Transforming Health Care from the Inside Out: Advancing Evidence-Based Practice in the 21st Century

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Health care is in need of change. Major professional and health care organizations as well as federal agencies and policy-making bodies are emphasizing the importance of evidence-based practice (EBP). Using this problem solving approach to clinical care that incorporates the conscientious use of current best evidence from well designed studies, a clinician's expertise, and patient values and preferences, nurses and other health care providers can provide care that goes beyond the status quo. Health care that is evidence-based and conducted in a caring context leads to better clinical decisions and patient outcomes. Gaining knowledge and skills in the EBP process provides nurses and other clinicians the tools needed to take ownership of their practices and transform health care. Key elements of a best practice culture are EBP mentors, partnerships between academic and clinical settings, EBP champions, clearly written research, time and resources, and administrative support. This article provides an overview of EBP and offers recommendations for accelerating the adoption of EBP as a culture in education, practice and research. (Index words: Best evidence; Evidence-based practice; Mentorship)
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The Importance of EBP to Health Care

EVIDENCE-BASED PRACTICE (EBP) is a problem-solving approach to clinical care that incorporates the conscientious use of current best evidence from well-designed studies, a clinician's expertise, and patient values and preferences (Melnyk & Fineout-Overholt, 2005; Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000). Figure 1 graphically shows these aspects of the EBP process as interrelated and all having opportunity to affect clinical decisions. In addition, when EBP is provided within a context of caring, it leads to the best clinical decision making as well as outcomes for patients and their families (Melnyk & Fineout-Overholt, 2005). Although it has been empirically supported that patient outcomes are at least 28% better when clinical care is based on rigorously designed research studies

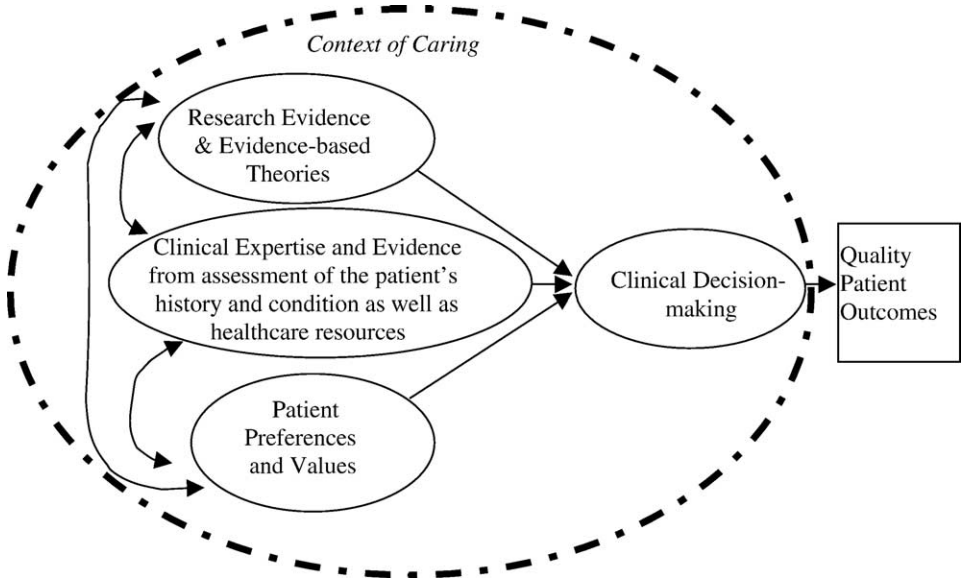

Figure 1. Evidence-based practice achieves the best outcomes when accomplished in a context of caring.

than when care is steeped in tradition (Heater, Becker, & Olsen, 1988), most nurses are not routinely implementing EBP. Findings from a recent survey to determine nurses' readiness to engage in EBP conducted by the Nursing Informatics Expert Panel of the American Academy of Nursing with a nationwide sample of 1,097 randomly selected registered nurses indicated that (1) almost half were not familiar with the term "EBP," (2) more than half reported that they did not believe that their colleagues use research findings in practice, (3) only 27% of the respondents had been taught how to use electronic databases, and (4) most do not search information databases (e.g., MEDLINE and CINAHL) to gather practice information—and those who search these resources do not believe that they have adequate searching skills (Pravikoff et al., 2005).

Because it takes an average of 17 years to translate research findings into clinical practice (Balas & Boren, 2000), major professional and health care organizations as well as federal agencies and policy-making bodies have placed a major emphasis on accelerating EBP. In the landmark document *Crossing the Quality Chasm: A New Health System for the 21st Century* (Committee on Quality of Health Care in America, Institute of Medicine, 2001), the Institute of Medicine designated Rule 5 of the 10 rules for health care as evidence-based decision making. In addition, the five core competencies for health care education deemed necessary by the Institute of Medicine's Health Professions Educational Summit includes using EBP (Greiner & Knebel, 2003). With such growing strong empirical support of EBP, clinicians and consumers must determine how and when EBP can be fully embraced as a culture for health care. This article provides an overview of EBP and offers recommendations for accelerating the adoption of EBP as a culture in education, practice, and research.

The Beginnings of EBP

The EBP movement started in 1972 when a British epidemiologist, Dr. Archie Cochrane, criticized the medical profession for not providing the public with rigorous systematic reviews of evidence from existing studies. He emphasized that thousands of low-birth-weight premature infants died needlessly because the results of several randomized controlled trials that supported the effectiveness of administering corticosteroids to high-risk women in preterm labor had not been compiled and analyzed in the form of a systematic review—the strongest level of evidence to guide interventions for clinical practice. When that systematic review was finally published, it showed that corticosteroid therapy reduced the odds of premature infant death from 50% to 30% (Cochrane Collaboration, 2003).

As a result of Dr. Cochrane's influence, the Cochrane Center was established in Oxford, England, in 1992, and the Cochrane Collaboration was founded 1 year later. The primary purpose of the center and the collaboration is to assist providers in making evidence-based decisions about health care by

developing, maintaining, and updating systematic reviews of interventions/treatments and by making these reviews accessible to the public (Cochrane Collaboration, 2003).

Although nursing has lagged behind medicine in the EBP movement, several models have evolved in nursing over the past decade to accelerate EBP. Several of these models are process models (e.g., the Stetler model, the DiCenso et al. model, the Iowa model, and the Rosswurm and Larrabee model [Ciliska, DiCenso, Melnyk, & Stetler, 2005]), and two are mentorship models (the ARCC [*A*dvancing *R*esearch and *C*linical Practice Through Close *C*ollaboration] model [Melnyk, Fineout-Overholt, Stone, & Ackerman, 2000] and the Clinical Scholar model [Schultz, 2005]). Although there may be some empirical support for these models, there must be further testing using randomized controlled trials to provide the empirical data necessary to support these conceptual models' broad use and proposed intervention strategies. With evidence to support that mentorship is imperative to the implementation of EBP (Melnyk et al., 2004; Schultz, 2005), the two mentorship models will be discussed here; likewise, the two individual clinician process models and the two organizational process models will be described.

The ARCC Model

The ARCC model was originally conceptualized by Bernadette Melnyk in 1999 as part of a research strategic planning initiative involving faculty from the University of Rochester School of Nursing and School of Medicine in an effort to more fully integrate research and clinical practice as well as to advance EBP within an academic medical center and progressive health care community (Melnyk & Fineout-Overholt, 2002). A central concept in the ARCC model is that of an EBP mentor, an advanced practice nurse with in-depth EBP and clinical knowledge and skills who provides mentorship in EBP and facilitates improvement in clinical care and patient outcomes through EBP implementation and outcomes management projects. Since its original conceptualization, Melnyk and Fineout-Overholt have expanded the ARCC model to include multiple strategies for advancing EBP within health care organizations. Specific goals of the ARCC model include (1) promoting EBP among both advanced practice and staff nurses locally and nationally, (2) establishing a cadre of EBP mentors to facilitate EBP in health care organizations, (3) disseminating and facilitating use of the best evidence from well-designed studies to advance an evidence-based approach to clinical care, (4) conducting an annual national EBP conference, (5) conducting studies to evaluate the effectiveness of the ARCC model on the process and outcomes of clinical care, and (6) conducting studies to evaluate the effectiveness of the EBP implementation strategies (Fineout-Overholt, Levin, & Melnyk, 2005; Melnyk et al., 2004).

The ARCC model has been implemented in several agencies, including Pace University, the SUNY Upstate Medical Center, and the University of Rochester. These liaisons have fostered empirical testing of the ARCC model, and support has been demonstrated for certain aspects of it. For example, nurses who rate themselves higher on knowledge and beliefs about EBP are more likely to teach EBP to others (Melnyk et al., 2004). Furthermore, nurses who report having an EBP mentor are more likely to implement evidence-based care (Melnyk & Fineout-Overholt, 2002).

A pilot study was recently conducted to determine the effects of the ARCC model on the process and outcomes of care in two acute care units within a 700-bed tertiary care center and four adult units in a specialty surgery center (Fineout-Overholt et al., 2005). Another pilot study is in process to test the model within the community via the Visiting Nurse Service. In addition, two new instruments, the EBP Beliefs Scale and the EBP Implementation Scale developed by Melnyk and Fineout-Overholt, are demonstrating promise in measuring important aspects of the ARCC model.

The Clinical Scholar Model

The Clinical Scholar model (Schultz, 2005) reinforces the intellectual processes of EBP, building a cadre of mentors who foster an environment in which staff nurses are encouraged to continuously ask questions. Clinical scholars are bedside clinicians who challenge nursing practices through inquiry, observation, analysis, and synthesis of internal data and published evidence, application of synthesized evidence, and evaluation of subsequent outcomes. Clinical scholars serve as role models in the ownership of their clinical practice. Inherent in the model is the final step, dissemination of findings from the projects and research accomplished by the clinical scholar team to team members and the health care public. Intrinsic to the model are collaboration, consultation, and mentorship by a nurse scientist

through every step of the educational and application processes.

Clinical scholars never stop asking why a patient is exhibiting certain signs and symptoms and whether current care practices are the right ones for ameliorating symptomatic challenges. As a role model, a clinical scholar is knowledge oriented and uses research as both a product and a process for teaching and managing care. For clinical scholars to assist other team members in navigating through the process of using evidence efficiently and generating evidence effectively, they must have extensive EBP process knowledge and skills and the attributes of a clinical leader: creativity, courage, compassion, strength, and vitality (Schultz, 2005).

The EBP Process

There are five sequential steps to the EBP process. Each step must be carefully considered and executed for the process to be most successful.

STEP 1: ASKING THE CLINICAL QUESTION

The initial step in EBP is asking a clinical question in the PICO format (i.e., P = patient population, I = intervention or area of interest, C = comparison intervention or comparison group, and O = outcome). An example of a PICO question is, "In adults [P], is cognitive–behavior therapy [I] or yoga [C] more effective in reducing depressive symptoms [O]?" This step in the EBP process has been said to be the most important and the most challenging one (Sackett et al., 2000). Without formulating a searchable, answerable question, the entire EBP process is off to a faulty start. A clinical question that is searchable and answerable requires answers from completed research, clinical judgment, and patient preferences. Potential for bias is inherent in the EBP process as every patient–clinician situation will require a different combination of science, clinician judgment, and patient values. In contrast, a research question requires answers from generating/doing research with consideration of the amount of bias introduced to answer the question: minimal when generating evidence about interventions and more when discussing the meaning of a phenomenon. The motivation behind a clinical question is what a clinician is to do or how a clinician is to conduct patient care (i.e., practice). The focus of a research question is on generating generalizable knowledge that will guide practice. PICO questions require time and focused energy because the clinical question drives the entire process, starting with an efficient search for the best evidence to answer the question.

STEP 2: SEARCHING FOR THE BEST EVIDENCE

The second step in EBP is searching for and collecting the best evidence to answer the PICO

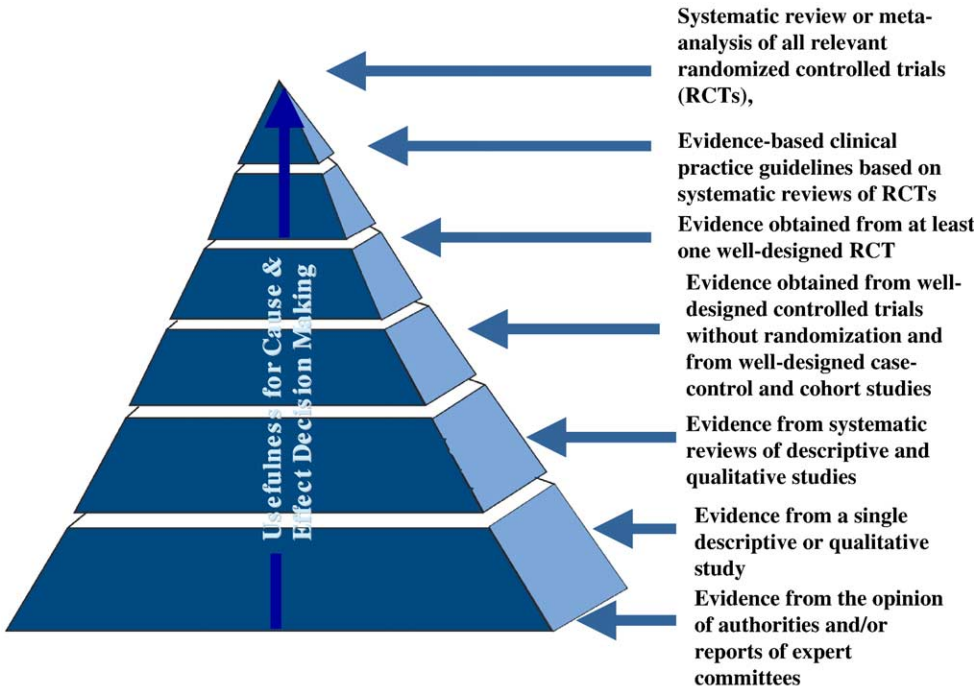

Figure 2. Levels of evidence for answering clinical questions about the effectiveness of interventions.

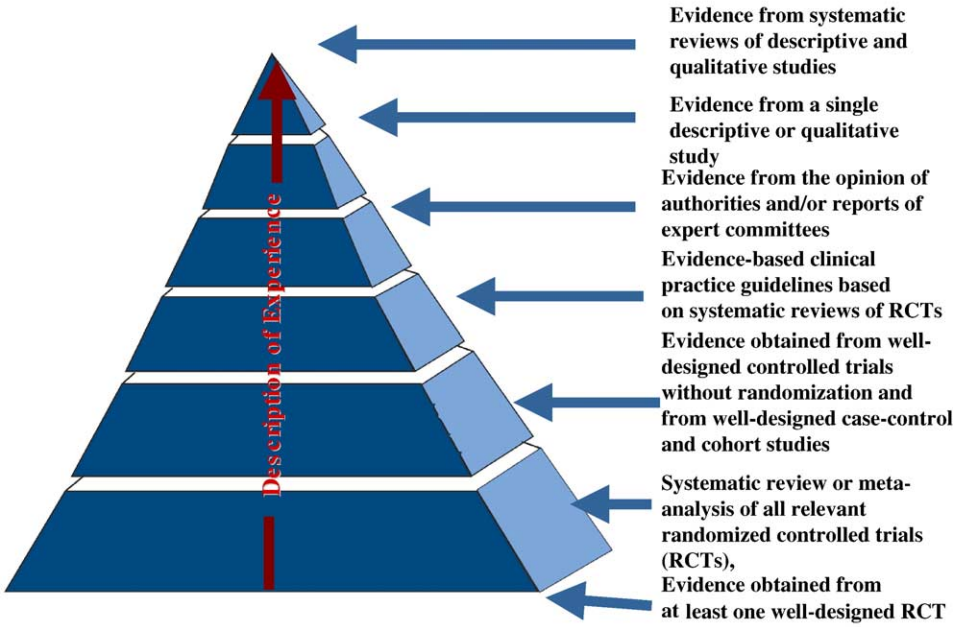

Figure 3. Levels of evidence for answering clinical questions about meaning.

question. The question informs clinicians which databases are appropriate to search, which keywords to start with in the search, which controlled vocabulary headings would make the most sense to map onto, and which study designs would be most appropriate for answering the question. Because systematic reviews of randomized controlled trials are the strongest level of evidence (i.e., Level I evidence) to answer questions about the efficacy of a certain treatment or intervention, accessing the Cochrane Database of Systematic Reviews early in the course of the search is important. The other levels of evidence for a therapy question are shown in Figure 2.

If clinicians have a question about the meaning of a construct or how one experiences a phenomenon (e.g., how do parents of a dying child experience grief?), then qualitative evidence is important and a different leveling of evidence would be appropriate (see Figure 3). Leveling of evidence can sometimes be confusing. However, if clinicians focus on the PICO question to determine which type of research evidence would best answer it, then they are less likely to be confused about what kind of evidence they need to retrieve. Evidence from opinion leaders or authorities or reports from expert committees may be necessary to guide practice when research has not been conducted; however, interventions based solely on this type of evidence require diligent, ongoing, rigorous outcomes evaluation for the purpose of generating stronger evidence.

STEP 3: CRITICALLY APPRAISING THE EVIDENCE

The third step in EBP is critically appraising the evidence found in the literature search. This critical appraisal process should be efficient and focus on three essential questions: (1) Are the results of the study or systematic review valid? (i.e., as close to the truth as possible); (2) What are the results? (i.e., are they meaningful and reliable—if applied, I can get the same results); and (3) Are the findings clinically relevant to my patients? For each type of study, there are subquestions under these three universal questions. The purpose of critical appraisal is to determine the value of the research to practice. Much like a diamond, the research will have flaws and limitations but will also have some worth to practice. This is a shift in the paradigm of how research is viewed by clinicians. Clinicians should no longer look for a study's flaws to eliminate the research but instead should view the research for the contribution it can make to practice, although it may be minimal at times.

STEP 4: ADDRESSING THE SUFFICIENCY OF THE EVIDENCE—TO IMPLEMENT OR NOT TO IMPLEMENT

The fourth step in EBP may vary depending on whether there is valid, reliable, and applicable evidence to integrate into practice. If such evidence exists, it would be amalgamated with a clinician's expertise and patient preferences to make a decision about patient care. For example, although the evidence from a series of randomized controlled trials supports the use of

TABLE 1. Selected EBP Process Models

Model	Steps/Phases/Process
DiCenso, Cullum, Ciliska, and Guyatt (2005) model	(1) Asking the question (2) Compiling the evidence (3) Planning a change (4) Integrating skills and experience
Iowa model (Titler, 2002)	(1) Generate the question from either a problem or new knowledge (2) Determine relevance to organizational priorities (3) Develop a team to gather and appraise evidence (4) Determine if the evidence answers the question (5a) If there is sufficient evidence, pilot the change in practice (5b) If there is insufficient evidence, generate evidence through research (6) If change is initiated based on the evidence, deem appropriateness of change to practice (7) If appropriate, institute change (8) Evaluate structure, process, and outcome data (9) Disseminate results
Rosswurm and Larrabee (1999) model	(1) Assess needs of stakeholders (2) Build relationships and make connections between nursing intervention and outcome (3) Synthesize the gathered evidence (4) Plan for the evidence-based change in practice (5) Implement the plan and evaluate the implementation (6) Maintain the change
Stetler (2001) model	Phase 1: Preparation Gather evidence; look for confounding influences Phase 2: Validation Appraise and synthesize evidence Phase 3: Comparative evaluation/Decision making Determine ability of evidence to answer the question Phase 4: Translation/Application If there is sufficient evidence, implement it either formally or informally Phase 5: Evaluation Evaluate whether evidence implementation sufficiently addressed the given issue

Augmentin for unresolved otitis media in children, a practitioner may decide to prescribe Azithromycin if a child refuses to take Augmentin owing to his or her distaste of the medication.

If there is no evidence to answer the clinical question, the fourth step is to generate evidence, either internal evidence through outcomes management initiatives or external evidence through rigorous research. Clinical judgment plays a vital role in generating or using evidence. Inexperienced clinicians view patient care differently and may not understand how a patient's trajectory or outcomes can be influenced by confounding variables; in contrast, experienced, seasoned practitioners often can anticipate the next aspect of a patient's experience with a certain diagnosis and will view the research differently, using a different set of experiential knowledge and skills. Clinical judgment will also influence how patient preferences and values are assessed, integrated, and entered into the decision-making process (Benner & Leonard, 2005).

STEP 5: EVALUATING THE OUTCOME OF EVIDENCE IMPLEMENTATION

Finally, the fifth step in EBP is evaluating the clinical outcome in a health care provider's own setting. Clinicians must carefully consider appropriate outcomes to best reflect the success of evidence implementation. Use of routinely collected data and/or development of new data collection instruments can provide clinicians with outcome data. It is important to consider the introduction of bias as well as confounding influences (e.g., lack of a common language around EBP concepts) on the outcomes evaluation. Including patients' evaluations of their experience of a program implementation as well as nurses' responses enables clinicians to obtain a more comprehensive assessment of the success of the program implementation. When evaluating the outcomes of an evidence implementation, it is important to realize that EBP fosters common goals such as improved patient care and best practice through interdisciplinary collaboration.

What EBP Is and Is Not

Research utilization (RU) was a movement focused on promoting nurses' use of research findings in their practices. The primary aim was applying a portion of research in a way that was unrelated to the original study (Polit & Beck, 2005). Although this movement served to heighten the awareness of nurses to the benefits of research, the tools (e.g., electronic databases and standardized rapid appraisal instruments) were not yet available to help direct care providers readily access the evidence and evaluate its worth to practice. As a result, synthesis of a body of evidence could not be a primary focus of RU. Some proponents viewed RU as primarily an organizational process (Horsley, Crane, & Bingle, 1978). Evidence-based practice is far broader than RU in scope; however, RU is part of the process. Evidence-based practice requires incorporation of the full body of best evidence (i.e., synthesis), clinicians' expertise and judgment, and patients' preferences and values in decision making (Melnyk & Fineout-Overholt, 2005) in answering a clinical question. In addition, EBP focuses on outcomes evaluation, either for an application of research to practice (e.g., individual or systemwide) or for ongoing evaluation of practice parameters (e.g., outcomes management; Melnyk & Fineout-Overholt, 2005). Therefore, it is important that nursing leaders clearly understand and define the more comprehensive approach of EBP as compared with RU. Although RU and EBP are not synonymous, the work done by pioneers in the RU movement was instrumental in paving the way for EBP to be more readily embraced.

Several models were developed to facilitate RU that provided guidance in applying research findings to practice. The Conduct and Utilization of Research in Nursing model provides six steps for organizational use of research in practice, beginning with identifying a problem as well as finding research to address it and ending with extending the application of findings to other settings (Horsley, Crane, Crabtree, & Wood, 1983). The Stetler model focuses on critical thinking and use of research by a knowledgeable nurse (Ciliska et al., 2005; Kim, 1999; Stetler & Marram, 1976). The Iowa model focuses on organizational use of research (Titler et al., 1994).

EBP PROCESS MODELS

In the past decade, Stetler (2001) and Titler (2002) broadened their scope to include principles of EBP in their models. Stetler's model is designed for use by individual clinicians or by a group of clinicians to address a particular patient care issue. In her model, Stetler described five phases in which clinicians engage to arrive at the best-quality decision and outcome (see Table 1). The final outcome of the Stetler model is evaluation of the use of evidence. DiCenso et al. (2005) also developed a practitioner model that walks through the steps of the EBP process and culminates in the evaluation of outcome (see Table 1).

The Iowa model is an organizational model that addresses quality practice from a deductive reasoning approach. The process by which an issue is addressed is clearly described (see Table 1). The process is initiated by triggers, either problems or new knowledge that has become available, that are relevant to practice. The process is completed with evaluation of outcomes and continues with dissemination of findings (Titler, 2002). Rosswurm and Larrabee (1999) also modeled the EBP process in six steps (see Table 1) that can be adopted by individual nurses or by organizations, with the final step as integration of change in practice. Although these models have been demonstrated to be helpful to practice and have growing empirical support regarding their validity, they were not universally adopted.

The origins of EBP were steeped in outcomes for patients (Melnyk & Fineout-Overholt, 2005). Nurses have long focused on patients as the center of their care; however, the competing clinical priorities of today's health care system have made maintaining this focus more challenging (Fineout-Overholt et al., 2005). What is new about EBP is that there are now specific criteria for appraising evidence as valid or invalid, an explicit process to enhance the efficiency of integrating research into practice with accompanying strategies, and methods for evaluating the outcome of integrating the EBP process into the culture of an organization. In addition, EBP principles enable nurses to once again own their practices and to have the tools with which to improve practice and determine best practices within a complex health care system (Strout, 2005).

Recommendations for Accelerating EBP in Academic and Health Care Environments

Multiple barriers that have impeded progress in advancing EBP in health care settings across the United States exist. Some of the major barriers include (1) misperceptions about EBP (e.g., it is too time consuming); (2) negative attitudes toward research;

(3) lack of administrative support; (4) insufficient number of EBP mentors and champions in health care systems; (5) inadequate knowledge, beliefs, and skills by advanced practice and staff nurses; (6) continuing education conferences that are didactic only in nature; and (7) professional educational programs that continue to teach baccalaureate and master's nursing students specifics about how to conduct research instead of how to access, efficiently critically appraise, and use studies to improve clinical practice (Melnyk et al., 2004; Melnyk, Fineout-Overholt, Stetler, & Allan, 2005).

In contrast, studies have supported several facilitators to advance EBP. These include (1) EBP mentors in health care settings, (2) partnerships between academic and clinical settings, (3) EBP champions within the environment, (4) clearly written research supports, (5) time and resources, and (6) administrative support (Melnyk & Fineout-Overholt, 2002; Melnyk et al., 2004; Omery & Williams, 1999; Schultz, 2005).

For the profession of nursing to rapidly accelerate the EBP paradigm shift, there must be (1) a different approach to teaching research and clinical courses in baccalaureate and master's degree programs that emphasizes EBP knowledge and skills; (2) development, testing, and actualization of EBP implementation models in health care organizations; (3) use of EBP mentors in clinical settings; (4) an acceleration of intervention studies that test the efficacy of interventions to yield evidence to guide best practices; and (5) an acceleration and funding of translational research to test strategies for disseminating efficacious interventions into clinical practice settings.

Some of these strategies for accelerating EBP were identified by a panel of 13 EBP and health care experts at the first U.S. Evidence-Based Practice Leadership Summit, which was held in conjunction with the fifth National EBP Conference, Translating Research into Best Practice with Vulnerable Populations, in June 2004 for the purpose of developing a strategic plan and action initiatives to rapidly accelerate EBP throughout the United States. The top three priorities for advancing EBP in the United States identified by this group of experts are the following: (1) form a national EBP/research consortium or network of institutions that facilitates the conduct of efficacy and effectiveness studies, (2) implement a national EBP mentorship program, and (3) develop standards for integrating EBP into all levels of education (Melnyk et al., 2005).

SPECIFIC STRATEGIES FOR ACCELERATING EBP IN EDUCATION

One of the major challenges in accelerating the EBP paradigm shift is that many baccalaureate and master's nursing educational programs continue to place an emphasis on teaching students how to conduct research instead of how to access, efficiently critically appraise, and use research in their clinical practices. The end result of an emphasis on the explicit conduct of studies at these levels is often a negative attitude toward research. In addition, teaching students in-depth critique of research articles instead of efficient steps in searching for and rapidly appraising evidence that is found promulgates the belief that EBP is an insurmountable feat in the real world, where patient caseloads and other role responsibilities place inordinate demands on nurses' time. Thus, there is an urgent need for an educational paradigm shift in which students in bachelors and master's programs are taught an evidence-based approach to nursing practice. For this shift to happen quickly, nurse educators must become educated and skilled in EBP. Preceptors for educational programs also must become skilled in EBP for them to role model the process for students they mentor. In addition, EBP must be consistently threaded throughout both didactic and clinical courses where real life case examples provide the framework for the EBP process and continual reinforcement through the professional program leads to lifelong learning skills to improve practice.

SPECIFIC STRATEGIES FOR ACCELERATING EBP IN PRACTICE

In health care organizations, an entire culture to support EBP must exist. Advance practice and staff nurses as well as administrators must have foundational knowledge as well as strong beliefs about the importance of EBP and critical skills to support evidence-based care. There also should be EBP mentors and champions within the system to continue to cultivate EBP implementation and outcomes management projects that will lead to improvements in patient care and outcomes. Strategies within an organization might include the development and implementation of ongoing EBP rounds in which the following are presented in a 20- to 25-minute presentation: (1) introduction to the clinical problem; (2) the PICO question; (3) databases that were searched; (4) rapid critical appraisal of the evidence; (5) implications for practice change;

and (6) plan for outcomes evaluation. Evidence-based practice journal clubs also are an excellent strategy to foster an EBP culture; however, commitment to ongoing participation is important from participants and leaders. Awards for successful EBP implementation and outcomes management projects build in recognition that fosters evidence-based care. In addition, a written organizational philosophy that places EBP as a central mission, as well as professional advancement systems that build in competencies related to the practice of EBP in performance evaluations, can spark an acceleration of evidence-based care.

SPECIFIC STRATEGIES FOR ACCELERATING EBP IN RESEARCH

Advancing best practices in nursing requires accelerating the number of clinical trials to generate evidence regarding the most efficacious interventions to guide clinical practice. There are many areas in nursing where there are sufficient descriptive work that have laid the foundation for intervention trials. In those areas, academicians should encourage doctoral students to embark on pilot intervention work as the groundwork for full-scale clinical trials as they launch their careers. In addition, the establishment of research networks across the country can accelerate the pace at which evidence is generated to guide clinical practice. Collaborations among nurse scientists and staff nurses also must be formed to foster evidence generation.

Lastly, in areas in which interventions have been supported through research, there must be continued efforts to synthesize existing bodies of evidence and concerted efforts to conduct translational research to determine what strategies work best in disseminating the interventions in clinical practice. Translational science is in the infancy stage. However, if the 17-year time lag between publishing research and successfully implementing it into clinical practice is going to be reduced, then intensive efforts and funding must be invested in conducting these types of studies.

Conclusion

Evidence-based practice has provided a process for changing practice to improve patient care. There are models, tools, and empirical support to assist clinicians in more easily living the EBP process in their environments; however, for health care to be transformed from the inside out, all clinicians must join together with the common goal of advancing EBP in their practice, academic, policymaking, or science-generating worlds to bring about best practice in the 21st century.

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