient before you had the EHR. Compare and contrast)
5. Have you noticed any consequences of using an EHR in regard to the interaction with your patients?
6. Have you noticed any benefits of using an EHR in regard to the interaction with your patients?
7. What actions, if any, do you take to incorporate the EHR into the medical encounter? (i.e. physical layout, sitting computer on knees to be in physical proximity to patient, let the patient see the screen)
8. Have your patients reacted to your switch to using an EHR? (If so, what do they say, Can you give a couple of examples?)
9. Were you concerned with how the EHR might affect interactions with your patients before you began using it? (Can you describe for me what you were thinking? What lead you to overcome these concerns and use the EHR?)
10. If you had your choice, would you go back to practicing medicine without an EHR or would you continue using the EHR? (Why (not)?)
11. Is there anything else you think I need to know about how EHRs influence provider-patient interaction?

Thank you for helping with this study. Your experience is invaluable to us.

Probing questions (if needed):
Can you give an example of that?

Can you tell me more about that?
I would like to hear more about that.
Earlier you mentioned… is there anything more you want to say about that?

Remember to confirm what they said for clarification and verification
Have I heard you correctly when you said…
Did you mean …

Follow-up questions after tape is turned off:
(If I prevent myself from asking a sensitive question… I was wondering…; Would it have been okay to ask about…?)

Demographic Data:
gender
age (year born)
number of providers in practice they work in
length of time using EHR
length of time as a practicing provider

APPENDIXK- III: INITIAL INTERVIEW INFORMED CONSENT

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO
CONSENT TO BE A RESEARCH SUBJECT

Medical Providers' View of the Effect of Electronic Health Records on Provider-Patient Interaction

A. PURPOSE AND BACKGROUND

Tiffany Noelle Martin, M.A. and Adele Clarke, Ph.D. from the Department of Social and Behavioral Sciences at the University of California San Francisco are conducting a study to understand the impact electronic health records (EHRs) are having on the provider-patient interactions from the view of the medical provider. This pilot study is not funded.

You are being asked to participate in this study because you are a primary care medical provider who has implemented an EHR and have also practiced without an EHR.

B. PROCEDURES

If you agree to be in this study, the following will happen:
You will be interviewed by Tiffany Noelle Martin for about one hour concerning your experiences interacting with your patients as a medical provider both before and after implementing the EHR. With your permission the interview will be taped for transcription. I will be asking you to discuss your experiences in interacting with your patients before and after implementing an EHR.

C. RISKS/DISCOMFORTS

Confidentiality: Participation in research may involve a loss of privacy, but information about you will be handled as confidentially as possible. Your name will not be used in any published reports about this study. The transcripts will be coded without names, using numbers to identify the transcript. In addition, two passwords will protect all data files. The tapes will be kept in a locked environment in which only the interviewer and faculty sponsor will have access.

D. BENEFITS

There will be no direct benefit from participating in this research.

There may be an indirect benefit of participating in this research is being able to express pleasures and frustrations associated with the EHR in reference to interactions with your patients. Indirectly, the information that you provide may help researchers better understand the potential costs and benefits of EHR implementations for provider-patient interactions in primary care settings.

E. ALTERNATIVES

The alternative is not to participate.

F. COSTS

There is not cost to you for participating in this research.

G. PAYMENT

You will not be paid for your participation

H. QUESTIONS

This study has been explained to you by Tiffany Noelle Martin, the Co-Primary Investigator, and your questions were answered. If you have any other questions about the study, you may call Tiffany Noelle Martin at (415) 514-0497 or the Primary Investigator and faculty sponsor, Adele Clarke at (415) 476-0694.

If you have any comments or concerns about participation in this study, you should first talk with the researchers. If for some reason you do not wish to do this, you may contact the Committee on Human Research, which is concerned with the protection of volunteers in research projects. You may reach the committee office between 8:00 and 5:00, Monday through Friday, by calling (415) 476-1814, or by writing: Committee on Human Research, Box 0962, University of California, San Francisco/San Francisco, CA 94143.

I. REPORTING

The data from this study will be reported in an academic setting. The interviews will be used as training for the interviewer. The data may be written up as a journal article and/or presented at an academic meeting.
If you would like a copy of any published manuscripts, please contact Tiffany Noelle Martin at tmartin9@itsa.ucsf.edu and they will be sent to you.

J. CONSENT

You have been given a copy of this consent form to keep.

PARTICIPATION IN RESEARCH IS VOLUNTARY. You have the right to decline to participate or to withdraw at any point in this study without penalty or loss of benefits to which you are otherwise entitled**.**

If you wish to participate, you should sign below.

_____	_____
Date	Subject's Signature
_____	_____
Date	Person Obtaining Consent

APPENDIX K-IV: FOLLOW-UP INTERVIEW CONTACT CONSENT

Medical Providers' View of the Effect of Electronic Health Records On Provider-Patient Interaction

University of California, San Francisco

CONSENT TO BE CONTACTED FOR FOLLOW-UP RESEARCH

What is the purpose of this consent?
We are conducting a study through the University of California San Francisco in which we are tying to understand the experience of medical providers in implementing electronic health records (EHRs) and the effect this has on the interactions you have with your patients. By signing this form, you will allow Tiffany Noelle Martin, MA to do a follow-up interview about your experiences with the EHR in relation to your interaction with your patients. You have no obligation to participate in the follow-up to this study.

What happens if I sign this form? If you sign this form, you are giving consent to be interviewed by Tiffany Noelle Martin about your experiences as a medical provider who has implemented an EHR.

What happens if I don't sign this form? Declining to participate will have no influence on participation in the initial interview component of this study nor will it have any influence on your present or future status as a medical provider.

Are there any risks to my signing this form? Participation in research may involve some loss of privacy. However, your records will be handled as confidentially as possible. Access will be limited to the Tiffany Noelle Martin and the Primary Investigator, Adele Clarke, Ph.D. who is overseeing this research. Access to this data will require two passwords. Your contact information will not be shared with anyone outside this study.

Are there any financial considerations? There will be no cost or payment to you if you sign this form.

What do I do if I have questions, now or later? If you have questions now, you should ask Tiffany Noelle Martin. If you have questions in the future, you may call Tiffany Noelle Martin at **(415) 514-0497** or e-mail at **tmartin9@itsa.ucsf.edu** or Dr. Adele Clarke at **415-476-0694** or e-mail at **aclarke@itsa.ucsf.edu**. You may also call the Office of the Committee on Human Research at (415) 476-1814. This office is concerned with the protection of volunteers in research.

What do I do to consent? If you agree to be contacted in the future for a follow-up to the interview, please indicate your preferred contact method and sign below.

Preferred contact method: □ phone: _____
□ mail: _____
□ email (address: _____

_____ _____
Signature Date

_____ _____
Signature of Person Obtaining Consent Date
May 2004

APPENDIX K-V: SCRIPT FOR INITIAL CONTACT

Hi, my name is Tiffany Martin. The University of California San Francisco is conducting a study to determine the impact using an electronic health records system has on the provider-patient interaction within in primary care settings. This project is not funded and is being used for my doctoral coursework requirements. I obtained your name from **Robert Miller**, who has worked with you in some EHR-related capacity in the past and feels you might have an important perspective on this topic and might be interested in participating.

I have been told that you initiated the EMR implementation, which is why you are critical to our study. I want to confirm that you have implemented an EHR? (Wait for answer. If yes, continue.)
I want to **commend** you for being a forerunner and taking the initiative to implement an electronic health record into your practice. Many other providers—and policy-makers—are very interested in what happens when an EHR is implemented into a primary care practice such as yours, which is why I am contacting **you** to participate in the study.
Do you work in a primary care setting in which your primary role is patient-care? (If yes, continue.)

What we are looking at:

- the impact using an EHR has on provider-patient interaction

Significance:

- Help you understand concerns regarding provider-patient interaction by other providers like you
- Help report ways in which providers are adapting to having an EHR in regard to provider-patient interaction.

What we are asking of you:

- We are asking you to do a one hour interview with Tiffany Martin, a medical sociology PhD student. There will also be a possible follow-up interview that will last no longer than thirty minutes.

Let me try to address concerns you might have.

Confidentiality of your practice
Strict confidentiality—your identity will be confidential.

If you decline to participate, no further effort will be made to contact you and there will be no record of this maintained. You may also decide to stop the interview at any point even if you have agreed to participate.

Do you have any further questions or concerns that I can address?

Do you think you might be interested in participating in this study?

If yes-

- Great! Let me get your contact information, in case I need to get back in touch with you. Let's go ahead and schedule a convenient time for the interview?
- Thank you for your interest and time in talking with me this morning/afternoon. I look forward to speaking with you again soon. Have a great day.

If unsure-

- I will let you think about it and if I don't hear back from you, I will check back in with you again in about a week. What is the best way to contact you? (phone, e-mail)
- Get e-mail address.
- [Nail down time to talk again, briefly – When is generally the best time for me to reach you?]
- Thank you for your interest and time in talking with me this morning/afternoon. I look forward to speaking with you again soon. Have a great day.

If no-

Thank you again for your efforts in implementing the EHR into your practice. If you change your mind and decide you would like more information about participating in our study, please call (415) 514-0497 or e-mail tmartin9@itsa.ucsf.edu. Have a good afternoon/morning.

APPENDIX K-VI: SCRIPT FOR RE-CONSENT

By participating in this portion of the study, you are giving verbal consent to be interviewed by Tiffany Noelle Martin as a follow-up to your initial interview of your experience as a medical provider who has implemented an EHR.

Declining to participate will have no influence on participation in the initial interview component of this study nor will it have any influence on your present or future status as a medical provider. You are free to decline or stop at any time.

There will be no cost or payment to you.

The same confidentiality and privacy standards from your previous consent will be true of this interview as well.

If you have questions, now or later, you can use the information on the consent from the previous interview or I can give you a second copy of this information. Would you like another copy of the contact information?

Would you like to continue with the interview?

Given sheet with this information on it:

If you have questions you may call Tiffany Noelle Martin, your interviewer, at **(415) 514-0497** or e-mail at **tmartin9@itsa.ucsf.edu** or Dr. Adele Clarke, the faculty sponsor) at **415-476-0694** or e-mail at **aclarke@itsa.ucsf.edu**. You may also call the Office of the Committee on Human Research at **(415) 476-1814**. This office is concerned with the protection of volunteers in research.

CURRICULUM VITAE

TIFFANY NOELLE MARTIN BROWN

UCSF Department of Social & Behavioral Sciences
3333 California Street, Suite 455
San Francisco, CA 94143-0612
Phone: 303-995-8275
E-mail: tiffany.brown@ucsf.edu

EDUCATION:

B.A., 1999	Mary Baldwin College (MBC), Staunton, VA Major: Sociology Minor: Health Care Administration
M.A., 2003	Indiana University Purdue University Indianapolis (IUPUI), Indianapolis, IN (Applied Sociology, Emphasis in medicine). Thesis: *The Influence of Organizational Sex Culture and Personal Sex Values on Sex-Related Services Rendered by Clinicians Working with Clients with Severe Mental Illness*. (Chair: Professor Eric R. Wright; Committee: Carrie Foote-Ardah, William Gronfein)
PhD, Defended June 2007	University of California San Francisco (UCSF) San Francisco, CA Emphasis: Medical Sociology Specialization: Health Policy Dissertation: *An Ethnographic Study of Electronic Health Record (EHR) Use in Solo/Small Group Primary Care Practices in the United States*. (Chair: Carroll Estes; Committee: Robert Miller, Norman Fineman) 3rd Area Specialization Qualifying Exam: *Quality and Cost in Medicine – Can the Electronic Medical Record Improve Either?* (Chair: Robert Miller; Committee Members: Carroll Estes, Eric R. Wright, Carrie Foote-Ardah)

HONORS AND AWARDS:

SAGE and Pine Forge Teaching Innovations & Professional Development Award/American Sociological Association Section on Teaching and Learning (June 2007)
IUPUI Department of Sociology Service Award (Spring 2003)
IUPUI Travel Fellowship Competition Winner (Fall 2002)
"Boy Scout" Award – High 5+ Project Award (February 2001)
Alpha Kappa Delta, (Sociology Honors Society), University of Alabama-Birmingham (UAB)
Sociology Graduate of the Year 1999, Mary Baldwin College (MBC)
Omicron Delta Kappa Leadership Award 1999, MBC
Dean's List, MBC
Carpenter Scholar, MBC
President's Society Member, MBC
Guard of the month, American Pool Company 1995

TEACHING:

Instructor

Course Title	*Term*
Mental Disorders (Metropolitan State College of Denver)	January 2007- May 2007
Introduction to Sociology (Front Range Community College)	January 2007- May 2007
Introduction to Sociology (Front Range Community College) accelerated 10 week course	September 2006-May 2007 (2 classes)
Introduction to Sociology (Concorde Career College) – accelerated 10 week course	November 2005-June 2006 (5 classes)
Introduction to Sociology (IUPUI-Columbus)	Summer 2003
Introduction to Sociology (IUPUI-Indianapolis)	Spring 2003

Teaching Assistant

Graduate - Sociology of Health and Illness (William Gronfein, IUPUI)	Fall 2002
Undergraduate- Introduction to Sociology (Kevin Schanning, MBC)	Fall 1997 & 1998, Spring 1998 & 1999
Undergraduate- Social Problems (Kevin Schanning, MBC)	Spring 1998 & 1999
Undergraduate- Medical Sociology (Kevin Schanning, MBC)	Fall 1997, Spring 1998, Fall 1998, Spring 1999
Undergraduate- Choir (Curtis Nolley)	Fall 1998, Spring 1999
Undergraduate- Families and Households (Patricia Drentea, UAB)	Winter 2001
Undergraduate (Robert Allen, MBC)- Music Department Chair –student assistant	Fall 1997, Spring 1998

Guest Lecturer

Graduate-Sociology of Health and Illness (William Gronfein)	Fall 2002
Graduate-Psychological Aspects of Genetic Counseling (Kimberly A. Quaid, IUPUI)	Spring 2002
Undergraduate- Introduction to Sociology (Eric R. Wright, IUPUI)	Fall 2002

Teaching Certifications/Additional Training:

Teachers are Made, Not Born (American Sociological Association Pre-Conference) August 2007 (August 2007)
Front Range Community College In-Service; The Power of Inquiry-Based Education, Using Clickers in the Classroom, Going Beyond Your Basic Bingo-Using Games in the Classroom, Safety Training January 2007 (Westminster, CO)
Front Range Community College Blackboard (formerly WebCTVista) Grade Book January 2007 (Westminster, CO)
Front Range Community College WebCTVista Tips and Tricks January 2007 (Westminster, CO)
Front Range Community College WebCT Vista: The Basics September 2006 (Westminster, CO)
Concorde Career College In-Service; Topic: Adult Learners Spring 2006 (Aurora, CO)
Indiana University Purdue University Indianapolis OnCourse training Spring 2003 (Indianapolis, IN)
American Sociological Association Conference on Teaching and Learning August 13, 2004 (San Francisco, CA)
Indiana University Purdue University Indianapolis Preparing Future Faculty 2003 (Indianapolis, IN)
North Central Sociological Association Preparing Future Faculty Certification March 2003 (Cincinnati, OH)

Additional Teaching Materials Used:

Teaching Sociology journal subscription
Concorde Career College: Instructor Guide (Topics include: Adult Learners, Learning Tips for Effective Instructors, Motivational Strategies, Learning Styles, Classroom Management, Teaching Strategies, Questioning Students, Communication Skills, Test Delivery, Grading, First Day of Class, Preparing for Delivery, Preparing to Teach Concorde Career College Courses)
Lewis, Jerry M. (2005). *Tips for Teaching Introductory Sociology, 3rd ed*. Belmont, CA: Wadsworth.
The New Yorker: American Sociological Association: The Sociologist's Book of Cartoons. New York: The Cartoon Bank
McKeachie, Wilbert J. *McKeachie's Teaching Tips: Strategies, Research, and Theory for College and University Teachers, 10th ed.* (1999). Boston: Houghton Mifflin Company.

Research Publications (Peer Reviewed)

1. Eric R. Wright and Tiffany N. Martin. (2003). "The Social Organization of HIV/AIDS Care in Treatment Programs for Adults with Serious Mental Illness" *AIDS Care* 15(6):763-773.
2. Robert H. Miller, Christopher West, Tiffany Martin Brown, Ida Sim, & Christopher Ganchoff. (2005) "The Value Of Electronic Health Records In Solo Or Small Group Practices" *Health Affairs* 24(5):1127-1137.

Research Presentations

Midwest Student Sociology Conference March 2002 "The Influence of Spirituality and Religion on Physical and Mental Health as Explained by the Psychosocial Resources Model" (Indianapolis, IN)

American Sociological Association Annual Meeting August 2002 "The Openness to Sex and HIV/AIDS Training for Clinicians Who Work with Clients with Mental Illness" (Chicago, IL)

Society for Applied Sociology Annual Meeting October 2002 "The Openness to HIV/AIDS Training for Clinicians Who Work with Client with Mental Illness Based On Work Attitudes and Sex Values" (Sacramento, CA)

North Central Sociological Association Conference March 2003 "Provider Selves: A Qualitative Case Study" (Cincinnati, Ohio)

Midwest Student Sociology Conference April 2003 "Tips for Getting Into Graduate School" (Goshen, IN)

American Sociological Association Annual Meeting August 2003 "Women Entering Medicine: Structure, Sex-Related Workplace Behavior, and Sensitivity to Being 'Sexist': A Case Study" (Atlanta, GA)

American Sociological Association Annual Meeting August 2003 "Why Did They Ask Those Questions?: The Development of Sociology Through History" (Atlanta, GA)

American Sociological Association Annual Meeting August 2007 "Is EHR use creating negative changes in provider-patient interactions in solo/small group primary care practices?" (New York, NY)

RESEARCH:
Individual Research

Project	***Tasks/Skills***
Medical Providers View of the Impact of EHRs on Provider-Patient Interaction Adele Clarke, faculty sponsor September 2005-current	• Wrote IRB Proposal (which was approved) • Designed research project • Designed interview schedule • Designed analysis schedule • Recruited Participants • Open-ended interviews with medical providers • Transcribed interviews • Grounded Theory Analysis • Wrote up analysis
"Experiences of Medical Providers" Carol Brooks Gardner, faculty sponsor October 2002-May 2003	• Wrote IRB Proposal (which was approved) • Designed research project • Designed interview schedule • Designed analysis schedule • Organized team members • Open-ended interviews with medical providers • Transcribed interviews • Grounded Theory Analysis • Wrote up and presented analysis ASAs

Project Manager

"Costs and Benefits of Implementing EHRs into Solo/Small Group Primary Care Practices"
Robert H. Miller
January 2004-July 2005

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- Helped write paper published in *Health Affairs*
- Data analysis (qualitative and quantitative)
- Observed MDs/DOs/NPs at 10 primary care practices
- Interviewed "EHR Champions"
- Developed online survey
- Helped in putting AHRQ grant together
- Wrote/Submitted CHR renewal
- Helped in writing observational protocol
- Helped in writing interview schedule
- Recruitment of primary care solo and small group practices
- Conducted literature review

Research Assistant

Project

Medicare Part D Project
Institute for Health and Aging
Norman Fineman/Carroll Estes
April-May 2005

Multiple Projects
Dale Danley/ Barbara Gerbert
September 2003-December 2003

Tasks/Skills

- Develop interview guide
- Manage recruitment list
- Help in interviews of national and state leaders in the transition to Medicare Part D
- Coded interview data for report
- Wrote UCSF CHR proposal (which was approved)
- Literature review
- Reviewed intervention script
- Trouble-shooting for potential project issues
- Researching vendors for focus groups
- Recruited dentists at ADA Annual Meeting for a tutorial research project
- Organizing meeting notes

"HIV Risk of Mental Illness Clients Across Service Sites," NIMH Grant R01
Eric R. Wright, Principal Investigator
Fall 2001- current

- Helped write paper published in *AIDS Care*
- Data analysis using SPSS (wrote syntax coding, ran analyses, developed tables, etc.)
- Data management in ACCESS and SPSS
- Data entry in MS DOC cases (computer assisted survey
- execution system), Excel, ACCESS, & SPSS
- Recruited, handed out and collected surveys from mental health providers at a mental hospital
- Organized second wave surveys based on nominations, handed out surveys and collected surveys
- Managed 'token of appreciation' for participants
- Developed coding of qualitative data from patient and staff
- surveys
- Library and web research on project-related topics
- Prepared poster for 2002 International AIDS Conference
- Audited patient instruments

"Civility in Public Places"
Carol Brooks Gardner-Principal Investigator
Fall 2002-current

- Open-ended Interviews with minority populations about
- their experiences in public places within Indianapolis
- Transcribed interviews

"High Five Plus"
Nutritional Study Funded by NIH
Kathy Herrington, Project Manager
Jan.-July 2001

- Team Leader (Organized and in charge of daily tasks and
- problem solving in the field)
- Set up computers and other equipment, organized team list
- of interviewees, acted as liaison between school contact,
- teachers, and project, got the children out of the classrooms
- Interviewed 3rd graders with previous day's food intake
- (date entered into program on laptop at time of interviewing)
- Printed interviews daily
- Acted as liaison between interviewers and project manager
- Identified problems and problem-solved to find solutions
- Reviewed and made corrections to team's data
- Developed protocol for future interviewers

"Stigma as a Barrier to Treatment and Screening of STDs in the Southeastern States"
(Bronwen Lichtenstein, PI)
Fall 1999-Winter 2001

- Helped with grant proposal
- Performed literature review
- Set up/Organized focus groups
- Helped run focus groups
- Transcribed focus groups
- Organized reimbursement/consent forms
- Set up analysis

Mark LaGory (UAB)
Fall 1999-Summer 2000

- Literature review
- Indexed book "Unhealthy Places"
- Developed tables for research

Sexual Harassment Survey
(Kevin Schanning)
Spring 1998

- Data entry (SPSS)

Additional Educational Experiences:

Sheppard Pratt Mental Institution-Adolescent Crisis Stabilization Unit Volunteer (Baltimore, Maryland) (Summer 1998, Fall 1999)

Study Abroad – Australia 1999 (Studied aboriginal culture.)

Study Abroad – Vienna, Austria 1997 (Studied music history.)

Additional Conferences Attended:

Connecting Americans to Their Health Care: Empowered Consumers, Personal Health Records and Emerging Technologies December 7-8, 2006 (Washington, D.C)
The Third Information Technology Summit: Improving the Quality of Health Care Through Information Technology: The Leading Conference for HIT Policy: A the Federal and State Levels September 25-27, 2006 (Washington, D.C.)
Connecting Americans to Their Health Care: Empowered Consumers, Personal Health Records and Emerging Technologies October 11, 2005 (Washington, D.C)
Primary Care Update in Psychiatry - Larue Carter Hospital/Indiana University School of Medicine Division of Continuing Medical Education November 9, 2001 (Indianapolis, IN)
American Sociological Association Annual Meeting August 2001 (Washington, D.C.)
Alternative Medicine Conference 1999 (Birmingham, AL)
Annual Leadership Workshop- Virginia Polytechnic Institute January 14, 1998 (Blacksburg, VA)

SERVICE:

Conference/Event Planning

Midwest Student Sociological Association Conference held at IUPUI April 2002 (Indianapolis, IN)
Lambda Collegiate Conference- A multi-campus sensitivity conference held at Mary Baldwin College 1998 (Staunton, VA)
Explore IUPUI- School of Liberal Arts and Sociology Department October 2002 (Indianapolis, Indiana)

Professional Memberships

American Sociological Association(1999-current) (Current section memberships: Medical, Sociological Practice, Teaching and Learning, Information Technology; Former section memberships: Mental Health, Sexuality)

Society for Women in Sociology (2007-current)

Association for Applied and Clinical Sociology (2006-current)

Sociologists' AIDS Network (2002, 2003)

Society for Applied Sociology (2002)

Indiana University Preparing Future Faculty Program (2001-2003)

Offices and Activity Memberships

Graduate Student Association Representative, UCSF (Fall 2003-2004)

Cohort Co-representative, UCSF (Fall 2003-2004)

Graduate Sociology Club President and Co-founder, IUPUI (Fall 2001-December 2002)

Student Representative, IU System Assistantship and Fellowship Health Insurance Committee, IUPUI
(Fall 2001-Spring 2003)

School of Liberal Arts Graduate Student Committee and Co-founder, IUPUI (Spring 2001-Spring 2003)

School of Liberal Arts Graduate Student Association representative and alternate, IUPUI (Fall 2001-Spring 2003)

AKD President, University of Alabama-Birmingham (UAB) (Spring 2000-Winter 2001)

Wesley Foundation Board Member, UAB (Spring 2000-Spring 2001)

Wesley Foundation Student Member, UAB (Fall 1999-Spring 2001)

Senator, Mary Baldwin College (MBC) (student government) (Fall 1996-Spring 1999)

Quest member, MBC (Spring 1996-Spring 1999)

Swim Team, MBC (1996-1999)

Cross Country Member,-redshirted, Brandeis University (Fall 1995)

Photography Club President, Brandeis University (Fall 1995-Spring 1996)

Community Activities

Race for the Cure-Denver; (October 2006)

Hoosier Halloween (Indiana University Alumnae Association Halloween Party at the Children's Hospital in Denver, CO); (October 2006)

Explore IUPUI Day (represented the School of Liberal Arts and Department of Sociology) (Fall 2002)

Veteran's Hospital (raised money for Christmas presents), IUPUI (Winter 2001 & 2002)

BJCC Conference on Diversity (Winter 2002)

Discovery UMC Praise Team, UAB (Winter 2001-Summer 2001)

Discovery UMC Praise Choir, UAB (Spring 2000-Summer 2001)

Jimmy Hale Mission (homeless shelter), UAB (Fall 1999-Spring 2001)

Firehouse Shelter (homeless shelter), UAB (Fall 1999-Spring 2001)

Children's Hospital Dance Marathon, UAB (2000)

Faith Church worktrips (repair/build houses for low-income families through Faith UMC in Maryland)

Habitat for Humanity volunteer in office (Staunton, VA) (Fall 1998)

Travillah Elementary School math tutor (in Maryland)

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