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An Historical Perspective of Emergency Medicine

By

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Introduction

An Historical Perspective of  
Emergency Medicine

Most of us enjoy a good state of health in our day to day lives, but there is always the possibility that sudden illness or trauma will create catastrophic and emergent need. In the event that some catastrophe should happen, the local emergency department provides the best chance of reversing or minimizing traumatic injuries and sudden illnesses. What can take place in an emergency department is nothing short of a miracle. People who were once destined for death are routinely saved by dedicated teams of health professionals who are ready 24 hours a day, 365 days a year. The minimum standard of emergency departments can provide advanced cardiac life support and stabilization until more definitive procedures can be rendered. The highest level of emergency care has a constantly ready team of surgeons, anesthesiologists, and other medical specialists who can perform emergency surgery in dedicated trauma rooms. Whatever the imagination can manifest in terms of illness or injury, the emergency department at the nearest hospital is probably capable of dealing with it at a high level of competence. Whether or not any individual ever uses emergency medical services, there is a high level of expectation and dependence on this unique facility in the American health care system.

The emergency department and the practices of emergency medicine provide a unique form of medical care within a special niche in our health care system. Emergency medicine has evolved into a rapidly responding type of health care intended to stabilize life threatening conditions until more definitive health care is provided. In order to provide this timely and critical care, the emergency



department is generally a separate facility with specialized personnel, supplies, equipment, and procedures. Some of the larger emergency departments have their own laboratories and diagnostic imaging equipment: many are in fact a hospital within a hospital. Legislation specific to emergency medical care exists at the federal, state, and local levels. These laws define the practice and existence of emergency medical care in a manner unlike any other medical practice. Given this unique structure, it is not surprising the emergency department has its own curious history. At the present there is no comprehensive historical analysis that explores the origins of this significant element in American health care.

The field of emergency medicine is relatively new and rapidly changing which makes assessments of emergency services difficult without historical context. Although the practices of emergency medical care originated hundreds of years ago, the majority of significant internal changes have taken place within the last two decades. As an example, the creation of the board specialty in emergency medicine occurred only in the mid 1970's; consequently the majority of emergency medicine residency programs date back only 10 to 15 years. Other recent and notable changes reflect the civilian application of military practices and technologies. The 911 emergency communications network which is modeled from military communications is only 10 years old in many areas of the country. Another military innovation, the use of paramedics in prehospital emergency care has only flourished in civilian life for the last twenty years. Many other military practices, particularly those originating in the Vietnam War have become essential components of today's

emergency medical services. These relatively recent changes of internal structure require an understanding in historical context as a mean to better appreciate their impact on the present and future emergency department.

As opposed to the internal changes of recent decades, the external forces of political and economic events are also changing and threatening the role and scope of emergency care. At the present, the typical emergency department is experiencing the effects of health care reform and managed care. Emergency department budgets are shrinking from drastic reductions in government funding in addition to the funding lost to managed care organizations which compete for the scarce economic resources. The most vulnerable populations to emergency department restructuring are the medically indigent who have come to rely upon guaranteed medical services. The emergency department has become our nation's "safety net" for a large population that experiences difficulties in accessing routine or "primary" health care. The politics and economics that created the role of the emergency department as a "safety net" is suddenly changing shape to threaten the only source of health care for millions of Americans. The need to understand our present situation or predict the future consequence of our political actions underscores the need for historical context.

The purpose of this research paper is to provide an historical sketch of the significant events and forces that have shaped the practices and institution of emergency care. As an avenue of exploring the history of emergency medicine, this research paper takes up two questions. Question 1: What were the significant

historical forces that shaped emergency care and its present utilization today? Question 2: Knowing the history of emergency medicine and understanding the origins of its present utilization, what can we predict about changes in service with particular emphasis on the under-served populations?

For the purposes of this paper “emergency medicine” is defined as an institution of technologies and practices that specialize in urgent and emergent health care needs. Included in this definition are the legislative and academic elements that legally define and perpetuate the field. This definition includes by necessity some of external elements of the emergency medical services (EMS) that are located outside the hospital such as emergency medical technicians, paramedics, ambulances, and other first responders and transport systems. Although much could be researched and written about the external EMS system, this paper will focus largely upon the institution that we normally associate with the hospital; that which takes place in the emergency room.

The first chapter of this paper will identify key historic developments and associations between emergency medicine and the phenomena of human conflict prior to American history. The origins of the emergency hospital in relation to armed conflict and industrial technologies are explored here. The second and third chapters expand upon associations between emergency medicine and technology, but within the context of American history. The second chapter includes American military experiences in developing emergency medical systems. The third chapter explores how emergency medicine evolved in peacetime civilian life. The fourth

chapter covers the legislative and political aspects that have essentially defined the institution of emergency medicine and surrounding emergency medical practices. The fifth chapter examines the historical trends in utilization of the emergency department and includes discussion on current issues of local emergency services. The fifth chapter also explores how utilization trends are presently affecting our emergency departments, particularly in the face of health care reform.

## Chapter 1

# Early Origins and Associations of Emergency Medicine

The earliest manifestations of emergency medical service are rooted in history where large numbers of acute injuries and illnesses occurred. In a relative pre-technological culture, human populations generally lacked the capability of creating large numbers of injuries in confined locations. Setting aside sporadic responses to disease and natural disasters, warfare and industrial accidents were the only events that consistently created casualties in sufficient numbers to warrant a new type of medical service. Trial, error, and experience slowly gave rise to a professional medical service to lessen the ecological impact of injury and disease. The early era marking the beginnings of emergency medicine is instructive in providing some of the first examples that illustrate how this medical system evolved.

The foundations of emergency medicine as discussed in following examples do not necessarily resemble emergency services as we presently know them . Emergency medical service originated in bits, pieces, and prototypes over several hundred years. The first historical example traces the association between medical care and military service. A brief history of the Order of St. John is presented to demonstrate how professional military medical service evolved. The second example is a prototype emergency hospital that was created out of military interests. This example embodies the principles of many modern emergency departments in terms of temporary and responsive care. The third example recognizes the earliest components of emergency medical services in the field. This example covers the first use of the ambulance and battlefield medicine. A final interesting example is an acute care facility that

operated for work related injuries. This example is somewhat unique because technological innovations and industrial accidents were probably uncommon until the industrial revolutions of the nineteenth and twentieth centuries. Collectively these examples provide the earliest historical foundations from which the modern emergency department arises.

The first well-documented organization of medical services in association with military activity is attributable to the Order of St. John which began peacefully in 1080 in the city of Jerusalem as a hospital and hospice service for pilgrims traveling to the Holy City. The original hospital mission was simple; to care for the poor and weary pilgrim as if they were lords and masters, (Bradford, 24). The hospital operated under a principal of charity, indifferent to their clientele's religious background or ability to pay. The original rules of charitable care and hospitality were so strongly laid down the Order of St. John retained the original mission to the present day, (Bradford, 24). In the beginning, the hospital of St. John had only religious foundations and backing. The military component of the Order of St. John emerged at a later date when crusading knights liberated much of the Eastern Mediterranean and the Holy City of Jerusalem.

In the year 1095 Pope Urban II called upon leaders of Europe to come to the aid of the crumbling Byzantine empire and rid the holy lands of Moslem occupation, (Bradford, 16, 17). Following the Prince's Crusade and the restoration of Christian rule in Jerusalem, the newly appointed ruler Godfrey of Boullion acknowledged the

value of the hospital of St. John. Godfrey initiated the first of many acts of generosity and gave the hospital a gift of land. Succeeding rulers of Jerusalem and grateful patients followed Godfrey's deed and made generous donations to the Order of St. John and the hospital. Within a few short years the Order of St. John had amassed tremendous wealth and property. By 1113 the holdings of the Order of St. John included large properties in France, Spain, and Italy as well as other strategic positions in the Eastern Mediterranean, (Riley-Smith, 40-41).

The newfound wealth of the Order allowed expansion of daughter hospitals along pilgrim routes and this is where the Order began to change character, (Riley-Smith, 40; Bradford, 24). The daughter hospitals appeared side by side to conquests and territory of the crusading knights. As a consequence to the expansion of Christian territories, there were continued conflicts with displaced and vengeful Moslems. The Eastern Mediterranean was in a constant flux of offensive and defensive actions from all sides. This continual state of warfare gave rise to a distinct military component that protected interests of the Order of St. John. In addition to providing charitable care, the Order began actively protecting pilgrims. Writing on this transition from Hospitaller to fighting knights, Ernle Bradford wrote;

*"The military protection of pilgrims might seem little more than a logical extension of the Order's principal rule-to look after the poor-but it was to evolve into a militant Christianity designed to fight Moslems wherever they might be found." (Bradford, 25)*



The "Hospitallers" as they are referred to sometime after the capture of Jerusalem, became a fighting order by the year 1136, (Bradford, 25). The Order applied to the Pope and was granted permission for a military arm and hence the Order became known as the Hospitaller Knights of St. John.

One of the outcomes of the military conversion of a hospital Order was the inevitable use of the hospital to directly serve military interests. There is some evidence suggesting the hospital came to serve military conflict as much as it served the poor. St. John Order Historian J.F. Symons-Jeune wrote about the nature of the mission of the Order, ". . . the service of man in sickness, in distress, in danger, and chiefly when these evils have been caused by enemy's malice" (Symons-Jeune, 22). Symons-Jeune' remarks reveal multiple characterizations that define legitimate hospital uses. The original mission of caring for the poor is present, but there is also an expression to use the hospital for military casualties. This changing role of hospital becomes more evident through descriptions following the military conversion. In writing about the great hospital in Malta, Bedford describes, "One hundred and fifty beds were constantly held ready for knights who might return from expeditions sick or wounded," (Bedford, 90) Bedford clearly describes a transition where the original hospital association of the Order of St. John has come to serve military interests.

As their name implies, the Hospitallers had the peculiar *modus operandi* of establishing hospitals wherever they went. As they retreated through the Mediterranean in succeeding centuries, the Order of St. John established hospitals within their new fortifications.

Hospitals, chapels, and fortresses still stand at Acre, Cyprus, Rhodes, and the last stronghold of Malta. The unvarying practice of hospital construction was peculiar to the Knights of St. John and was firmly established in their identity. The responsibility of creating hospitals can be attributed to the original mission of the Order, but the strategic advantage must have become an important element at some point. As seen in following examples, the Hospitaller tradition appears to be replicated in later military actions. Before their dismal defeat at Malta, the Order of St. John may have influenced other military thinking in relation to medical care. Other innovations in military medicine begin to make an appearance during the last centuries of the Hospitallers.

Another example from history more closely resembles a prototype of modern emergency hospitals. In 1688 Prince William of Orange and 12,000 of his troops arrived in Torbay, England after they were blown off course in a storm, (Capener, 197). The army marched to the city of Exeter where Prince William requested help for the sick and injured in his ranks. His incredible charm and heavy armor are said to have persuaded the city fathers to open a temporary hospital to care for the sick and injured members of his army, (Capener 197). A total of 90 patients were treated in what may have been the first recorded example of an emergency hospital. The city of Exeter supplied two surgeons, several assistants, a nurse, and a record keeper to keep track of expenses, (Capener, 197-199). The temporary nature of this hospital and the responsiveness to injury and disease from military activities are the features that make this hospital noteworthy. Although few records exist, this temporary

hospital was probably becoming increasingly common and may have originated from ideas spurred by the Hospitaller Knights of St. John

Shortly following the prototype emergency hospitals, the ambulance and other pre-hospital care made its first appearance. The slow progression from crusading knights to military emergency hospitals is in contrast to the rapid acceptance and widespread use of the ambulance. The rapid acceptance of the ambulance may be attributed to increased military mobility or the appearance of firearms that expanded military engagements and casualties. While evidence of early military hospitals is difficult to come by, history is abundant with examples of emergency services and ambulance utilization beginning in the late 1700's. The ambulance phenomenon of this time period signals the beginning technological changes in warfare and medicine. This time period also signals the beginning maturity of emergency medical services as a specialized discipline in medicine.

There are many examples of military use of the ambulance, but several sources attribute pioneering ambulance utilization to the French army. Napoleon of Bonaparte enters the history of emergency medicine twice. Napoleon extinguished the militant arm of the Knights of St. John at Malta and he is also the first military commander credited with using the ambulance, (Bedford, 95; Stewart, 12). Baron Jean-Dominique Larrey, Chief Surgeon of Napoleon's army designed and put ambulances into action in 1792, (MacDonald, 225; CMRP, 22). These ambulances were referred as "hospital ambulant" or "mobile hospital" that transported patients to the rear. The term "flying ambulance" is also used to describe the

specialized horse drawn carriages that virtually "flew" their injured cargo to the rear. The ambulances were an improvement, but were far from perfect. The flying ambulance has been described as, "the world's first triage machine," (Stewart, 12). Presumably if patients survived the ride, they could survive a surgeon. Prior to the military ambulance, the only similar apparatus was the "pest coach" used in 1665 to transport patients and presumably bodies during sporadic epidemics in London, (Capener, 197). In addition to bringing the ambulance successfully to military medical history, Baron Larrey is also credited for field improvements in battlefield medicine.

Baron Larrey believed in providing immediate care on the field prior to transportation in the ambulance. He instituted practices of immobilization, stitching wounds, and prophylactic amputations wherever injured soldiers were found, (Stewart, 12; CMRP, 22). Baron Larrey was said to have completed 200 amputations a day on the battlefield, (CMRP, 22). To assist his battlefield medicine, Baron Larrey created the first professionally trained corps of litter bearers, the prototype of the first paramedics or ambulance attendants. This was possibly the first period in history where the level of practice and competence in battlefield medicine made significant advances. The innovations used by the French army were quickly incorporated by nearly all nations, including the United States.

A final example that contributes to the history of emergency medical services is the brief but incomplete mention of medical care related to industry. As stated earlier, technology of the time period concurrent to early military medical practices was not sufficient to produce great numbers of injuries. Despite a lack of industrial

technology, a curious example arises from the fourteenth century. The authors of the Coordinated Medical Research Program cite evidence of an emergency aid station for stone cutters in 1393. This emergency aid station in Milan operated for 150 years with the municipality guaranteeing payments for medical services, (CMRP, 21). The only other evidence of industrial related medical care is the acknowledgment of "work house infirmaries" of the seventeenth century, (Capner, 197). Although evidence of emergency care arising out of industrial accidents appears rare in this time period, it becomes an important issue at a later date. The paucity of industrial accidents and injuries arising from relative pre-technologic civilian life is sharply contrasted in the twentieth century.

The early era of emergency care is notable for contributing the founding principles and associations of modern emergency medical care. In the absence of significant technological innovations, the medical specialty of treating acute injuries and illnesses originated largely in military practices. Examples of the first associations and innovations in early emergency medicine are provided by The Order of St. John, Prince William of Orange, and Baron Larrey of Napoleon's army. Each of these examples provides their own unique contributions to the growing phenomena of trauma injury management. The military hospital originated with the Order of St. John and was later used in a more modern prototype by Prince William. Baron Larrey contributed the first elements of pre-hospital care including transportation of the injured and field injury management. While being rare, an example of industrial emergency

hospital, an emergency aid station for stone cutters, represents the beginning of a separate development in emergency medicine.

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## Chapter 2

### Development of Emergency Medicine: Military's Experience Influential to Civilian Emergency Services

The modern emergency department in the United States is heavily influenced by the practices and technologies of military medicine. As with previous examples, military activity made constant use of technologies that created numerous injuries in relatively confined locations. As technology progressed, swords and arrows of earlier times gave way to high velocity projectiles, explosives, and rapid transportation. It is only sensible that the military was the first to develop a form of medical management to match these destructive potentials of war. The following examples will illustrate that American military medical practices have evolved over two centuries and six major wars to contribute some of the basic procedures and protocols found in our emergency rooms. Military medical practices have also modeled our systems of pre-hospital care. This chapter examines a part of the American experience in emergency medicine by studying military activities that have accumulated to influence modern emergency care.

The Revolutionary War provided the first crude structure of emergency medical concepts to be used by American military forces. Basic lessons learned from previous European military experiences, possibly originating from The Order of St. John, were present in the beginning of the revolution. Originally, medical services were provided by individual colonies for their own militia, but this proved to be an inadequate system for the larger organization of the Continental Army, (Gillett, 22). In response to a need for an organized medical service, Continental Congress passed the first piece of legislation pertaining to emergency medicine. The Hospital



Department of Continental Army was established on July 27, 1775, (Gillett, 22). The significance of this congressional act was the creation of a precedent changing American military history and later developments in civilian medical care. The Hospital Department evolved to utilize military and medical technologies and pioneer the field of emergency medicine. The experience of war waged with bayonets, swords, muskets, and cannons was a powerful motivation to create a mobile and responsive medical service.

The organization of the Hospital Department was hierarchical and made distinctions between fixed and mobile medical services. The hierarchy consisted of the Director General, Chief Physician of hospital services, and the subordinate hospital surgeons, regimental surgeons and their assistants (Gillett, 22). The duties of the Director General were nearly impossible tasks of personnel, supplies, and training that were frequently at odds with the medical personnel in the field. The constant shortage of supplies and the power struggle between permanent versus field hospitalization fueled jealousies and mistrust. The first Hospital Department directors preferred permanent hospitals to serve the military, but military commanders and regimental surgeons preferred the benefits of temporary hospitals in the field (Gillett, 27). The Director probably preferred the centralization of control while the regimental surgeon preferred a lower mortality associated with less crowded conditions. The regimental surgeons had significant impact on many decisions since they were usually first to experience the consequences of actions. These regimental surgeons were assigned to the troops and provided

the majority of first line medical procedures either on the field or in temporary facilities at encampments.

The distinction between physician and surgeon was fairly clear during the Revolution and the Civil War. Physicians generally attended professional schools such as Edinburgh University or fledgling medical schools in America. Some American physicians were self trained, and still others graduated from fly-by-night sham medical schools. There were approximately 3500 physicians in the original 13 colonies, and 400 of them had actual medical degrees, (Gillett, 19). Even though their medical skills and knowledge could be considered horrific by today's standards, the physician was considered to be a professional. Surgeons were accorded a different status by European tradition as having a skill that was invariably learned in a guild. Surgeons were not afforded a professional title on the European continent, (Jalenko, et al, 40), and their treatment in America was similar. However, unlike this European division of title, the two categories were not mutually exclusive in America. Some physicians became surgeons and the reverse was frequent as well. While physicians played an important role in the Revolutionary and Civil Wars, the majority of emergency medical care was handled by regimental surgeons. Surgical technique was more important for controlling bleeding, fractures, and gunshots and the frequent practice of amputations. The origins of emergency care are closely associated to the regimental and hospital surgeon. Not surprisingly, a majority of emergency services provided in the early to mid-twentieth century were provided by surgeons. The adversarial

atmosphere between medicine and surgery is still present in today's hospitals.

The resemblance of the Revolutionary War regimental hospital to the modern emergency department is striking. Both facilities are intended to receive acutely ill and injured patients, stabilize them, and either release or transfer to longer term facilities. For these reasons, the modern emergency department can trace its historical origins to the regimental hospital with some minor exceptions. The regimental hospital improvised its structure according to what time and circumstances dictated. Houses, barns, churches and schools were used in temporary locations, while specific structures were built for longer encampments, (Jalenko, et al, 42). The design and construction of the regimental field hospitals were specified by the Hospital Department. Figure 2.1 is an example of a desired design, but it was never actually used, (Gillett, 104). Other structures ranged from multiple room units to single room huts holding 6 to 25 men. When longer term facilities were not readily available, the alternate practice was to leave the huts standing for convalescent soldiers while the army moved on, (Gillett, 102).

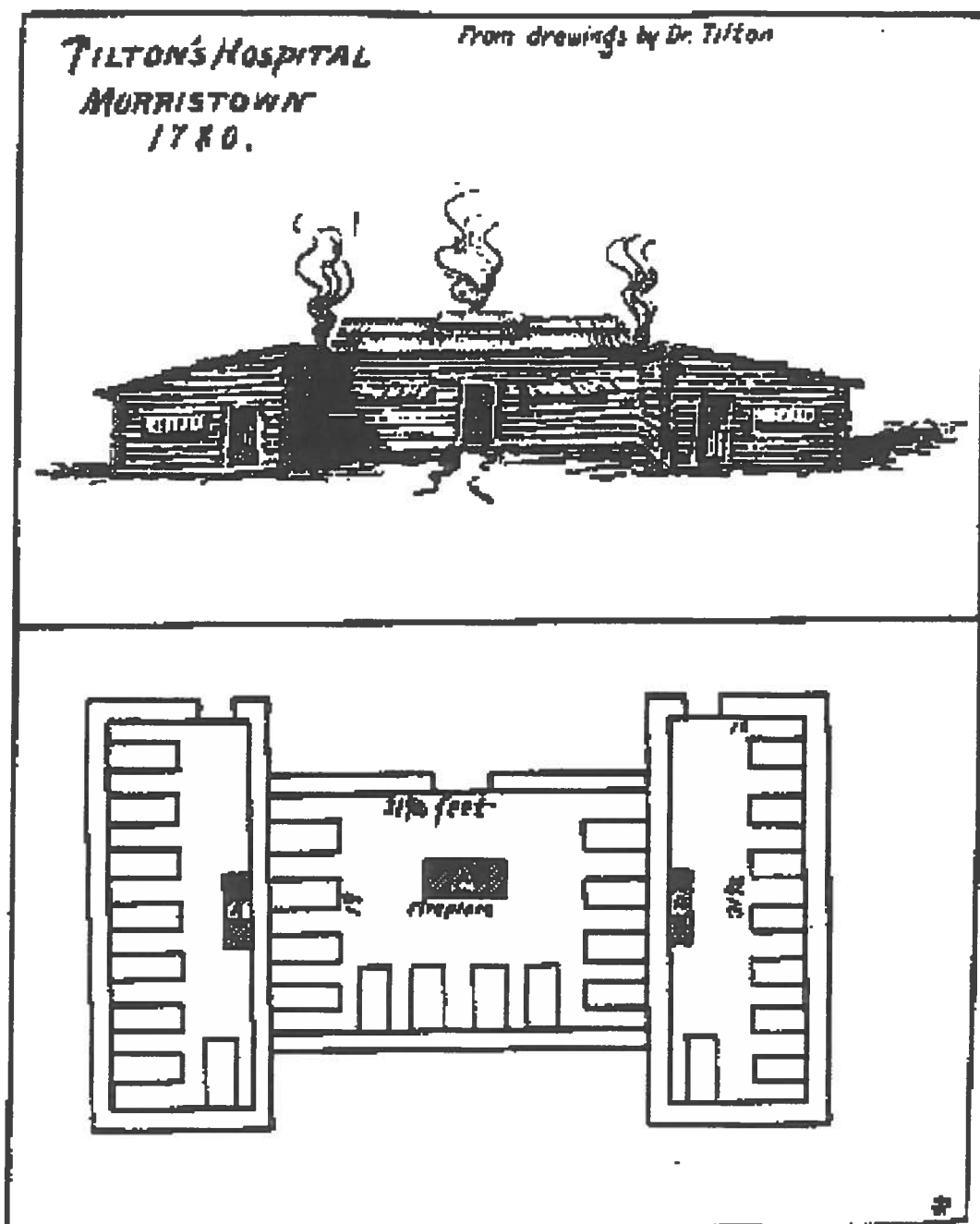


Figure 2.1 Continental Army Hospital  
 By Dr. Morris Tilton, 1780.

Source: Gillett, Mary. *The Army Medical Department: 1775-1818*  
 Center for Military History, Washington D.C. 1981, Page 104

The second line of hospitals and medical services were more permanent and used primarily for convalescence and dispersement of supplies. The Continental Army Hospital in Yellow Springs,

Pennsylvania is an example of a more permanent convalescent hospital, (Jalenko, et al, 42). Although extent and seriousness of injury partially influenced where a soldier was hospitalized, the major factor determining survival was actually disease.

The Continental Army was ill prepared to deal with injury, and the facilities and technologies for treating disease were almost non-existent. Ninety percent of the fatalities of the Continental Army, and 84% of the British fatalities occurred directly from disease (Gillett, 3). Malaria, dysentery, typhoid, smallpox, and yellow fever ravaged both armies before, during, and after engagements. At this time, medicine in America was based more upon theories and less upon observations and testing. Hence, theories of "miasma," "bad air," or "too much sleep" led to erroneous treatments that often killed the patient. Medical practices included ingestion or clysis with mercury and lead salts, blistering, and blood letting to the point of exsanguination, (Gillett, 6). Rampant disease and "putrid fevers" associated with the more permanent hospitals created the original atmosphere of suspicion and distrust amongst the regimental surgeons. Dr. Benjamin Rush, Medical Committee member of Congress observed that the risk of dying on the battlefield was 2% while the risk of dying if hospitalized was 25%, (Jalenko, et al, 42). The surgical practices of the Continental Army were also plagued with problems of infection and disease. Operative mortality for amputations ranged 45%-65%, (Gillett, 18) and amputations were very common for many limb injuries.

Altogether the Revolutionary War provided Americans with a basis for further development and experience in military emergency

medicine. The Hospital Department established by Congress created an enduring military institution and defined basic emergency medical concepts such as the regimental surgeon and the temporary hospital. Although injuries were significant during the Revolution, disease caused far more morbidity and mortality than any musket or canon. Unfortunately, few significant medical or surgical advances occurred during this time period as compared to distant generations of military and medical affairs.

From the American Revolutionary War to the Civil War, American military forces apparently learned almost nothing. The Civil War duplicated many of the same inadequacies of medical and surgical service except a few modest improvements in prehospital care. The Hospital Department, regimental surgeons, and regimental hospitals of the Revolutionary War were present, but this system was overwhelmed by the logistics of 3 million people in combat. The human cost of the Civil War was 620,000 lives with close to 200,000 men killed as a result of traumatic injury, (Gabriel, 181). The remaining 2/3 of the fatalities were caused by disease. The large numbers of dead are the testimony to the dismal medical and surgical capabilities of the respective armies. The only notable improvements in military medicine occurred rather late in the war. The ambulance and more organized prehospital care made their first appearance in military medicine.

The staggering increase in the number of fatal injuries can be partially attributed to the fruits of the industrial revolution and the lack of a medical system to deal with those injuries. In other words,

the capacity to maim and injure preceeded the technology to restore and heal, a pattern reproduced over and over in human history. The inaccurate muskets of the Revolution were replaced by the Springfield rifle that were accurate to a range of 600 yards, (Gabriel, 181). The practices of "fire and charge" of the Revolution were replaced by accuracy and distance of the armies. The Minie ball fired by the Springfield rifle was responsible for more than 90% of all wounds while the sabre and bayonet reportedly caused only 56 fatalities from 922 wounds, (Gabriel, 181). Technology made other inroads to the Civil War, some of them were beneficial. The Civil War was the first military experience where anesthesia was in widespread use. Tourniquets and cautery were eventually replaced by ligature for controlling bleeding from injuries and amputations, (Gabriel, 185). Unfortunately Lister published his paper on antiseptis following the war. Amputation mortality was no better than the Revolutionary War ranging from 25-45%, and as high as 52% when amputation was secondary to infection, (Griffiths, 204; Gabriel, 182). The following passage pretty well characterizes the miserable surgical and medical state of the Civil War:

*"The surgeon's sleeves rolled up, arms and aprons smeared with blood, not infrequently held their knives in their teeth in order to have their hands free. It was pre-Listerian surgery at its zenith. No one scrubbed up. Indeed after a battle at Perryville, water was scarce and some surgeons were unable to wash their hands at all for two days"*

(Griffith, 207)

Of the few innovations brought about by the Civil War, the most important were the use of the ambulance and improved prehospital care. At the time of the battle at Bull Run, the Union army had an ambulance capability for 100 casualties for 30,000 troops, (Gabriel, 188). Following the battle at Wilson's Creek in Aug. 1861, the wounded could not be moved for six days due to lack of ambulances. In November, General Grant was forced to abandon his wounded at Belmont due to lack of ambulances, (Gabriel, 188). Public outcry forced the Union Army to hire a new director for the Hospital Department, who in turn hired Jonathan Letterman as Surgeon General. Letterman immediately established a trained ambulance corps modeled after none other than Jean-Dominique Larrey of Napoleon's Army. At Antietam, Letterman's ambulances removed 12,000 wounded off the battlefield in less than 24 hours (Griffiths, 205). One month later at Fredericksberg, Letterman's ambulances removed 10,000 injured from the battlefield and into aid stations in 12 hours, (Gabriel, 189). Part of Letterman's success resulted from integrating the ambulance service into the Northern Railroad and steam ships of the East Coast and Mississippi and Ohio rivers, (Gabriel, 189). Union Army injured could be cleared from the battlefield and dispersed across a greater number of hospitals.

The ambulance corps created by Jonathan Lettermen had two important features that made it distinctive. The first feature was that the ambulances and the personnel behind it were dedicated to that sole purpose. The soldiers were no longer required to leave the front to carry the injured to the rear. The dedicated units also made ambulance service readily available from the first to the last injury.



The second feature of the ambulance corps was another principle borrowed from Larrey; the corpsmen were trained in the initial management of injuries. Lettermen employed a rudimentary form of "triage" by processing the injured through battlefield aid stations as a means of sorting the injured according to severity, (Gabriel, 190). In addition to the regimental surgeons and trained litter bearers, army nurses such as Mary Walker of the Union Army, and Sally Tompkins of the Confederate Army were tending the wounded under fire, (Griffiths, 205). Despite the improvements created by Lettermen, his ambulance corps and other improvements were not widely adopted until the end of the Civil War. The incredible size of battles still overwhelmed the unprepared armies. Following the battle at Gettysburg, 26,000 wounded and 6,000 dead remained on the field for days, (Griffiths, 206).

The Civil War was marked by only a few improvements in emergency medicine concepts, namely the ambulance and improvement of prehospital care. Between the American Revolution and the Civil War, the United States military forces had generated the rough prototype of medical services that would later become more successful with other medical developments. The ambulance corps was demobilized at the end of the war, but the concepts remained with the military to be used in the not too distant future. Surgeons and physicians returned to civilian practices with a tremendous amount of experience and improvements in skill. The increased skill and experience were soon to be combined with other medical advances that improved the health of civilians and military personnel alike.

The period of time between the Civil War through World War II was marked by an explosion of scientific breakthroughs that dramatically affected the civilian and military spheres of medicine. Lister's work in antiseptics, polio vaccines, sulfa drugs, and penicillin were just some of the medical breakthroughs that were pioneered in the civilian world and proven on the battlefield. World War I saw the first use of battlefield X-ray machines, blood transfusions, shock management and widespread use of tetanus vaccination, (Gabriel, 240). Among British casualties the incidence of tetanus infection dropped from 32% to 0.1% by the end of WW1, (Gabriel, 240-242). Similar medical miracles such as penicillin, blood product therapy, and mechanized, highly mobile ambulance services further reduced the casualties of WW II. Instead of major advances specific to emergency medicine such as the ambulance or field hospital, the medical technologies had more widespread applications in general medicine and surgery as well as emergency medicine.

The Korean War is notable to the history of emergency medicine because of the further refinement of the field hospital and the initial use of air ambulances. The popular television program of the 1970's, M\*A\*S\*H was based upon a real concept of a laterally positioned, highly trained surgical unit. In WWII, the surgical unit was moved closer to the front line and called the Advanced Surgical Center or ASC, (Gabriel, 253). The ASC was vertically positioned downstream from battlefield first aid stations, sometimes a distance of 100 miles or more. During the Korean War, the MASH unit was used as a lateral transfer of the most seriously wounded directly from the battlefield and bypassing the forward aid stations (Gabriel,

258). Casualties were surgically stabilized before transfer to an evacuation hospital. American forces made great advances with a relatively high number of vascular surgeons who reduced the amputation rate secondary to arterial injuries, (Gabriel, 259). Another pioneering innovation was the use of the helicopter for the most seriously injured. These aircraft were small and could only hold two patients at a time with no provision for in-flight medical support. The use of the helicopter was so successful it led to their almost exclusive use in Vietnam.

The Vietnam War being the most recent military conflict has had the most influence on the present day structure of American emergency medical care. Entering into the war, the military had an extensive array of experience from Korea and the backing of many decades of medical advancements. American military forces took these previous experiences and technologies and made additional innovations that resulted in efficient emergency services. Of the conceptual improvements, U.S. military forces decreased the medical response time, implemented a strategic control of medical evacuations, and made full use of triage systems for sorting the wounded. Technological improvements included the use of helicopters on an unprecedented scale, improvements in vascular surgery, better field equipment for immobilization and stabilization, and communications systems. The mortality figures reflect the significant improvements in military emergency care during the Vietnam War. Mortality from wounds dropped throughout the history of American wars from 13.2% for the Civil War, to 2% for

Vietnam, (Boyd, 2; Gabriel, 259; Braun, 86). Figure 2.2 illustrates the trend in dropping mortality rates.

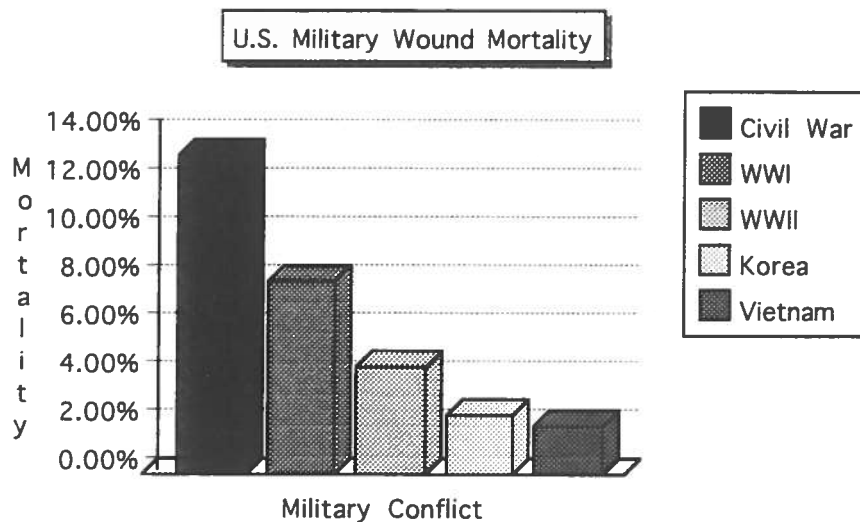


Figure 2.2. Trends In Military Wound Mortality.  
Sources: Boyd, 2; Gabriel, 259; Braun, 86.

The reduced time from injury to treatment along with management of emergency medical resources are the hallmarks of Vietnam emergency medicine. The 2 hour time between injury and treatment in the Korean war was reduced to 35 minutes in Vietnam, (Gabriel, 258, 260). Research in Vietnam showed there was a three-fold increase in wound mortality for every 30 minutes elapsed before medical care, (Jacobs et al, 8). Management of medical resources were primarily accomplished through Medical Regulating Officers (MROs) who directed helicopter medical evacuation units, frequently referred to as "Medivac". The helicopters capable of carrying 6-9 wounded with in-flight medical support were then directed by the MRO to the most suitable hospital facilities according to injuries and resources, (Gabriel, 261; Braun 87). If questions or

disagreements arose in flight, the corpsman or the helicopter crew could contact a hospital physician for advice or instructions. The resemblance to this military dispatching procedure of the current practices of civilian EMS systems is no accident. The hierarchy, management, and communications systems used in Vietnam became the model for 911 emergency systems and centralized dispatching of most cities today, (Boyd, 15-16).

During the Vietnam War, the helicopter proved to be the most effective transport system for the wounded, an observation that had an effect on civilian life. In the Vietnam War U.S. military forces flew 13,004 medivac missions in 1965, 76,910 missions in 1966, 85,804 missions in 1967, and a peak of 206,229 missions in 1969, (Gabriel, 261). The success of helicopter use for medical evacuation was influential. In 1965, Dr. Henry Howe of the AMA's committee on aerospace medicine predicted that U.S. Coast Guard and commercial helicopters might soon be pressed into service as air ambulances, (Braun, 87). Dr. Howe's prediction became reality. The first helicopter evacuation program was initiated as a joint experiment between the Department of Defense, Department of Transportation, and the Department of Health and Human Services in 1970. Existing helicopters and medical personnel were supplied by the military in a project named Military Assistance to Safety and Traffic, or MAST, (Boyd, 76; Rockwood, et al, 301). Primarily directed to the increasing incidence of traffic accidents in civilian United States, 24,550 missions were flown between 1970 and 1975, (Boyd, 76). Since this time MAST units have largely been replaced by commercial aircraft and crews.

The incorporation of triage practices into the modern emergency department is largely attributed to the recent and extensive use of triage in the Vietnam War. Elements of triage have existed in military medical systems as far back as the French Revolution and Civil War, but they became more formalized practices in WWI and WWII, (Rund, 4). The most recent practices of triage in the Vietnam war have provided the model which civilian hospitals now use. In the Vietnam war, triage was initiated by the field corpsman who often decided who was to be evacuated first. Additional levels of triage were performed by the MRO while medivac helicopters were in flight, and the final level of triage was performed again at receiving hospitals. Much like the medical resources management and communications systems, the military practices of triage in Vietnam are currently used by paramedics, 911 dispatchers, and receiving hospitals. The exclusive use of triage by the military gave way to civilian forms as early as 1963, (Rund, 7). By 1972 many institutions including San Francisco General Hospital were using the simplified Emergent, Urgent, and Non-urgent categories of patient triage, (Rund, 7).

The military was first to develop a system of triage due to the logistics of multiple injuries, but civilian emergency rooms didn't have this experience until later in the 20th century. The visits to American emergency departments increased from 18 million in 1958, to 44 million in 1968, to 76 million in 1977, (Rund, 6). The effect of increased utilization resulted in adoption of triage practices by 63% of hospitals by 1973, (Rund, 9). Unlike military medical practices, the increased use of civilian emergency services is partially

attributed to patients seeking primary or non-urgent health care, (Rund, 7; Shah, 1039; Kelly, 458). The resulting overcrowding of emergency departments creates a strain on the resources and personnel similar to what was experienced on the battlefield. Currently, triage in civilian emergency departments prioritizes urgent health care and diverts non-urgent patients to primary provider clinics or lower priority care. The practice of using triage nurses or a triage receptionist to screen patients has now become an accepted practice at most emergency departments and clinics, (Rund, 10; Shah, 1039).

The practice of triage that carried over from the Vietnam War to civilian emergency departments was part of a constellation of procedures that was oriented to mass casualties and multiple trauma. The initial steps in trauma management learned in Vietnam were eventually translated into standard practice of the emergency department. Advanced Trauma Life Support or ATLS was created in 1978 as a standard set of skills and procedures for the first hour of management of trauma by civilian physicians, (Collicott, 749). Prior to the mid-1970's, emergency medicine was not yet a professional specialty, and the level of training was sporadic, (Young, 667). ATLS and its parent protocol Advanced Cardiac Life Support, ACLS, standardized the approach to the trauma patient and has been used as the basis of training, and more recently the legal standard of training in American emergency rooms, (Collicott, 752). According to Collicott, ATLS originated from trauma research in combat zones and was implemented by civilian physicians in rural Nebraska. The ATLS training protocols strongly resemble the trauma procedures

suggested by osteopathic surgeon, Nazareth Asorian written in an article upon his return from duty in Vietnam. Asorian's procedures for airway, abdominal, and chest injury management are almost identical to current ATLS training standards. Asorian's Vietnam experience like many other physicians provided the base practices of current emergency medicine.

Part of the success of the dropping mortality of the Vietnam war can also be attributed to the rapid and efficient prehospital care provided by corpsmen. Attention to initial wound care, airway maintenance, control of bleeding and treatment of shock became standard practices by trained paramedical personnel that were shown to save lives, (Heaton, et al, 31). The use of trained paramedical personnel was an idea that did not exist in the civilian world until after the experience of the Vietnam war demonstrated the value of rapid resuscitation and prevention of additional injuries. Shortly following the Vietnam experience, civilian sector interest groups began to formulate training curriculum and mandatory standards for training prehospital personnel. These standards later became law in the Federal Highway Act of 1966, and the EMS Act of 1973. It is interesting to note that two provisions in the EMS Act specify using former military corpsmen in civilian prehospital care systems, (Boyd, 30-33)

Until WWII, emergency medicine evolved primarily as a surgical service with attention focused on injuries and their complications. Evidence of civilian emergency rooms of the period prior to WW II indicates they were almost exclusively oriented towards traumatic injury. In 1935, the city of San Francisco



emergency hospital service was run exclusively by surgeons and their assistants, (Butler, 9). However, following the advances made in civilian and military medicine, new benefits not directly related to traumatic injury began to emerge. Antibiotics, blood product therapy, and advanced cardiac life support have uses outside the sphere of traumatic injury. Many medical technologies developed or improved as military applications are currently used in the medical management of patients. As a result of the increased use and application of scientific medicine in the mid-twentieth century, the emergency departments were no longer limited to traumatic injury. The consideration of medical emergencies such as heart attack, sepsis, or bleeding disorders were beginning to constitute emergency department patients. With the appearance of medical advances, emergency medicine began to mature from a surgical intervention of war, to a medical and surgical intervention in civilian lives.

The accumulation of experiences and practices of the military, particularly those of the Vietnam War, have become the basis from which we have modeled our emergency departments. The progression of emergency medical services was slow and painful but eventually resulted in efficiency and life-saving skills that didn't go unnoticed in the civilian sphere. The timing of the Vietnam War coincided with a period of civilian history where accidents had reached epidemic proportions. Lacking an efficient and systematic model of emergency service in the civilian world, the Vietnam success in emergency care provided the concepts that were logical to adopt to reduce morbidity and mortality. Many of the innovations

pioneered in Vietnam became the basis for emergency medicine legislation, the subjects of following chapters.

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Chapter 3

The Civilian Experience in  
Emergency Medicine:  
The Industrial and Public Components

Civilian manifestations of emergency medicine lagged behind the military counterpart, but originated from increasing civilian exposure to traumatic injury. This chapter illustrates how the industrial and technological revolutions of the nineteenth and twentieth centuries resulted in the need for improved emergency services. As will be shown, technology and industrialism had direct and indirect effects. The social cost of production in fledgling heavy industries was astronomical numbers of injuries and fatalities. The use of products of technology eventually allowed civilians to achieve the velocities and destructive forces only previously seen in war. This chapter illustrates the unique responses to the increasing civilian exposure to these hazards. Components of industrial medicine and the origins of public civilian emergency departments are explored.

Following the Civil War, the agricultural United States underwent an industrial transformation in response to a multitude of factors. Some of the forces influencing the industrial revolution were economic and political, but the most significant elements were the advances in technology of industry and their applications, (Corn, 2; Selleck 3-13). The growth of American industry following the Civil War is illustrated in figure 3.1 which graphically demonstrates the growing nature of the U.S. manufacturing index.

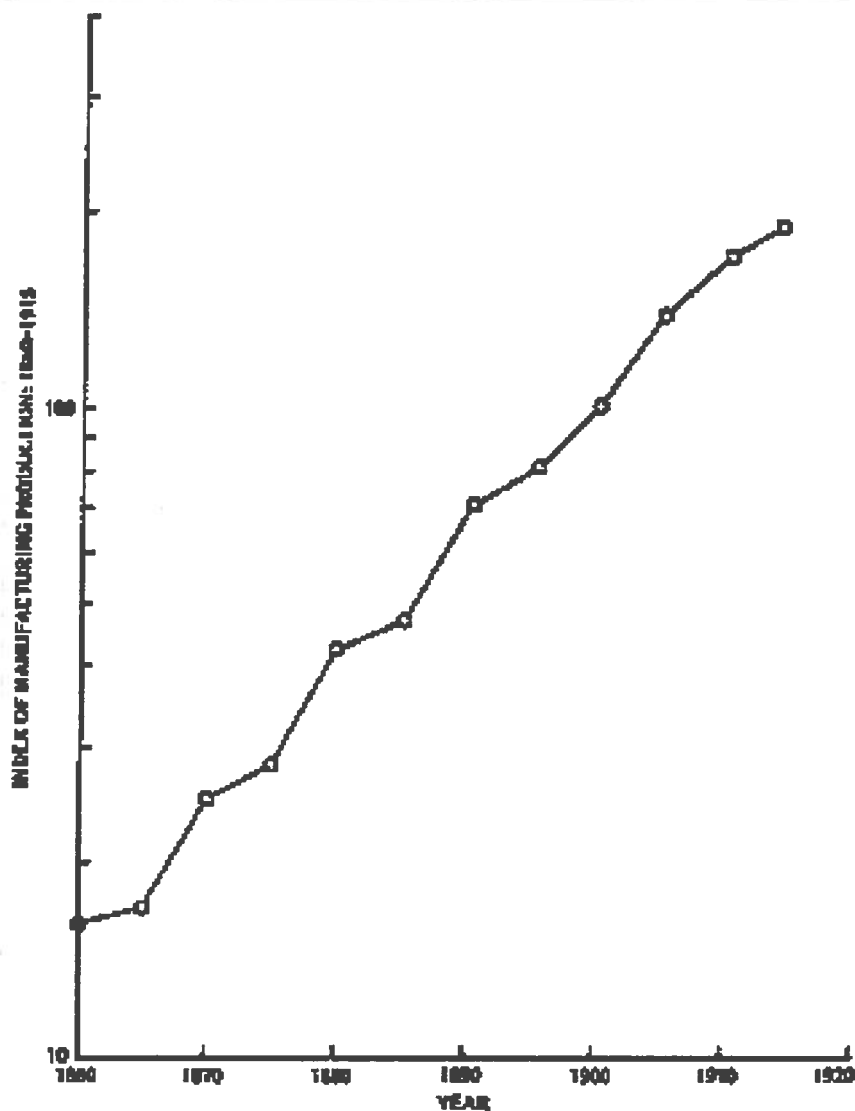


Figure 3.1 U.S. Manufacturing Index, 1860-1915

Source: Historical Statistic of the U.S.: Colonial Times to 1970. Part 2, Series 13-28 Washington: U.S. Dept. of Commerce and the Interior. Printed in Corn, Jacquelin. Response To Occupational Hazards: A Historical Perspective, (New York, Van Nostrand Reinhold, 1992)

In direct proportion to the increase in U.S. manufacturing, the exploitation of natural resources, construction of railroads, and the labor workforce increased to supply the demand. The production of Bessemer steel increased 6-fold between 1890 and 1910 with similar expansions in coal, ore mining, lumber, and oil industries, (Selleck, 30, 44). In order for America to achieve this production in a short

period of time, huge numbers of people entered the labor workforce. The combination of hazardous new industry and large volumes of laborers produced a changing experience of Americans and injury.

The consequences of industrialization without previous experience in safety and occupational health resulted in catastrophic numbers of injuries, deaths, and poisonous exposures. Selleck describes the chaotic nature of early industrial factories in the following:

*"American factories in the late 1800's and early 1900's were built according to standards already obsolescent. Existing systems of power transmission made them jungles of shafts and belts, with accident hazards overhead and underfoot, at every worker's elbow. They were ill-lighted, poorly ventilated, suited neither to modern production nor to the enforcement of safety or sanitation measures."* (Selleck, 46)

In 1913, 23,000 known occupational deaths occurred as a result of chaotic industrial conditions and generally lack of regard to safety, (Corn, 4). The number of injuries was certainly many-fold higher. Other statistics attest to the hazardous working conditions and lack of development of safety and accident prevention. The infamous "Death Calendar" created by Crystal Eastman in 1907 displays the industrial mortality for Allegheny County, Pennsylvania for the 1906-07 time period, figure 3.2. The busy looking calendar is actually filled with small "X's" which represent industrial fatalities totaling 326 lives lost in Allegheny County, Pennsylvania.

DEATH CALENDAR IN INDUSTRY FOR ALLEGHENY COUNTY																				
JULY 1906							AUGUST 1906							SEPTEMBER 1906						
1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14
15	16	17	18	19	20	21	15	16	17	18	19	20	21	15	16	17	18	19	20	21
22	23	24	25	26	27	28	22	23	24	25	26	27	28	22	23	24	25	26	27	28
29	30	31					29	30	31					29	30	31				
25							45							37						
OCTOBER 1906							NOVEMBER 1906							DECEMBER 1906						
1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14
15	16	17	18	19	20	21	15	16	17	18	19	20	21	15	16	17	18	19	20	21
22	23	24	25	26	27	28	22	23	24	25	26	27	28	22	23	24	25	26	27	28
29	30	31					29	30	31					29	30	31				
25							54							40						
JANUARY 1907							FEBRUARY 1907							MARCH 1907						
1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14
15	16	17	18	19	20	21	15	16	17	18	19	20	21	15	16	17	18	19	20	21
22	23	24	25	26	27	28	22	23	24	25	26	27	28	22	23	24	25	26	27	28
29	30	31					29	30	31					29	30	31				
40							36							43						
APRIL 1907							MAY 1907							JUNE 1907						
1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14
15	16	17	18	19	20	21	15	16	17	18	19	20	21	15	16	17	18	19	20	21
22	23	24	25	26	27	28	22	23	24	25	26	27	28	22	23	24	25	26	27	28
29	30	31					29	30	31					29	30	31				
51							47							42						

Figure 3.2 Death Calendar for Allegheny Co. PA, 1906  
 Source: Crystal Eastman 1907, Russel Sage Foundation. Reprinted in  
 Corn, Jacquelin. *Response To Occupational Hazards: A Historical  
 Perspective*. (New York, Van Nostrand Reinhold, 1992)

Evidence that industry and technology were creating significant health hazards becomes even more clear when production was increased to meet the demands for war. In the first two years of WWII, there were 7,500 more industrial civilian fatalities than

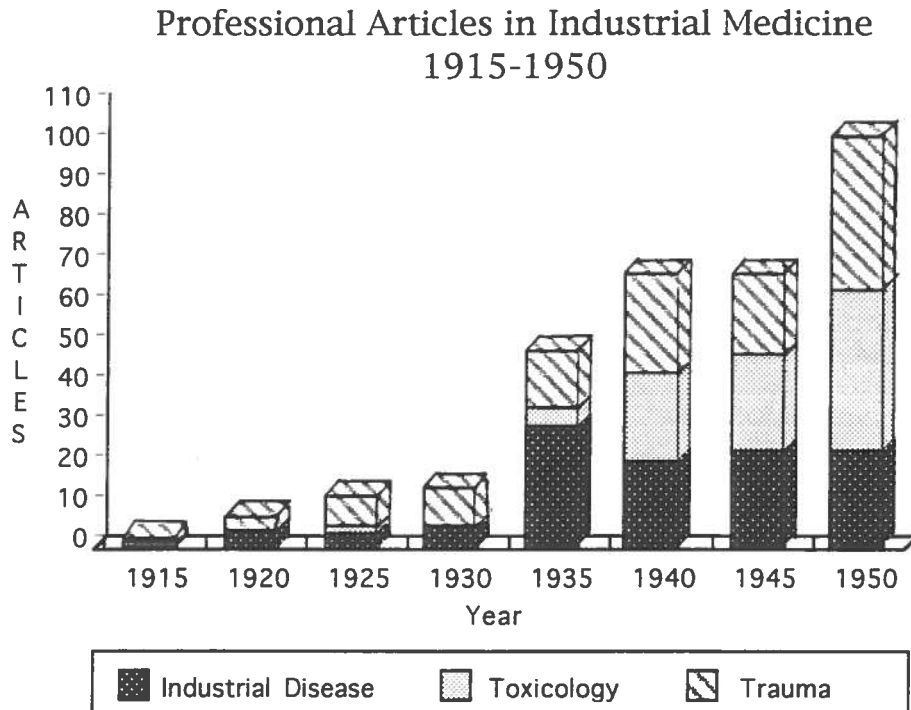


American soldiers in combat; morbidity was 60 times the rate for American factory workers than it was for all American military wounded and missing in action, (Corn, 16)! Occupational casualties in this two year period were 37,600 dead, 210,000 permanently disabled, and 4.5 million temporarily disabled, (Corn, 16). These startling figures illustrate the magnitude of change in the American civilian environment with respect to injury.

Civilian systems for industrial medicine lagged far behind their military counterparts because of political structures that were resistant to acknowledge the safety of an individual over the success and profits of industry. Jacqueline Corn attributes the slow progress of industrial medicine to "nineteenth century laissez-faire" attitude of the government towards big business and industry. Similarly, Selleck attributes a Jeffersonian attitude which favored small government and unrestricted business lacking regard for the human laborer. The reluctance to confront the rising escalation of industrial accidents is illustrated in 1904; Maryland declared its legislation that providing injured workmen with benefits as unconstitutional, (Corn 9). Any trivial reforms in occupational safety that may have existed in the early 1900's were essentially suspended by the Harding-Coolidge-Hoover administrations in favor of commerce and industry, (Corn, 11). The lack of regard for industrial safety can also be attributed to America's lack of experience with respect to technology and its potential consequences on health. Routine exposure to hazards was a relative novelty for the non-military citizen. Eventually, the magnitude of industrial injury could no longer be

hidden and systems of medical management specific to industry emerged.

When the field of industrial medicine emerged from the technological revolution, there were few other civilian organizations which dealt with the consequences of mechanical and technological lifestyles. The first meeting of the National Society of Physicians and Surgeons in Industrial Practice occurred in 1914 with six members in attendance, (Selleck, 65). From this small start, industrial medicine emerged as a growing health profession. One of the products of this organization was the creation of an academic forum which addressed occupational health issues and furthered the knowledge of industrial medicine and surgery. Figure 3.3 illustrates the increasing interest and activities of industrial medicine. This figure represents the number of professional papers and articles which address issues in the industrial medical forum. Taken as a proxy of what was occurring in American industry, this data indicates a progressive acknowledgment and concern for the problems created by industry. In addition, this figure also indicates that injuries and poisonous exposures were becoming increasingly prevalent in civilian life.



**Figure 3.3. Trends in Industrial Medical Literature.**  
 Source: Modified from Selleck, Henry. *Occupational Health in America*  
 (Detroit; Wayne State University Press, 1962) Pages 138, 141, 144.

As illustrated in figure 3.3, the subject of trauma and its surgical intervention became an important aspect of industrial medicine. Like military medical practices, industrial trauma surgery had a significant impact on the formation of early emergency departments.

The relationship between industrial medicine and the evolution of the civilian emergency department is rooted in the practice of trauma surgery. Although part of industrial medicine was concerned with the prevention of injury and disease, a significant amount of practice was performed in surgical treatment of injuries. Due to the lack of safety standards and the nature of operating hazardous machinery, it became commonplace to see injuries "equal in severity

to those of warfare," (Selleck, 159). Some surgeons who had gained experience in war were now appropriately applying their skills to industry. Surgeons without previous training in trauma surgery were beginning to get formal training by 1920 at the New York Postgraduate Medical School, (Selleck, 152). Medical schools and the Society of Physicians and Surgeons in Industrial Medicine advanced the academics of civilian trauma surgery until 1942 when the American Association of the Surgery of Trauma took over the responsibility, (Selleck, 161). The growing importance of trauma surgery in both private and public applications became the basis of the first emergency rooms and hospitals in America.

Trauma surgery originated as specific application of industrial medicine, but eventually the practice and responsibilities spilled over into public hospitals as an early form of emergency care. The most hazardous occupations in the early 1900's were the locations for the first industrial infirmaries, many of which employed their own surgeons. Mining, timber, and steel were typical industries that constructed their own hospitals and on-site infirmaries in the late nineteenth and early twentieth centuries. Eventually these infirmaries were replaced by public services that had acquired the ability to handle traumatic injury. The Bethlehem Steel Shipyard emergency hospital was built in San Francisco in 1907, but the duties of this hospital were probably taken over by the Potrero and Harbor Emergency Hospitals that served both the industry and public, (Butler, 11). In a similar fashion, the "accident room" at Roosevelt Hospital in New York City began to assume responsibility for accident surgical cases for many of the industrial plants in Northern

Manhattan, (Selleck, 152). This transition from industry to public sector appears to be partially responsible for the formation and use of the first emergency rooms in America. The continuous use of industrial medical facilities throughout the twentieth century may have further entrenched the role of the emergency department.

Perhaps more than any industry, the automobile manufacturing business may have contributed more to the need for emergency medical service than anyone could have previously imagined. The initial consequences of production in the assembly line were immediately apparent while other consequences of automobiles would plague later generations of Americans. The newer manufacturing techniques known as the "assembly line" transformed the manufacturing process of both automobiles and injuries. The Ford Motor Company began to employ physicians and surgeons as early as 1913, and were treating as many as 200,000 cases a year by 1915, (Selleck, 60). The production of automobiles went from 8,000 in 1900 to an estimated 52 million in 1954, (Selleck, 47). The ranks of medical facilities and trained medical professionals swelled alongside the automobile industry which further served to formalize emergency hospital services. The following narrative by Henry Selleck characterizes the advancement of emergency medicine as a by-product of American industry:

*"An industrial city such as Detroit has been likened to a battle area. If all the structures could be eliminated except the medical facilities of industry, there would remain an arrangement which resembled the forward first aid stations, the collecting stations which are the medical departments of industry, and the ambulance centers and base hospitals which are the*

*city's well arranged hospital centers. This set up provides full -time personnel to render immediate emergency care and prompt transportation to the central hospital. On arrival there a specially trained surgeon is available, or an internist if the emergency is medical in nature. All the special facilities such as radiology, shock team, and operating rooms are ready for instant use."*

(Selleck, 153-4)

This passage characterizing the 1950's automobile industry illustrates the increasing overlap between general public and industrial emergency services with hints of military influence. In addition to the spectacle of industrial accidents associated with the automobile assembly industries, the production of cars had another dramatic effect on our emergency services.

Although many domestic products of technology have proven to be dangerous, none have created as many injuries and fatalities as the automobile. Almost as soon as the automobile was introduced into American culture, the consequences became apparent and safety on the highways steadily deteriorated. Of the four gasoline powered vehicles in the U.S. in 1885, two managed to collide with sufficient force to injure both drivers, (Boyd, et al, 3). While 52 million vehicles were on the road in 1954, (Selleck, 47), one-quarter to one-half of the vehicles manufactured were destined to become involved in an injury accident, (Boyd, et al, 3). By 1970, 10,000 injuries were occurring each day on the nation's highways which was fifty times the casualty rate of the Vietnam war, (Boyd, et al, 3)! America had certainly entered an age where civilian public life could be considered more hazardous than industry or war.

The automobile brought attention to the rising phenomena of accidents in American culture, but many other products of technology and culture contribute to this situation. Domestic use of power tools, recreational equipment, farm machinery, and firearms are just some examples of the products of technology and culture which contribute to the growing picture of accident and injury. Data from 1980 shows that injury resulted in 140,000 deaths and 70 million non-fatal wounds, (Committee on Trauma Research, 1,4). From the same 1980 data, injury accounts for the majority of all deaths from ages 1-44, with a peak of 79% of all fatalities occurring in the 15-24 age group, (Committee on Trauma Research, 1,4). The data from 1980 is not the development of a sudden trend, but the steady progression of American culture and technologies and their associated consequences. If the rise in automobile accidents had not called national attention to the subject of injury and emergency medicine, the death figures from 1980 would be considerably higher.

The epidemic proportions of injury discussed in above examples were formally recognized in 1966 with resulting changes in public emergency medical care. Subsequent to the publication of, "Accidental Death and Disability: The Neglected Disease of Modern Society" by the National Research Council and National Academy of Sciences (NAS-NRC), America entered an era of formalization and modernization of emergency medical services. The NAS-NRC study showed that in 1965 alone, 52 million injuries resulted in 107,000 fatalities, 10 million temporarily disabled, and 400,000 permanently disabled, (NAS-NRC, 5). The findings of the NAS-NRC study showed that many Americans died needlessly as a result of a total lack of an

organized system to handle medical emergencies. As a result of general American experiences and the publication of "Accidental Death and Disability: The Neglected Disease of Modern Society," America was catapulted into an era of emergency medical developments. Beginning in 1966, the civilian and military components began to merge and form emergency medical practices as we currently experience them. The requirement to effect this change was strong leadership and national legislation, the subject of the next section.

The information provided in this section of the paper illustrates how civilian emergency medical services evolved following the consequences of the industrial revolution. Civilian forms of emergency medicine did not begin to exist until the industrial and technological revolution provided the means of continuous exposure to hazardous machinery and environments. Industrial manifestations of emergency medicine, namely the field of trauma surgery, evolved before public forms due to the relative high exposure in unsafe environments. Public forms of emergency medicine evolved as an extension of industrial medicine and eventually served the non-industrial public. Presently, American culture and technology perpetuates the field of emergency medicine independent of industrial or military contributions. This section ends at the beginnings of our modern era of emergency medicine.



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## Chapter 4

### Legislation and Influence: Creating and Defining Emergency Medicine

The American experience with accidental injuries and sudden illness eventually evolved into a formalized system of emergency care but it required several pieces of legislation to make it legitimate and permanent. This chapter focuses upon the three most important laws to emergency medical services and the emergency department. Two specific pieces of legislation were responsible for defining the external emergency response, the emergency department with its personnel, and the propagation of emergency medicine through residency training programs. These two pieces of legislation were the Highway Act of 1966 and the EMS Act of 1973. A third piece of legislation is presented here because it defines the minimum amount of care that an emergency department must provide for any person requesting for care. This piece of legislation is the Emergency Medical Treatment and Active Labor Act, or EMTALA of 1986.

Literature on the legislation of emergency medicine is extensive and has filled many volumes with thousands of details. A full coverage of all legislative aspects of emergency medical care is beyond the scope of this historical overview. Presented here are summaries of EMS legislation and several examples pertinent to historical events previously discussed.

The year of 1966 was pivotal for emergency medicine because a landmark study initiated the first national attempt to curtail unnecessary deaths due to acute injury and disease. The publication of "Accidental Death and Disability: The Neglected Disease Of Modern Society" by the National Academy of Sciences and National Research Council was the "prime mover to set off an avalanche of remedial

action," (Gaston, 195). The modern era of emergency medicine and the approach that entailed and integrated system of components is attributed to the publication of "Accidental Death and Disability," (Boyd, 5,6). Bolstered by the NAS-NRC publication, Lyndon Johnson signed the Highway Safety Act of 1966 into action which was the first federal law directing states to develop emergency medical services to reduce the morbidity and mortality on the nation's highways.

The Highway Safety Act did little to directly implement reforms in emergency medical care, but it did serve as a catalyst for states and public interest groups to begin developing plans for improvements, (Boyd, 9). The teeth of the Highway Safety Act of 1966 was that states were required to show intent of implementing elements of emergency medical service or lose 10% of their federal highway funds, (Rockwood, et al, 299). As a result of the Highway Act and general directions provided by the NAS-NRC study, state governments and emergency medicine interest groups began to form and address the challenges in emergency care. For clarity, a few of the many organizations and their activities are presented in table 4.1. Evident from the table is the overlapping efforts of many of the organizations.

Organization	Activities
Committee on Trauma, American College of Surgeons	Emergency medical technician teaching guidelines, standards for ambulances, emergency department design
Committee on Injuries, American Academy of Orthopedic Surgeons	Text for emergency medical technician course, training of emergency medical technicians
American College of Emergency Physicians	Formed 1968, First national conferences in 1969 & 1970, established criteria for board certification
Comission on Emergency Medical Services, American Medical Association	EMT Registries, hospital categorization, uniform hospital highway signs, recruitment of corpsmen as EMTs
National Academy of Sciences- National Research Council	Cardio-pulmonary resuscitation standards, public education of CPR, Emergency personnel training guidelines, ambulance design
National Highway Safety Bureau	Plans for emergency service response, EMT certification, ambulance design, helicopter use in project MAST

Figure 4.1 Organizations & Activities of Highway Safety Act  
Sources: ACEP, 10; Gaston, 196-202

The result of the Highway act of 1966 was the activity and production of many of the standards and designs for improving the nation's emergency health services. Unfortunately little was actually accomplished in bringing these two criteria to implementation; there was not sufficient funding or leadership.

The actual implementation of standardized and systematic approaches to emergency care didn't occur until more extensive federal legislation provided the incentives and mandates. The Highway Safety Act provided the initial burst of activity, but emergency medical services were still far short of the NAS-NRC recommended goals. The lack of coordination on the national level resulted in a dizzying array of independent activities which brought us only marginally closer to small improvements in emergency care, (Keller, 19). In 1972, the NAS-NRC issued a statement that

emergency medical services, "were one of the weakest links in the delivery of health care in the nation," which severely criticized the lack of federal leadership in the development of emergency medical services, (Boyd, 13). That same year, the Nixon administration responded with a series of EMS demonstration projects at selected sites around the country in an attempt to pilot successful systems of improved emergency medical services, (Boyd, 15). Congress and the Nixon administration eventually agreed to the most comprehensive bill in emergency medicine history, the EMS Act of 1973.

The EMS Act provided the federal funding and guidelines for states to develop and implement a consistent system of emergency medical service. Influenced by the NAS-NRC guidelines, the EMS Act specified a coordinated and systematic approach to implementing emergency medical services through fifteen mandatory components. These mandatory components covered areas of communications systems, ambulance design and emergency medical technician training, emergency department and critical care facilities, consumer participation, training of the lay public, accessibility of care, disaster linkage, mutual aid agreements, and the establishment of graduate and post graduate curriculum in emergency medicine, (Boyd, 18; Harvey, 20-22). The federal government's leadership was provided in the forms of information and funding with mandatory stipulations. The states were free to develop their own EMS systems as long as they complied with the federal mandates of standard levels of training, communications, and mutual-aid protocols.

One of the mandatory components of the EMS Act supplied funding to the first graduate and post-graduate education programs

in emergency medicine. The American College of Emergency Physicians was one of many groups that took to the task of developing "The Essentials for Residency Programs in Emergency Medicine," which later resulted in the first certifying board examinations in 1980, (Wiegenstein, 2183; ACEP, 19). With the creation of the new board specialty, emergency medicine entered a new era of respectability and professional status. Prior to the residency training program and certification, the emergency room was supplied with a physician who might have little or no training in the acute management of trauma or sudden illness. Residency training guidelines developed by ACEP, the American College of Surgeons, the AMA and other influential organizations provided the minimum set of skills and standards for a physician to handle a wide range of surgical and medical interventions. Currently there are more than 100 emergency medicine residency training programs graduating 900 emergency physicians a year, (Young 667).

The EMS Act specified a regional approach to the implementation of emergency medical services which set cooperation, mutual aid, and categorization requirements of all types of emergency service. The categorization of emergency department capabilities was essentially used to evaluate the resources and readiness of hospitals within a given region, (Boyd, 454; AMA 1). The AMA Committee on Emergency Medical Services published a guideline for the categorization of emergency services into Category I through Category IV, with Category I being the most complete emergency service, (AMA, 9). The AMA's categorization is described as a "horizontal" assessment which describes the readiness to provide

general emergency care to a population, (Boyd, 455). A second criteria developed which describes a hospital's "vertical" capability to handle advanced care beyond emergency stabilization. The "vertical" capability addressed a hospital's ability to handle severe injuries such as burns, spinal cord injuries, obstetric emergencies and others through multi-disciplinary approaches. Neurosurgery, vascular surgery, burn wards, and available surgical teams comprise a hospital's "vertical" capability beyond what the emergency department is expected to provide. The vertical capacity has become the "trauma center" designation and is described similarly in a level I through level IV system. The trauma center designation also has regional implications for handling the most extreme cases of traumatic injury and burns. This systematic categorization of both horizontal and vertical capacities of regional EMS systems was one of the many products of the NAS-NRC study and its implementation through the EMS act of 1973.

The idea of effective communications systems was pioneered in the Vietnam war and brought to the civilian public by both the EMS Act and grants supplied by the Robert Wood Johnson Foundation. Responding to President Lyndon Johnson's challenge to develop effective emergency systems in 1966, the Robert Wood Johnson Foundation supplied competitive grants to develop regional communications systems. Foundation grants specified the development of a well publicized emergency phone number, centralized dispatching, and inter-agency communication, (Boyd, 16). Robert Wood Johnson Foundation grants resulted in the implementation of 911 emergency communications systems that



bear striking resemblance to systems used in the Vietnam war. The EMS Act provided the funding to fully implement the pioneering systems developed under Foundation grants.

All other aspects of our present emergency care system including paramedics and trained ambulance personnel conceptualized in the NAS-NRC document, "Accidental Death and Disability," and implemented through the EMS act. The EMS act specified a two stage implementation of prehospital Basic Life Support capabilities, followed by the development and capability of Advanced Life Support capabilities, (Boyd, 18). Prehospital care was advanced by standardized training requirements for Emergency Medical Technicians, (EMTs), and a higher level of sophistication practiced by paramedics whose skills were nearly identical to military hospital corpsmen practicing in Vietnam. The AMA committee on Emergency Medical Services established a policy of recruiting former military corpsmen for civilian duty because of their experience and capability was compatible with EMS standards, (Gaston, 198). Two provisions of the EMS act also specified the recruitment of former corpsmen as a means of providing trained prehospital care in accordance with the EMS act, (Boyd, 30). The EMS act resulted in the introduction of paramedic services to most communities by the mid 1980's.

A final piece of legislation pertinent to emergency departments pertains to the requirement to treat all patients who present for care. Component 9 of the EMS act stipulated that EMS services "provide, without prior inquiry as to ability to pay, necessary emergency

services to all patients requiring such services," (Boyd, 43). Penalties for violations of this mandate were either not enforced or lacked sufficient punitive actions. In 1986, congress passed a new law within the Consolidated Omnibus Budget Reconciliation Act, or COBRA. This law is the Emergency Medical Treatment and Active Labor Act or EMTALA which is designed to prevent hospitals and emergency departments from dumping patients according to financial or any other criteria. EMTALA states that all hospitals receiving federal Medicare or Medicaid provider funds will: provide a screening examination, emergency medical conditions or active labor must be treated or stabilized, or the patient is safely transferred to another medical facility for more appropriate care, (42 USC Sec. 1395). The interpretations of "emergencies," "active labor," and "safe transport," are defined in legislative terms, not in standard medical definitions. An "emergent medical condition" or "active labor" can be shown to exist if a patient suffers any morbidity or mortality or will not reasonably reach another facility before delivery occurs, (Burditt vs. The Department of HHS). EMTALA violations can result in a \$25,000 fine for both the physician and hospital.

EMTALA has made it difficult for emergency departments to "dump' patients for lack of ability to pay, but some situations make this law difficult to enforce. When EMTALA was written, congress hadn't anticipated gatekeeping functions of managed care organizations that require authorization and approval to use the emergency department. Without prior authorization, many managed care organizations have denied payment to an emergency

department for services rendered to patients, (Young, 1996). Patients have been known to leave the emergency department against medical advice when they discover their visit will not be covered,(Young, 1996). In California, SB 1832 was introduced to change this situation by requiring managed care organizations to pay for the screening examination as a minimum. The improvement is far from perfect. Managed care organizations are not required to pay for additional services unless an emergency exists. Frequently an emergency is not known to exist until well into the screening examination. The loophole in EMTALA law which allows managed care organizations to partake in possible EMTALA violations will need to be specifically addressed in future federal legislation.

This chapter has provided the legislation and political influence that have formed our present emergency departments. The need for emergency medical service and the available technologies and resource systems were brought together through federal legislation in the Highway Act of 1966, and the EMS Act of 1973. The federal government's leadership role in legislating the standards and providing the funding is responsible for our present emergency medical systems. Once created, additional legislation was required to ensure that all Americans have access to the emergency department regardless of their ability to pay. The EMTALA law was created to prevent patient "dumping" for economic reasons and it has been largely successful. Managed care organizations are presently changing emergency department admissions procedures which may constitute EMTALA violations under the original intent of the

legislation. Congress may have to address the impact of managed care organizations to ensure that all persons have equal opportunity to seek care in our nation's emergency departments.

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## Chapter 5

### Historic Trends in Utilization and Current Issues in Emergency Medicine

Although the emergency department has evolved as a system of emergency health care, it has also been used as a source of primary health care in non-urgent settings. This non-urgent use of emergency medical resources is controversial and raises many important issues. This chapter focuses upon the patterns of emergency department use and the phenomena described as "sub-acute care," "non-urgent care" and the regrettable term, "inappropriate use". The first part of this chapter examines the utilization history with attention paid to causal factors. A second section addresses some of the current issues in emergency medicine with respect to the historical trends of emergency department use. Included in this discussion are relevant examples that affect local emergency departments in Alameda County, California.

#### Part I: Trends of Utilization patterns

Prior to the 1950's, emergency department utilization patterns are only descriptive with little reliability or statistic measure. This lack of data on early emergency department use reflects the unofficial role and inconsistent standards of emergency medicine. The earliest emergency departments provide only occasional glimpses of the past. In an 1896 San Francisco Examiner article, a certain Dr. Fitzgibbons estimated, "thousands upon thousands of people had been brought in off the street and treated on the city's single operating table in a span of 4 years," (Butler, 7). From this small start, emergency rooms of San Francisco and many other cities gradually assumed a significant volume of health care. The era of greatest change for the early emergency departments was the post-

WWII boom in hospital construction. As new hospitals were constructed, the emergency department began to provide a steady source of admissions and income and assumed a more prominent role in our health care system.

Due to the growth and increased use of the emergency department, records for the latter half of this century are more complete and show a stepwise increase of emergency department volume. Figure 5.1 illustrates annual emergency department visits from the 1950's to the present. Evident from the figure is the progression of emergency department cases to a current figure of 100 million visits per year.

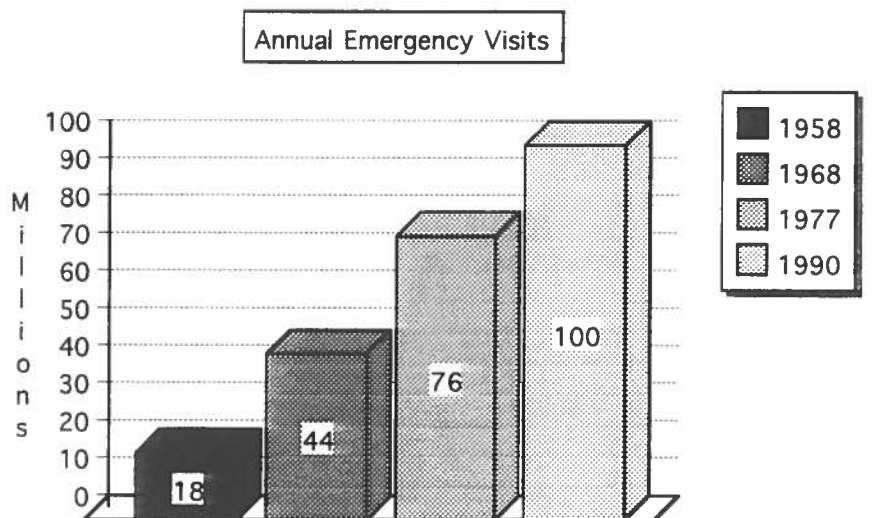


Figure 5.1 Annual U.S. Emergency Department Visits  
Sources; Rund, 6; Young, 666

The increased use of the emergency department from the 1950's to the present can be partially attributed to increased need for emergent health care, but more significant use resulted from factors unrelated to emergencies. The period from 1955 to 1965 saw an increase of annual traffic fatalities from 39,000 to 49,000,



(Accidental Death and Disability, 8) which in addition to other accidents indicates a rising use of the emergency department for injuries. The rise in traffic fatalities was partially offset by a decrease in industrial accident fatalities and thus undermines the role of accidents to account totally for the tremendous rise in emergency department use. Industrial accidents declined from 37 to 20 per 100,000 during the period 1933 to 1966, (Accidental Death and Disability, 8). The initial increase in emergency department was more strongly related to insurance practices and decreasing availability of primary care.

According to Paul Starr, new models of professional competence emerged as a product of post WWII government investment in medical sciences and hospital construction. The general practitioner was disfavored in light of tremendous medical advances and a prevailing dogma of specialization as a key to medical mastery. The percentage of doctors reported to be engaged in specialty disciplines increased from 24% in 1940 to 69% by 1966, (Starr, 358-359). Medical students planning to become primary care providers dropped from 60% to 16% between the first and fourth years in a study conducted in the 1950's, (Starr, 355). The growth of medical information was only part of the influence creating medical sub-specialties; financial incentives were more powerful motivators. Because commercial medical insurance developed in association with hospitals, medical specialists working within the hospital received more economic support. Doctors were encouraged to move into hospital oriented positions, (Starr, 358) which left fewer primary care practitioners to attend basic health care needs.

Due to the increased specialized and decreased primary care practices of the 1950's and beyond, the emergency department became an acceptable place for many people to receive their health care, (Smith, 41). In 1955, hospital admissions increased 53% but emergency department visits increased 307%, (Smith, 41). The initial rise in emergency department visits can be directly attributed to decreases in availability of primary care. For simplicity, the effects of decreasing primary care practice can be broken down into the categories of barriers and preferences. Perceived barriers which led to the initial rise of emergency department use include: decreased availability of physicians practicing primary care; unavailability of physicians on weekends and nights; a large population in metropolitan areas without any other access to health care; increased confusion over the appropriate access point for health care; a large mobile middle class unaligned with primary care; and health insurance plans favoring hospital and emergency department utilization over private practice, ( Smith 41; Agna 1-2). Preferences or choices which have led to increased emergency department use include: increased physician and public confidence and awareness of the emergency department; increasing identity of the emergency department as a source of primary care; reluctance for physicians to treat in their offices due to lack of skill or equipment; physicians depending upon the emergency department as a back-up for after hour care; accessibility of the emergency department around the clock seven days a week, (Smith 41; Agna, 1-2; Young, 667). The barriers and preferences constituting convenience and inconvenience have largely defined the initial growth of emergency department

visits. Many of these factors are presently valid, (SACP, 3) and add to present emergency department volume.

Private or commercial insurance has also contributed to initial increases in emergency department volume. Commercial insurance evolved with hospitals before private practitioners, and so hospital visits were covered long before private office visits. Despite insurance preference for hospitals, there was a lack of primary care providers within the hospital. Patients also had confusion over how to access health care from that hospital. As a result of these factors, emergency department visits soared because they were covered by insurance, and were easy to access. Commercial indemnity insurance was also attractive to the hospitals because it allowed fee-for-service billing for ancillary services such as radiology and laboratory studies, (Smith 43). The ability to charge in full for ancillary services allowed the practice of cost-shifting, or applying some of the charges to cover charity care, (Starr, 388; Young 671). Hospitals of the 1950's and 60's had a strong financial incentive to open their emergency rooms to as many commercially insured patients as possible, partially because insured patients helped to cover the cost of the uninsured.

While commercial indemnity insurance added to the initial rise of emergency room visits, the lack of it has had an overwhelming effect in the last twenty years. The prevalence of commercial insurance remained a positive economic factor in the emergency department until the mid-1970's and early 1980's. A fundamental problem with indemnity insurance is its connection with employment, (Starr, 333). The problem with employment based health insurance appears to be two-fold. First, it leaves out

populations that are retired, disabled, unemployed, and those employed at menial and no-benefit jobs. Second, medical care as a fringe benefit of employment guarantees economic prosperity of the health care industry which is partially responsible for inflation in health care services, (Starr, 333). As a result of run-away inflation in the health care market, the cost of indemnity insurance began to rise making policies unaffordable. The lack of affordable health insurance resulted in increased use of the emergency department by those unable to afford insurance. A large percentage of emergency department visits can be attributed to the unavailability of coverage from commercial insurance, possibly beginning in the late 1960's and carrying forward to the present. The role of commercial indemnity insurance has been reduced to the point that it presently accounts for only 1% of the revenues for Alta Bates Hospital Emergency Department in Alameda County with 36,000 patient visits a year, (Hardy, 4-27-96). Commercial indemnity insurance is not the only form of insurance to affect the emergency department, other forms of insurance have left their mark as well.

The introduction of Medicare and Medicaid in 1965 contributed to a significant increase of emergency department use, but each contributed for different reasons. Together, the two forms of public assistance greatly expanded the access to health services by the poor and elderly. At the time of introduction of Medicare and Medicaid, the non-poor visited physicians 20% more often than the poor, but by 1975 the figures had reversed themselves, (Starr, 373). Medicare became rapidly accepted by the entire medical community for a variety of reasons such as; associations to social security,

popular public approval, and uniform eligibility and coverage, (Starr, 370). Perhaps the most important reason for Medicare's acceptance is that it allowed physicians and hospitals to charge whatever the prevailing and accepted rate for services. Fee for service billing and outrageous charges were the inevitable result of Medicare programs which accelerated health care inflation. One of the many fall-outs of health care inflation was to further price medical care out of the hands of many Americans which inevitably resulted in increased use of the emergency department.

Unlike Medicare, Medicaid shared none of the positive attributes or perceptions which had the effect of steering patients away from primary care providers and towards the emergency department. Excepting the emergency departments and socially motivated individuals and clinics, the participation of the medical community with respect to Medicaid was extremely limited. Medicaid had social stigmas, lack of full federal and state support, non-uniform reimbursement structures, and under-valued reimbursements all of which made it highly unattractive for private practitioners, (Starr, 370). Emergency departments on the other hand were forced to accept whatever they could get in terms of reimbursement from a growing population of medically indigent users. Together, Medicaid and Medicare patients contributed to a tremendous increase in emergency department visits beginning in the mid-1960's, but the volume of Medicaid patients has persisted in the emergency department due to its acceptance there. Medicaid patients have become a very important source of revenue for most emergency departments.

The decade beginning in 1985 showed the first signs of departure from the alarming increases in emergency department utilization. The growth of emergency department visits in the mid-1950's was 17% and leveled off to 11% for the next several decades, (Smith, 41). Compared to the past growth rates, the yearly gain in emergency department visits from 1985 to 1994 varied between 1%-3% with 1994 being the first year to show a drop in the number of visits, (SACP, 2). This decline in emergency department use has been predicted by some to occur as a result of health care reform and the introduction of managed care practices, (Montague, 54). The penetration of managed care systems is highest in the Pacific states and this is where the greatest drop in emergency visits has occurred, a decrease of 13.9% between 1993 and 1994, (SACP, 4).

Managed care and the growth of corporate medicine has had several distinct impacts on emergency department utilization. The restructuring of health care under corporate identities has resulted in the closure and consolidation of hospitals and their respective emergency departments, (Montague, 54; Slater, 9). Many hospitals, HMO's and managed care corporations have put increased emphasis and use of urgent care clinics that offer quick service and convenient hours to non-emergency patients, (Montague, 54). The once shunned Medicaid patients are now appearing lucrative when compared to the medically indigent and active efforts are being made to attract these patients to managed care organizations. Other forms of managed care influence are directed at educating patients to use the emergency department only for emergencies, (Montague, 56), or requiring prior physician authorization to use the emergency

department, (Young, 671). The changing practices of health care reform and managed care principles are largely responsible for the plateau and possible decline of emergency department use, but this may not be an improvement in our emergency services. Discussed in the next section are the current issues in our emergency departments and the consequences of health care reform.

## Part II: Current Issues In Our Emergency Departments

Central to nearly all present issues concerning the modern emergency department are two characteristics, the numbers of medically indigent patients, and the proportions of non-urgent patients. Estimates vary according to source but most authorities cite figures of non-urgent use somewhere between 40-55% of all emergency department visits, (SACP, 3; Kellerman, 1953). Urgent time-sensitive but not emergency health needs can increase the figure to somewhere near 83% for emergency department cases, (SACP, 3). Estimates for the numbers of patients who are uninsured or medically indigent vary widely according to location and whether the service is private or public. One source estimates the number of uninsured and medically indigent case load approach 80% at a single hospital, (Kelly, 458). A more reliable figure from the National Association of Public Hospitals reports 37% of outpatient and emergency room visits were uninsured at NAPH member hospitals, (NAPH, 9). The actual numbers of medically indigent vary somewhere between the two figures.

Not surprisingly, the role of the emergency department in our health care system has become a "safety net" or a place of "last

resort" for the millions of uninsured and/or patients lacking access to basic health care. The frequently used number of nearly 40 million uninsured and an estimated 80 million underinsured have the emergency department as their primary access to medical care, (Lowe et al, 790). The large percentage of patients presenting with sub-acute problems reflects the fact that there is no where else to go. Many patients are lacking insurance or encounter other barriers such as refusal to accept Medicaid in private practice, or have illegal immigration status. Many of the patients in inner city areas are mentally and socially incompetent to secure jobs, let alone earn enough income to afford health care. In these instances, Arthur Kellerman asks; "Is it fair to label non-urgent visits to the ED "inappropriate" when many patients have no where else to go?" Some studies of emergency department utilization use the term, "inappropriate use" (Frey, et al), which appears uninformed, racially biased, and ignorant of the fact that people have learned to use the emergency department for primary health care since the 1950's. The necessity to use the emergency department as a sole means of health care continues to be the root of many headaches in public hospitals.

Unfortunately the burden of providing the "safety net" is not equally distributed amongst public and private hospitals. Public emergency departments located in inner city areas have the tremendous burden of supplying the needs of those populations that are disenfranchised from other sources of health care. The hospitals that shoulder the burden of providing for the disenfranchised and medically indigent are referred to as "Disproportionate Share



Hospitals", or DSH. The DSH status translates to higher proportions of welfare recipients and medically indigent persons, many of which have complex problems of homelessness, mental health, drug addiction, and chronic diseases such as AIDS and tuberculosis. Highland General Hospital in Alameda County is one of these DSH hospitals that "does what the private sector finds too costly, too difficult, or too unappealing to do," (Slater, 1). American public hospitals like Highland General, comprise 7.4% of the total number of U.S. hospitals yet provide 18% of all outpatient care and 19% of all emergency care in this country, (NAPH, 7). Due to the economic make-up of its population, Highland and other DSH public hospitals are extremely dependent upon Medicaid and special DSH funding.

Two sources of critical funding to DSH hospitals are currently in jeopardy due to government budget cut-backs and the consequences of managed care. Money allocated by the federal government to DSH hospitals translates into 35 million dollars a year for Alameda County and Highland Hospital, but this figure will be reduced by 15 million dollars next year as federal DSH funding changes, (Slater, 8,10). Highland Hospital is also dependent upon Medicaid in the form of MediCal payments for 53% of its revenues, but this funding is no longer secure as managed care organizations are siphoning these patients, (Slater, 8). The once shunned Medicaid patients are becoming attractive to managed care organizations at other private Alameda County hospitals. Faced with the prospect of empty hospital beds and a large volume of indigent and marginally insured patients, private hospitals have begun to court their best economic alternatives, MediCal recipients. The president of Highland's medical

staff estimates that the hospital has lost between 10 and 12 million dollars of critical MediCal funding to Alta Bates and Summit hospitals, (Slater, 8). The lost MediCal funding is from the overall hospital budget which affects the viability of both the hospital and its emergency department.

Compounding the service and financial problems faced by Highland is the fact that Highland is also the Trauma center for northern Alameda County. The trauma center designation has proven to be a financial burden not welcomed by many hospitals. In a survey of 313 trauma centers, 58% reported serious financial problems, 36% reported minor financial problems, and 68% reported net losses, (Eastman, et al, 837). Since their introduction into American health care, more than 90 trauma centers have withdrawn their status or closed their doors (Eastman, et al, 835). The hardship faced by urban trauma centers is due to the high cost of providing trauma care, the poor financial risk of their clientele, and shrinking Medicaid and Medicare reimbursements. Highland's troubles are compounded by the loss of MediCal patients that help offset the losses of uninsured patients who use their services.

On the fate of Highland hospital many lives hang in the balance and may be characteristic of issues faced in emergency rooms around the country. The burden of emergency care and non-emergency care has become a critical "safety net" of our health care system that draws closer to the brink of disaster. In the case of Highland, the two responsibilities of emergent and indigent care are tied to the same emergency department placing it precariously in Alameda County's health care system. The closure of Highland Hospital would

be catastrophic to the poor and uninsured of Oakland, not to mention trauma care services for auto accidents and other emergencies in the County. If Highland were to close, emergency room visits to Summit and Alta Bates hospitals would double overnight, (Ouellette, 23) and they are already operating above capacity. Alta Bates emergency department was designed to handle 12,000 patients a year and it operates currently at three times that number, (Hardy, 4-27-96). The type of clientele normally covered by Highland is exactly the clientele that Summit and Alta Bates don't want and are ill prepared to handle. Non-compliant tuberculosis patients, the homeless, and shooting victims represent poor risks for managed care organizations. Prospects of Highland's closure lead to predictions of nearby Summit Hospitals emergency department closure within two years from being inundated with uncompensated care, (Young, 4-26-95).

Recent hospital consolidations and closures have created additional pressures which further strain overburdened emergency rooms. The proportion of hospital beds to population numbers is finally beginning to approach realistic numbers, but it does nothing but aggravate conditions in remaining emergency departments. The federal limit of 4.5 hospital beds per 1000 set by the Hill-Burton Act in the 1940's became the target for many communities instead of the maximum ceiling it was intended to be, (Starr, 349). As a result of the boom in hospital construction in the 1940's and 50's, many communities including the East Bay acquired far more hospital beds than were needed. In direct proportion to the hospital boom, emergency rooms proliferated. However, unlike the extra hospital beds, the EDs have been used with increasing frequency and

dependence through time. In the era of managed care and corporate competitiveness, many of these hospitals and their emergency rooms have been consolidated or closed, redirecting the historically high volume of users to remaining emergency departments. In the last several years, Oakland Hospital closed, Merritt, Peralta, and Providence hospitals have merged to form Summit Hospital, (Slater, 8), while Alta Bates merged with Herrick Hospital and closed Herrick's emergency room, (Hardy, 4-27-95). Presently threatening the East Bay with hospital closures or consolidations are Oakland Kaiser, and Brookside hospital in Richmond. While the closure of hospitals reduces unneeded beds, each emergency department closure redirects patients to remaining overburdened emergency departments.

The possible closure of another facility such as Highland Hospital raises many questions and issues that are symptomatic of the current state of our emergency departments. Many questions remain unanswered pertaining to the fate of trauma care, health care of the poor and uninsured, the consequences of managed care in our emergency departments, and the proper use and future of our emergency departments. This section has discussed only a few of the many issues pertaining to our emergency departments as discussed in the examples of Alameda County and Highland General Hospital. Many other issues can be identified that are pertinent to both Highland Hospital, Alameda County and emergency medicine in general, but these are beyond the scope of this project. The consequences of losing Highland's academic training programs in emergency medicine and trauma surgery warrant attention. The

heated debate over what constitutes primary care and the role of the emergency room in providing that care is another issue that needs more background and study.

It would be difficult and unwise to contemplate the present and future condition of our emergency departments without understanding our past behaviors and actions. We have essentially relied upon the emergency department as a safety net for defects in our health system, and there are many defects. Beginning in the 1950's we used the emergency department as a source of health care when medicine became specialized and difficult to access. In the 1960's attempts were made to provide better health care access to the poor and elderly, but that attempt lacked the commitment to provide health care to all of the intended, and the emergency department took up the slack. When health care inflation priced many Americans out of the system, the emergency departments were used once again to absorb the fallout. The present emergency department is built like "a house of cards" with a tremendous base of overuse and an extremely fragile economic structure.

Although intended to correct the shortcomings of our health care system, health care reforms and managed care may actually weaken and collapse the safety net features of the emergency department. Both emergency care and "last resort care" for the disenfranchised populations are currently threatened by encroachments on the fragile economic structure of the emergency department. These "encroachments" take the forms of reductions in Medicaid and Medicare expenditures, reductions in DSH funding, and

siphoning of the scarce economic resources by private and commercial hospital ventures. Although the cost to taxpayers is tremendous, DSH hospitals such as Highland should be supported until alternate forms of health care can realistically be provided. Allowing our DSH hospitals and their emergency rooms to fall into closure will effectively abandon our disenfranchised populations to corporate "goodwill" at the very best. Our hard-won quality of emergency care for traumatic injuries and sudden illnesses will certainly slip in the remaining overburdened emergency rooms.

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## Conclusion & Discussion

### An Historic Perspective of Emergency Medicine

In this research paper I addressed two important questions. The first question: What were the significant historical forces that shaped emergency care and its present utilization today? The second question: Knowing the history of emergency medicine and understanding the origins of its present utilization, what can we predict about changes in service with particular emphasis on the under-served populations? The answers to the first question are provided in the first four chapters that outline the key historical events in the evolution of emergency medicine. Answers to the second question are addressed in the fifth and final chapter which provides the utilization history and addresses some of the current issues facing the emergency department.

The heritage of the modern emergency department can be summarized in terms of specific tools unique to emergency medicine, and their application to needs of our society. The military has largely provided the tools of emergency medicine by creating the organization, personnel, and many techniques of emergency care. I have chronicled the organization of emergency care beginning with crude concepts in early history and the American Revolution, and their progression to sophisticated access and delivery systems of the Vietnam War. I have shown how some of these organizational components have been implemented into civilian life as our EMS systems of prehospital and hospital care. The personnel of the emergency department are also illustrated as directly connected to military health care providers. Concepts of emergency physicians, nurses, and prehospital personnel have their origins as regimental surgeons, army nurses, and military corpsmen who have gained

important positions in our present emergency services. I have also illustrated some of the many techniques and procedures as having originated from trial, error, and experience on the battlefield and more recently applied to civilian life. Altogether the tools organization, personnel, and technologies developed through the military have provided the foundations of emergency care which were applied to growing and diverse needs in the civilian populations.

The second component of emergency department heritage is the diverse needs that have arisen which are met through evolutionary changes in service. I have illustrated how the emergency department originated in response to industrial and public trauma and eventually assumed a secondary role of non-urgent care. The creation and applications of technology were central to the ability for civilians to achieve injuries and a resulting need and development of emergency care. In addition to traumatic injuries, the need to treat medical emergencies has also become an important function made possible by combined civilian and military scientific applications. A unique cluster of situations are also absorbed into emergency service and are composed of difficult mixtures of public safety and crisis interventions. The emergency department is used to meet the initial needs of rape victims, inmates of the justice system, psychiatric patients with injuries, and every conceivable physical and emotional injury in our culture. Perhaps most important to the present issues of emergency service, I have illustrated the needs of the poor and indigent that rely on the emergency department as their sole source of care.

In order to address the second question of this research paper, an understanding of trends in emergency department utilization are presented in the first part of Chapter 5. Our present volume of emergency department users originate from multifactorial processes beginning in the 1950's. I have provided the examples of the lack of primary care providers, Medicaid and Medicare, runaway health care inflation, decline of commercial insurance, and a host of culturally manufactured barriers and preferences that all contributed to emergency department over-utilization. As overly simplistic figures, half of all patients present to the emergency department with no emergency at all, and half of all patients have no ability to pay for their care. For a large portion of our population, the emergency department represents a "safety-net," or the last remaining place to get some form of health care attention.

As this thesis moves from the past and into the present and future, answers to the question of changes in emergency department service take the form of educated projections and warnings. I have illustrated several local issues in Alameda County as prognosticators, and they reflect gravely on potential changes affecting the needy and vulnerable populations of the East Bay. Highland Hospital, like many other public sector hospitals, have a disproportionate share of vulnerable, needy, and indigent patients which rely upon the guaranteed medical services, something referred to as a "safety net". As previously discussed, public sector hospitals like Highland are currently being threatened from two sides; the reduction in government DSH funding, and competition for scarce economic resources by managed care organizations. The economic viability

and thus the strength of our "safety net" is currently in real jeopardy as the fate of Highland hangs in a political and economic balance. Adding to the problems of public sector economic viability are several other factors which should be considered in charting potential changes in emergency service.

Most emergency departments in this country are already operating above their capacities, and so even small changes in regional emergency department ecology may have significant consequences. Changes in our health care system that reduce unneeded hospitals will also reduce the number of operational emergency departments. As discussed in the fifth chapter, remaining emergency departments in Alameda County may not be able to handle the volume and service needs of patients currently using Highland's emergency department, let alone the patients currently using Oakland Kaiser and Brookside EDs which are projected to close.

The history of emergency medicine has shown that changes in emergency service usually follow military, industrial, and public calamities. Emergency medicine evolved in response to emergencies, and with few exceptions, improvements have trailed tragedies by many years. The information I have provided in the fifth chapter of this paper points to a grim possibility of losing control of a substantial function of our emergency departments, the function of the safety net. Based upon the historical power of emergencies to propel changes in emergency medicine, one potential prediction is that our "safety net" will fail resulting in the dire loss of service to the vulnerable and poor populations. Examining the issue within the

context of the history outlined in this paper, an important question arises as to whether we will allow another "emergency" to occur before we are motivated to do something about it. How far are we likely to regress in health service to the poor and disenfranchised populations before we mobilize to do something about it? With certainty, the loss of our nation's "safety net" prior to ensuring safeguards in health care for the vulnerable populations will result in needless suffering and mortality.

An obvious issue arises equal in importance to the phenomena of non-urgent care, and that is the future of bona fide emergency care. There will always be emergencies, and there will always be a system of handling emergencies, but what will happen to our level and competence of emergency care as resources dwindle? At the present there are few indicators or studies which focus upon the optimum number and availability of emergency services. Additionally, little is known about the effects of managed care on the quality and availability of true emergency service. Chapter 5 eluded to some impacts upon East Bay region trauma service and their connection to the precarious balance of Highland Hospital. Will a privately run managed care organization be able to take over regional trauma service? What happens to the emergency medicine residency training programs? Obviously many questions are answered that have no real answers just yet.

Up until the formation of the modern emergency department as a result of the EMS Act of 1973, the military has had quite an influence on the evolution. As emergency service continues to evolve over the next several decades, several additional questions

arise. How will we proceed as we leave behind the significant historical influences such as the military. The usefulness of both civilian and military models of the past have been fully incorporated and yet our emergency departments are lacking in tools and models to meet new "emergencies" that are forming in the present. While systems for dealing with injuries have been the guiding principles for the formation of our emergency department, we will need to rely on new models of health care to meet new emergency challenges. The principles which guide us through the next several decades will need to be rooted in providing basic primary health care for all persons, and not necessarily through the emergency department. Rather than provide specific answers, the second question of this thesis has only raised some general concerns and a number of important and unanswered questions.

The End.