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Title: **Nursing Practice, Knowledge, Attitudes and Perceived Barriers to Evidence-Based Practice at an Academic Medical Center**

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Aim. This paper is a report of a study describing nurses' practices, knowledge, and attitudes related to evidence-based nursing, and the relation of perceived barriers to and facilitators of evidence-based practice.

Background. Evidence-based practice has been recognized by the healthcare community as the gold standard for the provision of safe and compassionate healthcare. Barriers and facilitators for the adoption of evidence-based practice in nursing have been identified by researchers. Healthcare organizations have been challenged to foster an environment conducive to providing care based on evidence and not steeped in ritualized practice.

Methods. A descriptive, cross-sectional research study was conducted in 2006-2007 with a convenience sample of 458 nurses at an academic medical center in California (Response rate 44.68%). Two reliable and valid questionnaires were electronically formatted and administered using a secured website. Relationships between responses to the two instruments were examined and results compared with previously published data.

Results. Organizational barriers (lack of time and lack of nursing autonomy) were the top perceived barriers. Facilitators were learning opportunities, culture building, and availability and simplicity of resources. Statistically significant correlations were found between barriers and practice, knowledge and attitudes related to evidence-based practice.

Conclusion. Similar barriers to the adoption of evidence-based practice have been identified internationally Educators must work with managers to address organizational barriers and proactively support evidence-based practice.

Key Words

Nursing Practice, Knowledge, Attitudes, Barriers, Evidence-Based Practice, research utilization, Academic Medical Center, Magnet hospitals

Summary Statement

What is already known about this topic

- Nurses experience many barriers to evidence-based practice.

- Time is one of the most commonly-noted barriers to nurses employing evidence-based practice.

- Evidence-based practice improves the quality of care and patient safety.

What this paper adds

- Higher perceived barriers related to availability and understanding of research were associated with lower knowledge and use of evidence-based practice, although effect size was small.

- The use of a computerized approach to implementing the instruments, as compared to paper methods used in research to date.

- Descriptive research can provide a baseline assessment for strategic planning efforts to move organizations toward evidence-based practice.

Implications for practice and\or policy

- Nurses need time away from the responsibilities of bedside care, autonomy over their practice, education in finding and assessing evidence, access to evidence, and mentorship to shepherd them through the implementation process and reinforce didactic learning.

- A research-based needs assessment is needed to provide an evidence-based foundation for organizational strategic planning efforts and educational initiatives to support evidence-based practice.

- Managers need to understand the ability of clinical nurses to implement evidence-based practice in the actual practice environment and to document the effectiveness of initiatives undertaken to promote evidence-based practice.

INTRODUCTION

Evidence-based practice has been recognized by the healthcare community, as well as by regulatory agencies, as the gold standard for the provision of safe and compassionate health care.

The International Council of Nurses has demonstrated a commitment to both nurses' active participation in nursing research (ICN 2006) and the "use of research to inform evidence-based practice" (ICN 2007, p.1). Globally, governments have embraced evidence-based practice, with the development of initiatives to advance the provision of health care based on best evidence rather than on tradition (Glacken & Chaney 2004, Parahoo 2000, Retsas 2000).

In the United States of America, the Institute of Medicine, American Nurses Credentialing Center (ANCC), and the Joint Commission on Accreditation of Healthcare Organizations recognize evidence-based practice as a critical step in improving healthcare quality. The Institute of Medicine recognizes evidence-based practice as an essential competency for healthcare providers in the 21st century (Greiner & Knebel 2003). The ANCC's Magnet Hospital programme lists well-enhanced public confidence in the facility and improved recruitment and retention of Registered Nurses as two of the primary benefits of achieving Magnet status. Magnet certification recognizes excellence in nursing care. The use of evidence-based practice methods in nursing care delivery is a key component of the Magnet programme (McClure & Hinshaw 2002). The Joint Commission has consistently supported the implementation of evidence-based practice in medicine and nursing as a means of improving healthcare systems (Joint Commission 2008). Evidence-based practice has repeatedly been shown to improve patient outcomes (Heater et al. 1988, Swan & Boruch 2004, Joint Commission 2006).

In southern California, a number of hospitals have achieved ANCC's Magnet certification, and many more have applied and are on the journey to becoming recognized. The local

community where the research took place is similar, with several hospitals having received Magnet certification and others being in the application process. The organization where this study was conducted submitted an application in 2008, beginning their journey towards Magnet status, and nursing leaders set in motion a strong commitment to evidence-based practice. Strategies to promote evidence-based practice must be based on evidence and must address known barriers or facilitators to the adoption of evidence-based practice by nurses if they are to be successful in moving evidence into practice.

BACKGROUND

Many researchers have identified both barriers and facilitators to the adoption of evidence-based practice in nursing (Funk et al. 1991, DiCenso et al. 1998, Newman et al. 1998, Parahoo 2000, Retsas 2000, Estabrooks et al. 2003, Hutchinson & Johnston 2004, Fink et al. 2005, Kajermo et al. 1998). Some consistently reported barriers are: lack of time, lack of authority to change practice; organizational cultures rewarding routine, task-based practice; misconception about evidence-based practice; lack of administrative support; lack of mentorship; lack of access to resources; poor understanding of statistics and critical appraisal; unclear workplace expectations; and inconsistent basic knowledge and experience with research (Funk et al. 1991, DiCenso et al. 1998, Newman et al. 1998, Parahoo 2000, Retsas 2000, Estabrooks et al. 2003, Fink et al. 2005, Kajermo et al. 2008). Conversely, participatory management, an academic degree, education, availability of relevant research, time, positive attitudes and mentorship have shown a positive relationship to nurses' intentions to use research in practice (Estabrooks et al. 2003, Hutchinson & Johnston 2004, Kajermo et al. 2008).

Theoretical framework

The theoretical framework for the study reported in this paper was Rogers's theory of Diffusion of Innovations (Rogers 2003). Diffusion is seen by Rogers as the process by which an innovation is communicated over time through a social system, and the main elements of diffusion theory are innovation, communication channels, time and the social system (Rogers 2003). As applied to EBP, research findings or evidence represent the innovation, the report or presentation of the research findings are the communication, and the healthcare setting represents the social system. The innovation-decision process involves knowledge, persuasion, decision, implementation and confirmation. The characteristics of an innovation (relative advantage, compatibility, complexity, trialability and observability) influence how that innovation is perceived and ultimately adopted or rejected (Rogers 2003). In our project, the selection of research instruments, participant recruitment strategies, and data interpretation were guided by this theoretical framework.

THE STUDY

Aim

The aim of the study was to describe nurses' practices, knowledge, and attitudes related to evidence-based nursing, and the relation of perceived barriers to and facilitators of evidence-based practice.

Design

A descriptive, cross-sectional research design was used. This paper is a report of data from a large academic medical center. A comparison of the summarized data from this study with

similar data collected by other researchers in diverse healthcare settings will be available in another paper (Brown, et al., accepted JCN).

Participants

A convenience, non-probability sample of 458 nurses was drawn from all nurses employed in an academic medical center in California. The total potential number of nurses caring for inpatients at the time of data collection was 1025. Therefore our response rate was 44.68%.

Data collection

Two reliable and valid (Funk et al. 1991, Upton & Upton 2006) questionnaires were used to explore respondents' practice, knowledge, attitudes and perceived barriers associated with evidence-based practice. The questionnaires were administered during December 2006 and January 2007, prior to the implementation of organizational educational initiatives in order to serve as baseline measures and needs assessment to guide development of the initiatives.

The BARRIERS to Research Utilization scale has been used extensively in research (Funk et al. 1991a, Hutchinson & Johnston 2004, Fink et al. 2005). Rogers's Diffusion of Innovation theory was used to underpin the development of the tool. The tool consists of 29 items rated on a 5-point Likert scale, with 1 representing "to no extent," 4 representing "to a great extent," and an option for "no opinion." In addition, the scale includes two free-text items for respondents to list other barriers and facilitators to research utilization and an item which allows them to rank the greatest, second and third greatest barriers from the free-text lists. The scale consists of four subscales: characteristics of the adopter (in this research represents the nurse); characteristics of the organization (in this research represents the hospital/unit); characteristics of the innovation

(in this research this represented the evidence/research); and characteristics of the communication (in this research this represented the medium conveying the evidence). Internal reliability has been established by a Cronbach's alpha of 0.91 (Funk et al. 1991a). Content validity was established using a second measure of research utilization and feedback from experts in the field (Funk et al. 1991a).

The second tool was the Evidence-Based Practice Questionnaire (EBPQ) developed by Upton & Upton (2006). This consists of 3 sub-scales: practice, knowledge/skills, and attitudes. Internal reliability has been established by a Cronbach's alpha of 0.87 for the entire questionnaire, 0.85 for the practice of EBP sub-scale, 0.79 for the attitudes sub-scale, and 0.91 for the knowledge/skills sub-scale (Upton & Upton 2006). Construct validity was established using an independent EBP measure yielding a moderately positive relationship between scales (Upton & Upton 2006).

For the present study, a demographic form was developed requesting information on age, educational preparation, sex, ethnic group, highest educational degree, years of nursing experience, nursing position, and hospital unit. In addition, the final computer screen asked an open-ended question to elicit any information related to evidence-based practice not covered in the questionnaires or respondents' opinions.

Nursing staff members were recruited by posting recruitment flyers in nursing units and organizational newsletters. A researcher also attended unit-based staff meetings and leadership meetings to recruit participants.

Ethical considerations

The study was approved by the appropriate ethics committees. An instruction screen, two research instruments, a demographics form, and informed consent form were converted to electronic format. Participants were guaranteed anonymity, and a click-through informed consent procedure was employed. A password-protected website was created and data were encrypted to promote security.

Data analysis

Data analysis was conducted using SPSS v.15.0.1. The alpha level was set at 0.05. Descriptive statistics were used. Pearson correlations were calculated for each of the subscales (BARRIERS and EBPQ) to assess the relationships between the BARRIERS subscales and the EBPQ subscales. Given the number of tests of statistical significance ($k = 12$ tests) and the concomitant inflation in Type I error rate, a Bonferroni Inequality adjustment was applied, with a conservative family-wise error rate of .15. Hence, the per comparison alpha was modified to .0125 (.15/12) and a reject the null decision for a single correlation coefficient was made only in if the *a posteriori* probability value was less than .0125.

Qualitative content analysis was used to analyze open-ended items and explore narrative data for the emergence of patterns and themes (Lincoln & Guba 1985, Polit & Beck 2008).

Validity and reliability

Reliability of the EBPQ tool was assessed by computing Cronbach's alphas for the three subscales with scores as follows: 0.90 for practice, 0.94 for knowledge, and 0.67 for attitudes.

The reliability scores for this sample were similar to those reported in Upton and Upton's original research, with a slightly lower score on the attitudes subscale (Upton & Upton 2006).

The reliability of the BARRIERS scale for this sample was similar to that in the original research by Funk et al. (1991a) and other reports (Parahoo 2000, Retsas 2000, Hutchinson & Johnston 2004, Fink et al. 2005). Cronbach's alphas were calculated for the four subscales of the tool, with results as follows: 0.82 for adopter subscale, 0.81 for innovation, 0.80 for organization, and 0.67 for communication.

Trustworthiness of the qualitative data was established through peer debriefing and member checks. Peer debriefing involved initial coding by the first author, independent coding by another research team member and assessment of the emerging themes for consistency between researchers. Member checks were accomplished through dialogue with nurses, confirming the emerging themes.

RESULTS

Participants

The sample was comprised of 458 respondents. The majority were female (90.2%), with 9.8% male. Fifty-four percent described their ethnic group as white, 37.6% as Asian/Pacific Islander, and the remainder (8.4%) as Black, Hispanic, multi-ethnic or other. The majority (57.7%) were over 40 years of age. There was a high level of nursing experience and of holding a baccalaureate degree. The majority of the sample had over 13 years of nursing experience (54.5%), 29.6% had 3-12 years' experience, and 16.1% had 2 years or less. The majority (65.9%) had a bachelor's as their highest degree earned, with 21.8% having a diploma or associate degree, 10.9% having a Master's degree, and 1.5% with doctoral degrees. The majority of

respondents were staff nurses (54.5%), with 28.0% nursing managers, 5.0% clinical nurse specialists or educators, and 8.6% nurse practitioners or midwives. The majority of respondents were from acute care medical or surgical services (29.5%), followed by women's health (18.5), critical care/intermediate care (18%), and other services (16%).

Not all nurses answered all items. Among those who clicked through the informed consent, response rates for individual items ranged from 62% (285/458) to 46% (211/458). Nineteen percent (89/458) of participants added free text responses to the "greatest barriers" open-ended item, with responses of single words or brief phrases; 99% (453/458) of participants added free text responses to the open ended items asking for facilitators for evidence-based practice, the response length varying from a sentence to several paragraphs.

What are nurses' baseline practice, knowledge, and attitudes about evidence-based practice?

Attitudes showed the highest mean score (5.15) followed by knowledge (4.56) and then practice (4.49), and these scores are shown in Table 1 along with the individual item means. To determine the priority of the items presenting as the top learning needs, the percentage of respondents choosing the low response categories (1 - 4) were calculated within each subscale, the means were then rank-ordered, with 1 representing the highest priority for intervening. The top five items for the knowledge subscale were converting information into questions, research skills, evaluating validity of material, critical appraisal, and awareness of information types and sources. The top item for the attitudes subscale was "time to read research." The top priority items for the practice subscale were critical appraisal and formulating questions around clinical problems.

The strongest correlation for the EBPQ factors was between "Practice of Evidence-Based Practice" and "Knowledge/Skills Associated with Evidence-Based Practice" ($r = .591$, $p < .05$), indicating that higher knowledge scores were associated with higher practice scores. Nurses with higher knowledge and skills related to evidence-based practice also had higher practice scores.

What are the perceived barriers to and facilitators of evidence-based practice?

Organization emerged as the subscale with the highest mean score, followed by communication, adopter and innovation (see Table 2). To determine the importance of the items presenting as the top barriers, the percentage of respondents choosing the moderate and great extent categories were calculated then rank ordered, with 1 representing the top barrier. The majority of the top ten barriers ranked by respondents were from the "organization" subscale, with items relating to "time" identified as the top two barriers, followed by lack of autonomy to change practice then lack of support by other staff. The barrier item "the amount of research information is overwhelming" was originally eliminated in Funk's 1991 data analysis as the item yielded a low factor loading. In our sample, the percent of participants responding that this item was a moderate or great barrier was 52.5%, placing it as the ninth ranked barrier; therefore, the item is reported in the overall rank ordering of barriers.

From the open-ended items, four themes were identified as related to the greatest barriers and three themes as related to facilitators of nursing research and evidence-based practice. The themes representing the greatest barriers to research utilization were time, knowledge, support, and culture.

Barriers Themes

Time

Respondents indicated that they had limited time for evidence-based practice during scheduled working hours, as evidenced in the following narrative statements: "no time work like a dog"; "short-staffing"; "patient acuity too high"; and "no time while caring for patients." The notion of time constraints also extended to personal time outside work hours, as demonstrated by the following: "very little time in the day to find and read research" and "too many family responsibilities to read research at home."

Knowledge

Lack of knowledge related to difficulty in finding and understanding research reports and data, as well as how to change nursing practice. Respondents stated: "do not know what to read, there is too much"; "do not feel capable of evaluating research"; and "no recent education on research."

Support: Resources and Mentoring

Inadequate support for clinical nurses to be involved in evidence-based practice emerged from respondents' narratives. Support included both resources and mentoring. Resources involved logistics of accessing information and administrative support by the organization, as highlighted by the following comments: "not internet available on the unit"; "cost of implementing new ideas"; and "need desktop access to full text articles." Mentoring comments addressed guidance by knowledgeable people (advanced practice nurses and researchers) through the process of finding, acquiring, critiquing, and applying information in the practice environment. The following response exemplifies the narratives related to mentoring: "people

who know how to read research and change the way things are done in the clinical areas are needed to mentor others to learn how."

Culture

Culture emerged in the narratives as a barrier to research utilization, and was perceived in two ways. First, the existing organizational culture created barriers to clinical nurses' autonomy in changing their practice, as exemplified in the following comments: "process to change is complicated"; "MD (physician) not supportive or aware of new research"; "arrogant research nurses"; and "doctors' opinions and preferences." Second, nursing resistance to changing established patterns also emerged as an aspect of culture which created barriers to research utilization, as demonstrated in the following responses: "inertia" and "the way we have always done it attitudes." Another thread woven into the narratives brought the interaction between nurses and other healthcare providers into focus as contributing to nurses' resistance or lack of action, as in the following:

"The nature of 'task orientation nursing' here is a deterrent to utilizing research. Nurses are so busy carrying out MD orders and are not seen as an equal professional in the care of patients, that the ethos of evidence-based nursing practice is not facilitated. Also the vast amount of inconsistencies from MD to MD in the treatment of any one disease makes for a confusing situation… It is no wonder that he/she has no desire to go forward with research that might go against medical practices."

Facilitator Themes

Learning environment, building culture, and availability and simplicity of evidence emerged as themes in the narrative responses related to facilitating of research utilization.

Learning Environment

Respondents' narratives clearly indicated a desire to increase their knowledge and skills associated with understanding and using research to enable them to incorporate evidence-based practice. Learning opportunities and mentorship were viewed as facilitators for research utilization, as voiced by this respondent: "Research discussion group, classes, and mentors to facilitate change." The narratives indicated that education alone was not enough to change practice; mentorship was a necessary adjunct to educational offerings due to the complexity of the nursing work environment. One respondent said:

"An onsite CNS… nurses in general don't have time on the unit to read many research articles and then interpret the data, but I believe if a CNS actually comes around, explains the research and how it can be implicated into practice, we would be more willing to give it a try."

Building Culture

Respondents were aware that the organizational culture needed to recognize and reward autonomy in nursing practice. The following narratives characterized the notion of building culture: "mechanisms to implement change, involvement of staff nurses, and environment that encourages thinking and rewards thinking," and "environment open to change, multidisciplinary environment of mutual respect, culture of putting the patient first and egos second." Many respondents shared a vision of what would facilitate research utilization by nurses and contrasted that with the reality they saw: "environment of open communication and exchange of ideas, this is not the environment on my unit." A number of responses included thoughts on how to change the culture: "Applaud little efforts, praise any new ideas, collaborate, acknowledge bedside nurses, continue to emphasize a team approach to problem solving, we bedside nurses and

researchers need each other"; "make sure our guidelines of nursing practice are evidence-based";

"Make it policy then educate and enforce"; "share research at staff meetings"; "have updates in a

newsletter"; and "champions who can mentor and diffuse [sic] any difficulties." Many

respondents suggested the use of research posters, research discussion forums, and journal clubs

that focus on research, interpretation, and application.

Availability and Simplicity of Evidence

Available and easy-to-understand evidence that is clinically relevant to the problems

faced by clinical nurses was perceived as a facilitator to advancing evidence-based practice.

Research was recognized as important, but often the available research was cited as not relevant

to clinical nursing problems. Research has to be usable, which to our respondents meant simple

language, available and understandable: "To simplify is not to comprise the holy grail of

research, but to get it out to the people who can use it" and "Sometimes we make it so difficult

with words such as validity, reliability, generalizability and p values that we loose [sic] sight of

everyday opportunities to take a new idea, implement it, then evaluate and revise it. It's just the

nursing process really and all nurses understand that"; and "Translate research into real everyday

language."

What are the relationships between perceived barriers and EBP practice, knowledge, and

attitudes?

When examining the correlations between the EBPQ and BARRIERS scales, the strongest

correlation was between the "Characteristics of the Communication" subscale of the BARRIERS

scale and the "Knowledge/Skills Associated with Evidence-Based Practice" subscale of the

EBPQ scale ($r = -.216$, $p < .05$)—although there was a relatively small effect size (i.e., $r^2 =$

4.67%). This negative relationship signifies that higher scores for "Characteristics of the Communication" were associated with lower scores for "Knowledge/Skills." The more the nurses perceived the research as difficult to find and understand, the lower they perceived their own knowledge and skills related to evidence-based practice.

The next strongest correlation was between the "Characteristics of the Organization" subscale of the BARRIERS scale and the "Knowledge/Skills" subscale of the EBPQ scale (r = -.179, p = .004). The more the organization was perceived to be a barrier, the lower the nurses perceived their own knowledge and skills to about evidence-based practice. This was followed by the "Characteristics of the Communication" subscale of the BARRIERS scale and the "Practice of Evidence-Based Practice" subscale of the EBPQ scale (r = -.167, p = .007). The correlations between the two subscales were fairly small and none exceeded an absolute value of .216. The higher score for the BARRIERS scales denotes a greater perceived barrier in communication of research, which negatively correlates with a lower score on the EBPQ scale.

DISCUSSION

Several limitations can be identified with this research. The use of self-reports to assess knowledge may have resulted in inflated knowledge scores. One participant's comment highlights this possibility: "I did not realize how much I did not know until I did these surveys…I have a lot to learn." Another limitation related to missing data, which resulted in varying response rates to the instruments. Internal consistency for the communication sub-scale of the BARRIERS tool for this sample, while acceptable, was lower than that reported by Funk et al. (1991a).

The organization presents as a consistent barrier to evidence-based practice for nurses. The barriers in this sample demonstrated a similar response pattern to that in other published research, as indicated in Figure 1 (Funk et al. 1991a, Carroll et al. 1997, Kajermo et al. 1998, Oranta et al. 2002, McCleary & Brown 2003, Glacken & Chaney 2004, LaPierre et al. 2004, Karkos & Peters 2006). Organization was the highest barrier, followed by the communication, adopter, and innovation for all studies shown in Figure 1, with the exception of McCleary and Brown. McCleary and Brown's (2003) sample of 176 Canadian nurses in a pediatric teaching hospital showed the highest barrier as Communication (2.63) followed by Organization (2.61), Innovation (2.39) and finally Adopter (2.29). Researchers have suggested that better understanding of the practice environment is essential to our understanding and development of interventions to advance evidence-based practice in the nursing community (Wallin et al. 2006, Cummings et al. 2007).

While consistency in mean scores for the barriers subscales is demonstrated across international research studies (Figure 1), variation in the rank order of individual items within the various subscale dimensions exists. The settings for the studies in Table 3 were drawn from teaching hospitals, with the exception of the Funk study, which drew from a professional nursing association. The studies were selected as the most similar in setting or organizational context (academic/teaching hospitals) to compare with the current findings. In our sample, four of the top five barriers related to the organization. At least one of the items relating to time ("insufficient time to implement" or "no time to read") was ranked within the top two barriers in five out of six studies (Funk et al. 1991, Retsas & Nolan 1999, Retsas 2000, McCleary & Brown 2003, Hutchinson & Johnston 2004). Lack of authority to change patient care, which ranked as the third barrier in our sample, was in the top five barriers for four of the studies shown in Table 3

(Funk et al. 1991a, Retsas 2000, McCleary & Brown 2003, Hutchinson & Johnston 2004).

Difficulty understanding statistical analysis was presented in the top five barriers for four studies

(Retsas & Nolan 1999, Retsas 2000, McCleary & Brown 2003, Hutchinson & Johnston 2004)

out of the six, as compared to 11th place in our sample. Thompson et al. (2006) reported

difficulty with statistical analysis as the 14th ranked barrier in a sample of private and public

sector nurses in Hong Kong. The timing of data collection may have in part contributed to this

finding, with increasing emphasis on interpretation and application of research findings in both

the service and academic settings in the time periods reflected in the research. Thematically, the

time, resources, autonomy, and learning needs identified in our study were similar to response

patterns of participants in the USA (Funk et al. 1991, Fink et al. 2005) and in the UK (Newman

et al. 1998, Thompson et al. 2001, Gerrish & Clayton 2004), Sweden (Kajermo et al. 2008),

Ireland (Parahoo 2000), Canada (Estabrooks et al. 2003), and Australia (Retsas 2000, Hutchinson

& Johnston 2004).

The negative relationship found in our study between the research message (communication)

and knowledge/skills has clear implications for researchers. Research reports need to be written

to communicate findings simply and clearly to foster understanding by clinical practitioners. In

addition, researchers should offer a variety of strategies for disseminating research findings in

the context of service organizations.

In this ~~our~~ study, nurses' attitudes to evidence-based practice were more positive than their

associated knowledge and implementation of evidence-based practice. Nurses were also limited

by barriers to making evidence-based practice a reality in their clinical units. We found that a

relationship existed between knowledge and practice. Other research has demonstrated that

educational interventions can be effective at increasing the knowledge and skills associated with

evidence-based practice (Sherriff et al. 2007). Further research is needed to evaluate the ability of specific educational interventions to increase the actual implementation of evidence-based practice.

Our findings provided a roadmap for the study organisation to begin educational initiatives to increase nursing capacity for evidence-based practice. Several organizational initiatives have been undertaken to address nursing autonomy over practice: the implementation of shared governance structures and staff-nurse-led councils for professional practice and nursing research. Organizational commitment has been demonstrated by authorization of non-patient care hours for staff nurses to participate in changing practice during scheduled time at work. Simultaneously, tiered educational opportunities were offered, beginning with the lowest scoring knowledge items. The tiered education began with a two-hour workshop on core concepts for evidence-based practice and on building capacity for evidence-based practice. A workshop was conducted with advanced practice nurses in the nursing education department, as well as with nursing leaders and staff nurses in the clinical ladder program. The clinical ladder program is a promotion process for bedside nurses at this institution. In addition, to address one of the lowest knowledge scores (asking clinical questions) a competition was held to engage all levels of nurses in questioning nursing practices. The intention behind the competition was to infuse excitement about evidence-based practice and to develop skills in asking clinical questions. Our Research Council is now offering a class on "Searching the Nursing Literature Effectively" to address the fifth greatest barrier, nurses being unaware of research. Several staff nurses with advanced practice nurses as mentors have been supported by the institution to participate in a community based evidence-based practice internship program lasting 10 months. Each dyad completed an evidence-based practice project and disseminated their findings. At present,

ongoing educational sessions are being offered on refining clinical questions, finding the best evidence, and learning to critically appraise research papers.

CONCLUSION

The barriers to evidence-based practice have proved consistent in studies from the United States of America, Ireland, Canada, Finland, and Sweden. Nurses need time away from the responsibilities of bedside care, autonomy over their practice, education in finding and assessing evidence, access to evidence, and mentorship to shepherd them through the implementation process and reinforce didactic teaching. The application of a research-based needs assessment, as in the findings reported in this study, creates an evidence-based foundation for organizational strategic planning. Educational initiatives informed by assessment of clinical nurses' perceived learning needs will allow organizations to support evidence-based practice. It is also important to understand the ability of clinical nurses to implement evidence-based practice in the actual practice environment and to document the effectiveness of initiatives undertaken.

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Table 1. *Evidence-Based Practice Questionnaire (EBPQ) Results*

Item	N	Mean Score	Response Patterns	Priority Item Rank
Knowledge		**4.56**	% responding 1-4 (1, poor – 7, best)	
Converting information needs into a question	269	3.99	62.1	1
Research skills	269	4.16	55.4	2
Awareness of information types & sources	266	4.23	52.6	4*
Ability to determine the validity of material	264	4.30	52.7	3
Ability to critically appraise	268	4.31	52.6	4*
Knowledge of how to retrieve evidence	269	4.47	44.2	7
IT skills	264	4.50	48.1	5
Monitoring & reviewing practice skills	268	4.65	42.2	8
Able to identify gaps in own practice	269	4.67	44.6	6
Able to determine usefulness of material	267	4.75	39.7	10
Dissemination of new ideas with colleagues	268	4.79	40.3	9
Apply information to individual cases	268	4.90	34.0	11
Sharing ideas/information with colleagues	268	5.03	32.5	12
Ability to review own practice	266	5.14	28.6	13
Practice		**4.49**	% responding 1-4 (1, never-7, frequent)	
Critically appraise literature	268	3.79	62.7	1
Integrate the evidence with expertise	267	4.53	45.7	3
Formulate clear question	265	4.59	47.2	2

Track down relevant evidence	271	4.64	44.6	4
Evaluate outcomes of practice	269	4.65	43.9	5
Share information with colleagues	269	4.71	39.4	6
Attitudes		**5.15**	% responding 1-4 (1, negative–7,positive)	
Workload	272	4.06	57.7	1
Stick to old ways versus change	270	5.28	30.0	2
Resent questioning versus welcome questioning about clinical practice	272	5.49	24.3	3
EBP waste of time	273	5.75	20.1	4

Table 2. *BARRIERS Scale Results*

Item	N	Mean Score	% responding moderate/great barrier	Overall Item Rank
Organization		2.63		
Insufficient time on job to implement new ideas	278	2.94	67.3	1
Does not have time to read research	285	2.91	65.2	2
Does not have authority to change patient care	276	2.70	59.7	3
Other staff not supportive of implementation	250	2.68	58.0	4
Physicians will not cooperate with implementation	250	2.60	54.8	7
Research results are not generalizable to setting	263	2.56	51.3	10
Facilities not adequate	263	2.36	42.6	14
Administration will not allow implementation	241	2.32	42.3	15
Communication		2.39		
Relevant literature not compiled in one place	239	2.65	56.0	6
Statistical analysis not understandable	268	2.57	48.5	12
Research not readily available	279	2.43	48	13
Research not reported clearly or readably	239	2.36	40.7	16
Implication for practice not clear	277	2.33	40.5	17
Research not relevant to nurses practice	273	2.06	27.4	28
Adopter		2.28		
Unaware of research	282	2.73	57.1	5
Not capable to evaluate quality of research	264	2.56	53.0	8
Isolated from knowledgeable colleagues	277	2.48	49.8	11
Feels benefits of changing practice are minimal	272	2.20	33.9	22
Unwilling to change/try new ideas	276	2.16	37.3	19

No documented need to change practice	261	2.13	32.9	24
Sees little benefit for self	281	2.09	33.5	23
Does not see value of research for practice	275	1.99	29.5	27
Innovation		2.16		
Research has not been replicated	212	2.36	37.3	18
Uncertain whether to believe results	270	2.22	36.6	20
Literature reports conflicting results	226	2.22	31.4	25
Research not published fast enough	226	2.19	34.5	21
Research has methodological inadequacies	211	2.14	31.2	26
Conclusions drawn from research not justified	239	1.90	21.3	29
Additional Item				
The amount of information is overwhelming	259	2.58	52.5	9

Table 3. *Top Ranked Barriers Scale Comparison to Published Research*

Item: Rank order responding moderate or great barrier	Brown, *et al.* This Sample USA	McCleary & Brown 2003 Canada	Hutchinson & Johnston 2004 Australia	Retsas 2000 Australia	Retsas & Nolan 1999 Australia	Funk 1991 USA
Insufficient time on job to implement new ideas	1	5	2	1	1	2
Does not have time to read research	2	1	1	5	2	10
Does not have authority to change patient care	3	4	4	2	7	1
Other staff not supportive of implementation	4	6	10	10	8	6
Unaware of research	5	13	3	12	3	3
Relevant literature not compiled in one place	6	2	6	18	NA	12
Physicians will not cooperate with implementation	7	15	7	6	6	4
Not capable to evaluate quality of research	8	12	8	8	12	14
Research results are not generalizable to setting	9	20	12	9	9	7
Isolated from knowledgeable colleagues	10	16	17	7	11	11

Figure 1. Barriers to evidence-based practice at academic medical centers compared by category of barrier across international studies.