Evidence-Based Practice
Creating a Spirit of Inquiry to Solve Clinical Nursing Problems

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Evidence-based practice (EBP) has become the clarion call in nursing, and healthcare professionals internationally are highly cognizant of the importance of linking evidence and outcomes to nursing practice (Melynk & Fineout-Overholt, 2005). Evidence-based practice is the integration of the best research evidence with clinical expertise and patient values to facilitate clinical decision making (Sackett, Strauss, Richardson, Rosenberg, & Haynes, 2000). The goal of EBP is to use the highest quality of knowledge in the provision of care to yield the greatest impact on patients’ health status and healthcare (Melynk & Fineout-Overholt, 2005). EBP involves a systematic search for the most relevant evidence, as well as a critical appraisal of this evidence to answer a clinical question (see Table 1; Bennett, 2007, p. 19).

Need for the Study
Canada, England, and Australia remain at the forefront as leaders in the full implementation of EBP. Although EBP has been demonstrated to provide the highest quality of care to patients and their families, its use in nursing in the United States has not yet been widespread. Numerous misconceptions and barriers impede the full use of EBP in nursing. Yet steadily and increasingly, EBP is becoming mainstreamed into nursing practice across the United States. Widespread use of EBP in nursing requires that nurses become fully informed about this paradigm or worldview of using the best evidence in the literature for use in clinical decision making.

Purpose
Using a case method approach, a pilot study was conducted to explore the implementation of EBP to determine the best practice for clinical issues identified in professional nurses’ practice settings. Specifically, in this study the investigator sought to explore the levels of evidence available in the conduct of evidence-based literature search activities, to identify barriers in the conduct of EBP, as well as to gain an understanding of professional nurses’ perceptions regarding the use of EBP in clinical decision making.

Background
EBP has its origins in medicine, when in 1972, an Oxford physician-epidemiologist, Dr. Archie Cochrane, became frustrated with the persistently high incidence of low-birth-weight preterm infant mortality in England, despite available evidence that supported the use of corticosteroids for women in preterm labor. This evidence, in the form of several randomized clinical trials, had not been compiled and analyzed into a systematic review, which would have facilitated dissemination of this effective intervention. He admonished the medical profession for not having rigorous reviews of evidence in which to support clinical practice decisions. In 1992, the Cochrane Collaboration was established to assist healthcare professionals in making well-informed decisions through the provision of access to systematic reviews of healthcare interventions. Systematic reviews became the core focus of the Cochrane Collaboration (Jennings & Loan, 2001). Systematic research reviews are defined as a comprehensive and systematic identification, analysis, and summary of research evidence related to specified issues and can use statistics, tabulation, or compare-and-contrast.
TABLE 1. How to Search for Relevant Evidence?

<table>
<thead>
<tr>
<th>Database</th>
<th>Searching</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is important to determine which databases are available for students. Select databases to search by relevancy of database scope to the PICO question</td>
<td>The librarian will instruct students how to access available databases</td>
</tr>
<tr>
<td>Cochrane Database of Systematic Reviews</td>
<td>This essential resource is the place to start and must be available to students. &quot;If systematic reviews exist that can answer the clinical question, the search for relevant evidence and the critical appraisal process has already been done&quot; (Melnyk &amp; Fineout-Overholt, 2005, p. 43)</td>
</tr>
<tr>
<td>Note: databases are dynamic, not static. For example, the Cochrane Database of Systematic Reviews became searchable by MeSH headings</td>
<td>This relatively small database can be searched by keyword Try various terminologies as well as synonyms Try different forms of words Also search by MeSH headings</td>
</tr>
<tr>
<td>Other databases in the Cochrane Library should be reviewed for relevance: Database of Abstracts of Reviews of Effects (DARE; Other Reviews)</td>
<td>Many databases are available for purchase from different vendors. Students should understand how to access the help screens to determine the searching guidelines used (ie, the format for phrases, Boolean searching, truncation, etc.)</td>
</tr>
<tr>
<td>Cochrane Central Register of Controlled Trials (CENTRAL; Clinical Trials)</td>
<td>A search in the Cochrane Library will list the number of results from each of these databases</td>
</tr>
<tr>
<td>Cochrane Methodology Register (CMR; Methods Studies)</td>
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<tr>
<td>Health Technology Assessment Database (HTA; Technology Assessments)</td>
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<tr>
<td>NHS Economic Evaluation Database (NHSEED; Economic Evaluations)</td>
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<tr>
<td>Cumulative Index to Nursing and Allied Health Literature (CINAHL)</td>
<td>A comprehensive database of a wide range of the literature in the fields of nursing and allied health. Librarian assistance using the controlled vocabulary and limits will generate focused searches to produce relevant results. For example, limiting by the special interest of evidence-based practice is helpful</td>
</tr>
<tr>
<td>MEDLINE, produced by the National Library of Medicine</td>
<td>The number of records as well as the complexity of the medical literature indexed in MEDLINE, produced by the National Library of Medicine, requires searching by MeSH (medical subject headings) and using appropriate limits to obtain relevant results. For example, limiting by publication type of randomized controlled trial is helpful</td>
</tr>
<tr>
<td>The following databases may provide useful information depending upon the PICO question:</td>
<td></td>
</tr>
<tr>
<td>National Guidelines Clearinghouse (<a href="http://www.guideline.gov/">http://www.guideline.gov/</a>)</td>
<td>This public resource for evidence-based clinical practice guidelines contains extensive help for searching</td>
</tr>
<tr>
<td>PsychINFO</td>
<td>This index of scholarly literature in the behavioral sciences and mental health uses an extensive controlled vocabulary, necessary for maximizing useful search results. Also, limiting by form/content type of clinical trial or meta-analysis can be helpful</td>
</tr>
<tr>
<td>National Center for Complementary and Alternative Medicine (<a href="http://nccam.nih.gov/">http://nccam.nih.gov/</a>)</td>
<td>Provides a searchable database of clinical trials, which are organized by conditions, drug interventions, sponsors, and locations</td>
</tr>
<tr>
<td>Agency for Healthcare Research and Quality (<a href="http://www.ahrq.gov/clinic/epcix.htm">http://www.ahrq.gov/clinic/epcix.htm</a>)</td>
<td>Provides information about evidence-based practice programs and lists reports</td>
</tr>
<tr>
<td>TRIP Database (<a href="http://www.tripdatabase.com/index.html">http://www.tripdatabase.com/index.html</a>)</td>
<td>Provides clinical question answering, using the principles of evidence-based medicine</td>
</tr>
</tbody>
</table>
methods to reach conclusions based on the body of studies in the review (Brown, 2009, p. 372).

Similar to medicine, EBP in nursing originated outside the United States (Jennings & Loan, 2001). In the late 1990s and early 2000, as EBP became more interdisciplinary and considerably more nursing research was being conducted, the EBP movement in nursing in the United States began. Concurrent at this time, the Institute of Medicine (IOM) published two reports: *To Err Is Human: Building a Safer Health System* (Committee on Quality Healthcare in America, IOM, 1999) and *Crossing the Quality Chasm: A New Health System for the 21st Century* (Committee on Quality Healthcare in America, IOM, 2001). Both reports addressed the need for reform for safer, higher quality care from redesigned systems of care that utilize state-of-the-art care. A significant finding in the latter report was that a 20-year gap existed between research findings and actual implementation in clinical practice; consequently, EBP was hallmarked as an essential factor for healthcare reform (Burns & Foley, 2005).

The demand to implement EBP became evident, and EBP is now indoctrinated in the healthcare system as it is required by accreditation agencies, professional organizations, and health insurers, has been woven into nursing curricula, and is a key element in quality improvement.

**Factors Relating to Slow Use of EBP in Nursing**

Factors contributing to the relatively slow but ever-increasing adoption of EBP in nursing are numerous. One of the most significant misconceptions regarding EBP is that it is just another buzzword, a current catch phrase that will run its course until a new vogue trend in nursing emerges. In comparison to traditional practice, EBP significantly improves patient outcomes (Bennett, 2007). Furthermore, patients who receive care from rigorous, well-designed studies based on evidence experience approximately 30% better health outcomes (LoBiondo-Wood & Haber, 2006). Another misconception of EBP is that it is a replacement term for research utilization. EBP, however, is not synonymous with research utilization, as EBP is broader and takes into consideration patient preferences, expertise of healthcare practitioners, and resources (Sackett et al., 2000). In addition, in EBP, the use of knowledge is not derived from one single study but involves a systematic search for and a critical appraisal of the most relevant evidence to answer a clinical problem (Melynk & Fineout-Overholt, 2005). Additional factors that have contributed to the slow integration of EBP in nursing include a lack of EBP knowledge and skills. Although baccalaureate education requires an undergraduate nursing research course, traditionally nursing research curricula have focused on preparing generators of research. In teaching EBP, the emphasis is placed on nurses becoming users. Although most optimally, nurses should be prepared as both generators and users of research, what remains essential to the success of EBP is the recognition of the importance of research in nursing. In academia, in light of the current and emerging worsening of the faculty shortage nationwide, competing faculty demands and responsibilities may interfere with the pace of integration EBP in nursing. In clinical practice settings, lack of administrative support and/or insufficient resources may hamper the movement of EBP in practice (Melynk & Fineout-Overholt, 2005).

Multiple, diverse ways of knowing or of developing nursing knowledge have long been recognized in nursing (Carper, 1978), and concern exists that nurses engaging in EBP operate from a predominantly medical model with heavy reliance on randomized controlled trials (RCTs) and that EBP focuses only on empirical knowing. Critics have articulated the lack of relevance of RCTs to nursing practice. Furthermore, because quantitative methods have predominated in medical research and EBP follows the conventional medical approach, many healthcare professionals have concluded that EBP uses only quantitative evidence in decision making. However, levels of evidence for use include the highly valued systematic review and/or meta-analysis of RCTs or clinical practice guidelines, well-designed studies, systematic reviews of descriptive and qualitative studies, single descriptive or qualitative study, and opinion of authorities or reports of expert committees (Melynk & Fineout-Overholt, 2005). Although the RCT remains the most valued quantitative study due to the rigor of control, manipulation, and randomization, additional levels of evidence remain acceptable for EBP. Increasingly, as recognition of the contribution that all of the hierarchical levels of evidence hold, comfort levels and ease toward the use of EBP in nursing grow stronger.

Despite the above barriers to EBP implementation, the urgent necessity to use EBP remains, primarily because of the length of time it takes to integrate research findings into standard practice, and clearly without the best current evidence, practice becomes antiquated and out of date.

**Method**

Ten professional nurses working full-time in diverse work settings and pursuing their RN-BSN degrees were encouraged to participate in an EBP project via an independent nursing practicum. These nurses had no previous knowledge of EBP and were intellectually curious to learn how to seek the best evidence for clinical problems identified in their practice settings. Initial seminars focused on their misconceptions of EBP, and the largest concern voiced was lack of confidence in being able to obtain and use research findings and their general sense of resistance to research. An agenda was set to address the need for the paradigm shift of EBP, whereby nurses would be mentored regarding the process of becoming a user of research. In seminar discussions were held on the history and need for EBP, as well as the five steps of EBP, the differences between generators and users of research, hierarchical levels of evidence, and effective decision making. Crucial to this activity was the creation of a therapeutic milieu, whereby nurses were encouraged to foster their spirit of inquiry, ponder about situations or recurring unresolved issues or dilemmas in their work situations, and creatively reflect upon their clinical practice. The practice of nursing as both an art and a science was explored with the recognition that each nurse brings her or his own creative expertise to the bedside. This expertise in
combination with the best evidence, resources, and patients’ values and preferences is what makes EBP so important to the delivery of excellent nursing practice.

State-of-the-art library resources are essential to the conduct of evidence-based search activities. Prior to the conduct of this pilot study, collaboration with health science librarians was established and the Cochrane Database was purchased. Reference staff librarians were solicited for their interest and invited to join the EBP seminars. Mentoring seminars ensued regarding the potential topics of inquiry, available evidence, and actual formulation of a PICO question. These actions resulted in highly enthusiastic, creative, interdisciplinary scholarly inquiry.

The involvement of reference librarians was deemed essential to the study as nurses identified their need for enhanced library navigation skills and initial lack of available evidence. Reference librarians provided guidance in online search strategies and with their expert knowledge generated available evidence regarding the actual search of their PICO questions. Questions posed to the mentor focused on how much evidence is enough (How many systematic review are enough?), and discussions ensued regarding the differences between traditional literature reviews and EBP (see Table 2).

According to Ciliska (2005, p. 345), the five stages for the EBP process are as follows:

1. asking a clinical question,
2. searching the literature for relevant research,
3. critically appraising what has been found,
4. implementing the change in practice, and
5. evaluating the change in practice.

The most difficult step in the EBP process is getting nurses to recognize and admit uncertainties in practice and then moving them to embrace uncertainty as an opportunity for change (Johnston & Fineout-Overholt, 2005). On the basis of the identified uncertainties addressed in the literature, nurses posed their PICO questions. A PICO question is a format whereby the important question is posed addressing four components: a statement of the patient population, statement of interest/intervention, comparison of intervention, and a statement of outcome.

### Table 2. Searching for Evidence: The Librarian’s Role

**Getting started**

Class professor invites librarian to attend a classroom session in which both the students and the librarian hear an explanation of the project. This provides the opportunity for the librarian to show enthusiasm for the project and to establish a feeling of positive support that will be available throughout the research process.

Students give librarian their preliminary topics in PICO format and make appointments for group consultations. Prior to consultations, the librarian determines appropriate and available databases for searching and works with terms from PICO questions in these databases, paying special attention to thesaurus of descriptors, explosion, and limit of terms. Students come to the consultation with the librarian with different levels of ease, using computers as well as with database searching. Some groups will have changed or modified their PICO questions. The librarian needs to be attentive to each student to understand the level with which to begin to help.

The students’ understanding of the literature itself is far beyond that of the librarian. The librarian responds to the students’ evaluation of search results by suggesting other search possibilities.

**Core databases**

Searching in these databases was relevant for students from all groups. The Cochrane Database of Systematic Reviews is the place to start. This essential resource must be available to students. Other databases in the Cochrane Library should be reviewed for relevance. “If systematic reviews exist that answer the clinical question, the search for relevant evidence and the critical appraisal process has already been done” (Melnyk & Fineout-Overholt, 2005, p. 43).

*Note.* Databases are dynamic, not static. For example, between the time of the project and this preparation the Cochrane Database became searchable by MeSH headings.

Cumulative Index to Nursing and Allied Health Literature (CINAHL) is a comprehensive database of a wide range of the literature. Librarian assistance using the controlled vocabulary and limits generated focused searches that produced relevant results.

The number of records as well as the complexity of medical literature indexed in MEDLINE, produced by the National Library of Medicine, requires searching by MeSH and using appropriate limits to obtain relevant results.

**Important databases**

Depending upon the search question, the following databases were important to search:

- PsycINFO indexes scholarly literature in the behavioral sciences and mental health. Using the controlled vocabulary is helpful for maximizing useful search results.
- The Agency for Healthcare Research and Quality provides information about evidence-based practice programs and lists reports [http://www.ahrq.gov/clinic/epcix.htm](http://www.ahrq.gov/clinic/epcix.htm)

**General observations**

Students should be expansive in their searches, but focus on their evaluations. Try all search ideas. Often results of one search will provide ideas or terms for another search. It is important not to give up after unsuccessful searching.

Use thesauri, think of synonyms, and try plain keyword searches. Consult with the librarian again. There is a great deal of overlap among the databases mentioned above. A sign that the search may be successful is when the same results are retrieved from different searches or from different databases.

It is possible that there have been no systematic reviews or randomized controlled trials that are relevant to the question.
statement of outcome (Melynk & Fineout-Overholt, 2005).

Findings
Nurses in this study were employed in diverse healthcare settings and developed PICO questions relevant to their clinical specialties. PICO questions were diverse and yielded variability in the ability to obtain systematic reviews. Below are descriptions of the formulation of PICO questions:

**PICO 1 Example**

Two nurses employed as pediatric telephone triage nurses in an outpatient children’s hospital reported frequently responding to parental calls regarding febrile school-aged children. The nurses posed their PICO question because there was no existing policy on whether to recommend acetaminophen or ibuprofen, and they identified that healthcare professionals in this setting indiscriminately alternated between recommending acetaminophen or ibuprofen for children with a temperature of 100.4°F or higher. Therefore, their PICO question was as follows: In febrile children with temperatures greater than 100.4°F, which is more effective in fever reduction, acetaminophen or ibuprofen?

A search of the evidence revealed that no clinical guidelines existed. However, a systematic review reported that acetaminophen provided initial greater initial temperature reduction, but that ibuprofen provided a more significant antipyretic effect at 4 hours and the temperature decrement lasted longer (Wahba, 2004, p. 283). In another systematic review, there was no evidence to support the common practice of alternating ibuprofen and acetaminophen and most significantly was that this practice was considered dangerous as a result of synergistic and toxic effects (Carson, 2003). On the basis of evidence, the nurses presented these data to nursing tasks (Nelson & Baptiste, 2004, p. 14). Administration and staff were informed of the cost-saving (long-term) benefit of a “no lifting policy” identified in the literature as well as the American Nurses Association’s (ANA’s) Position Statement Supporting Actions and Policies That Result in the Elimination of Manual Patient Lifting to Promote a Safe Environment of Care for Nurse and Patient (ANA, 2003).

**PICO 3**

Not all evidence yielded clear-cut decisions despite extensive, rigorous investigations. Two oncology nurses practicing in a large teaching institution sought to determine whether there were any differences in site infection rate between the use of gauze and paper versus transparent polyurethane dressing changes for central venous catheters in adults with cancer. Their current agency policy supported the use of both. Their PICO question was as follows: In patients with cancer who have central venous catheters, which is more effective in reducing the risk of site infection, tape and gauze dressing or transparent dressing?

Extensive literature in the form of systematic reviews and Centers for Disease Control and Prevention’s clinical guidelines were available. In a systematic review, Gillies et al. (2006) reported that much uncertainty remains regarding the effect of type of central venous catheter dressing on the risk of infection; therefore, the selection of dressing type should be based on patient preference choice of dressing and cost (p. 1). Evidence revealed that additional, rigorous randomized controlled trials need to be conducted before any firm conclusions can be reached regarding different types of dressing change for central venous catheters. These nurses communicated these findings to their clinical units and based choice of dressing on patient and hospital preferences, which more commonly employed transparent dressings.
PICO 4
A nurse employed in a cardiac surgical outpatient practice engaged in strong health teaching and counseling regarding cardiac disease and treatment approaches to patients and families voiced interest in more closely examining the literature on heart disease. This nurse posed the following specific PICO question: Which reperfusion therapy, percutaneous coronary angioplasty (PTCA) or thrombolytic therapy (TT) is more effective in salvaging myocardium and reducing death in patients presenting to the ER with symptoms of an ST-segment elevation myocardial infarction?

Six RCTs and two meta-analyses provided extensive evidence, which clearly supported that PTCA is superior to TT in both the short-term (4–6 weeks) and long-term outcomes (6–18 months) (Keeley, Boura, & Grines, 2003). Although cognizant of the increased use and efficacy of percutaneous coronary angioplasty versus thrombolytic therapy in patients with acute myocardial infarction, this nurse had not critically appraised data for the best evidence regarding this treatment choice. As a result of the extensive and comprehensive search for and obtaining of substantial evidence, she gained increased scientific knowledge to more effectively communicate to patients and families and act as an advocate in articulating patient and family values and preferences in determining cardiac treatment options.

Although the benefits and increased use of PTCA had been made public through mass media, awareness of the evidence was deemed most beneficial by the nurse searching the literature. She described the value of gaining this specific information:

Searching the evidence allowed me to be a more effective advocate for patients. I can now better inform patients and their families in the comparison of PTCA and TT from the scientific literature.

PICO 5
As a result of attending an alternative healthcare conference and learning about the use of acupuncture for treatment of adults with asthma, three nurses were interested in exploring the use of acupuncture in the management of children with asthma. Initial research revealed parental concern and subsequent non-adherence with the use of oral steroid inhalers in maintenance therapy for children with asthma. In seeking to determine whether acupuncture was an alternative to asthma management in children with asthma, three nurses posed the following PICO question: Among school-aged children with asthma, is acupuncture more effective than oral inhaled steroids in maintaining effective respiratory function?

Although there was an abundance of literature retrieved from the Cochrane library consisting of two systematic reviews of complementary treatments (acupuncture and homeopathy) for chronic asthma, these reviews pertained to adults only (McCarney, Lasserson, Linde, & Brinkhaus, 2004). Numerous RCTs were available, investigating the efficacy of acupuncture in asthma. A search of the National Institute of Health and the American Academy of Pediatrics reference sources confirmed that no clinical trials have been done on children with asthma. Therefore, their PICO question was not plausible. However, nurses did gain a further understanding of the state of the art for asthma management in school-aged children.

Discussion
This study sought to explore the implementation of an EBP approach to determine the best practice for problems identified in nurses’ clinical practice setting. Ten nurses, when provided with continuous mentoring throughout the entire process, found the experience to be challenging, exciting, and highly feasible. All but one of the PICO questions yielded sufficient evidence to implement change in practice. The PICO question addressing the efficacy of acupuncture and management of childhood asthma could not be investigated because of insufficient evidence due to the dearth of research between these variables of interest. All other PICO questions were answered through the availability of systematic reviews, RCTs and clinical practice guidelines, as well as single descriptive studies.

In this study, the major identified initial barrier was clearly nurses’ lack of experience in retrieval of EBP literature. This finding is consistent with the EBP literature identifying nurses’ gaps in knowledge and skills in retrieving research publications (Hart et al., 2008). In an EBP readiness study supported by the American Academy of Nursing Informatics Expert Panel Pravikoff, Pierce, & Tanner (2005), identified most of the 1097 registered nurses sampled reported that they do not search appropriate databases to gather information regarding their practice and of those who do so, they report lacking skill in search techniques.

In this study, the support/mentorship of a reference librarian at hand using her expert knowledge in search techniques was invaluable and largely facilitated nurses’ acquisition of essential information. After initial sessions, nurses gained confidence and competence in search techniques. Because of baccalaureate preparation and completion of an undergraduate research course, this sample of nurses did not perceive difficulty understanding and applying research findings to their practice setting. Crucial to this positive outcome was the availability of a mentor to discuss and facilitate enhanced understanding of advanced statistics and to give guidance to the next step in their EBP process. Nurses were informed early on in the EBP process to tolerate frustration and that search techniques are sophisticated, complex, and time-consuming. The use of small groups in a collaborative, supportive environment facilitated knowledge acquisition and ease in comfort level in learning about EBP. Nurses in this study reported that implementation of an evidence-based approach to solving clinical nursing problems is a challenging but stimulating activity, and that they gained confidence in knowing that they could use research in their practice. Through the EBP project, nurses witnessed how EBP
dramatically enhances scholarship and practice by bringing forth state-of-the-art scientific knowledge in the clinical arena.

The results of this study support that EBP in nursing is a learned activity that with support can be easily achieved by neophyte nurses. Through the use of mentors, barriers can be overcome and EBP implemented with success in diverse healthcare settings. Although the mentoring process in this study occurred in an academic setting, mentors can be utilized in diverse organizational settings. Increasingly, as EBP becomes more embedded in nursing curriculum nationwide, myths and misunderstandings regarding EBP will continue to diminish and the discipline of nursing will be further enhanced through the use of sound evidence to guide our practice.

Implications
Further research is needed to identify factors that will enhance nurses’ use of information gathering techniques and to explore how nurses seek information for their clinical practice decisions. In addition, investigations that explore diverse effective measures in which to engage more nurses in EBP are needed to advance this highly valuable activity in nursing.

References


