

Building a Foundation for an Evidence-Based Approach to Practice: Teaching Basic Concepts to Undergraduate Freshman Students

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The University of Pittsburgh School of Nursing introduced evidence-based practice (EBP) into the freshman-level curriculum this year. This article describes the reasons behind this decision, the development of the curriculum, the specific EBP content, and the student assignments. The introduction of EBP into the first-level nursing curriculum has proven to be successful; consideration is even being given to expanding the EBP content. (Index words: Evidence-based practice; Critical thinking; Research utilization; Baccalaureate education; Curriculum) *J Prof Nurs* 21: 351-357, 2005. © 2005 Elsevier Inc. All rights reserved.

THE UNIVERSITY OF Pittsburgh School of Nursing decided to incorporate evidence-based practice (EBP) into its freshman-level curriculum, beginning with the 2004–2005 freshmen class. This decision was prompted by several landmark reports as well as internal mandates from the University of Pittsburgh. This article will provide an account of the university's impetus to incorporate EBP into the freshman-level curriculum, an overview of the development of the EBP content, examples of EBP class exercises, and future directions for the curriculum.

Driving Forces Highlighting the Need for EBP Implementation

Beginning in 1999, the Institute of Medicine (IOM) began publishing a number of reports indicating that changes needed to be made in the United States health care system. In *To Err is Human: Building a Safer Health System*, the IOM addressed patient safety and identified the innumerable preventable risks

and deaths that occur as a result of errors in care (Committee on Quality Healthcare in America [CQHA], IOM, 1999). In *Crossing the Quality Chasm: A New Health System for the 21st Century*, the IOM discussed reform measures necessary to ensure quality care delivery (CQHA, IOM, 2001). Safer, high-quality care must come from redesigned systems of care, ones that deliver state-of-the-art health care (CQHA, IOM, 2001). This report disparages the 20-year gap existing between research generation and implementation of findings into practice; it supports the use of information technology and EBP as essential factors for health care reform. More importantly, this report recommended that there be a meeting of an interdisciplinary team of health profession leaders to address restructuring clinical education (CQHA, IOM, 2001). This committee, the *Committee on the Health Professions Education Summit* (2003), presented five core competencies that all clinicians across health care disciplines should possess to meet the needs of the 21st-century health care system. These five competencies include providing patient-centered care, working in multidisciplinary teams, applying quality improvement, using EBP, and using informatics.

Specific to the nursing profession and the mandates for baccalaureate education, the *American Association of Colleges of Nursing [AACN] (1998)*, in *The Essentials of Baccalaureate Education for Professional Nursing Practice*, identified four core competencies: critical thinking, communication, assessment, and technical skills. In her introduction to this report, the president of AACN stated that “changes within the health care delivery system, shifting population demographics, and scientific advances require that nursing re-evaluate the roles and preparation of its future practitioners. . . Nursing education must keep pace with these changes.” In addition, the National Council Licensure Examination for Registered Nurses measures competencies fundamental to the practice of nursing (National

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Council of State Boards of Nursing [NCSBN], 2003). These competencies include nursing process, caring, communication and documentation, and teaching/learning (NCSBN, 2003). Each examination measures the knowledge, skills, and abilities necessary for nurses to meet the needs of clients and to practice safely and effectively as a newly licensed entry-level registered nurse (NCSBN, 2003). Finally, professional nursing supports EBP as a means to broaden its scientific base and to illustrate the effectiveness of nursing interventions in terms of cost and outcome (Rambur, 1999). Widespread adoption of EBP has not been realized, however (Estabrooks, Floyd, Scott-Findlay, O'Leary, & Gushta, 2003; Estabrooks, Winther, & Derksen, 2004; Hallas & Melnyk, 2003; Melnyk et al., 2004). Furthermore, baccalaureate nurses who are expected to use research in practice continue to be underrepresented in the workforce (Rambur, 1999).

The University of Pittsburgh School of Nursing has a history rich in educational innovation within a research-intensive environment. Recently, the provost set forth key attributes for all students, including critical thinking (Maher, 2004). Although there are diverse definitions of critical thinking, nearly all emphasize the ability and tendency to gather, evaluate, and use information effectively, a process that parallels EBP (Beyer, 1985). Given that the school has strong commitments to research and education, the preceding reports, coupled with growing support from the nursing profession nationally and internationally, led us to incorporate EBP early in the baccalaureate curriculum.

Precedents in EBP to Build a Curriculum

Evidence-based practice remains a relatively new concept to nursing, causing many challenges to become apparent when making curriculum decisions. First, various definitions exist for evidence-based nursing practice. For our purposes, Ciliska, Pinelli, DiCenso, and Cullum (2001) define it as "integrating the best available research evidence with information about patient preferences, clinician skill level, and available resources to make decisions about patient care." Evidence-based practice is broader than the use of research alone and involves five steps: (1) asking a clinical question; (2) collecting the most relevant evidence; (3) critically appraising the evidence; (4) integrating the evidence with one's clinical expertise, patient preferences, and values to make a

practice decision; and (5) evaluating the change or outcome (Ciliska et al., 2001; Melnyk & Overholt-Fineout, 2005). An aim of EBP is to decrease wide variation in individual clinicians' practices, thus eliminating worst practices and enhancing best practices (Tanner, 1999).

Second, long-standing traditional patterns of education in which students are lectured must be discarded (Rambur, 1999). This is often difficult because traditional teaching methods involve reliance on textbooks as a binding standard of reference and because EBP is drawn from published research (e.g., journal articles and online references). In addition, students must be taught the ability to question, when they are given answers traditionally (Rambur, 1999). One of the main goals of education, at any level, is to help develop general thinking skills, particularly critical thinking skills (Van Gelder, 2005). Critical thinking is a necessary skill to use EBP, and students must be taught critical thinking early (Tanner, 1999). Students and faculty learn to co-explore evidence when students learn to question and discover that faculty are not the all-knowing disseminators of knowledge as purported in traditional teaching methods (Rambur, 1999). Furthermore, communication is a key element of EBP. Students must be taught to draw upon bodies of knowledge traditionally believed to be beyond the realm of nursing and to work in interprofessional teams for best-quality patient care (Pearson & Craig, 2002).

Third, the available literature addressing education of EBP focuses primarily on clinical nurses in the workforce. Less readily available is literature addressing the incorporation of EBP into the nursing curriculum, particularly at the undergraduate level (Chaboyer, Willman, Johnson, & Stockhausen, 2004; Kessenich, Guyatt, & DiCenso, 1997). This lack of literature is partly a result of the fact that few nursing education programs have yet to formally include EBP in their curriculum (Kessenich et al., 1997). Therefore, the resulting literature on program development and evaluation either has not been generated or has yet to be published.

The available literature highlights a discrepancy in how to implement EBP into the nursing curriculum. Foster (2004) suggested that ambiguity exists in defining the concept of EBP and in the blurring of EBP with the research process. A lack of clarity about EBP content, process, and outcomes is a challenge that educators face; it often results in the continuance of traditional nursing research courses using research textbooks, in the hope that they will pass for EBP

TABLE 1. University of Pittsburgh School of Nursing Competency Matrix

	Provost (key attributes)	BSN essentials (core competencies; core knowledge)	National Council Licensure Examination for Registered Nurses (test plan)	IOM (core competencies)
Communication skills (written/oral)	X	X	X	
Critical thinking, EBP, and nursing process	X	X	X	X
Quantitative skills, assessment, and quality improvement	X	X	X	X
Technical skills		X	X	
Health promotion, risk reduction, and disease prevention		X	X	
Illness and disease management and patient-centered care		X	X	X
Information and health care technologies	X	X		X
Ethics		X	X	
Human diversity	X	X		
Global health care	X	X		
Health care systems and policy		X		
Caring—collaboration and interdisciplinary teams			X	X
Teaching—learning			X	

preparation (Foster, 2004). Some scholars, however, suggest that nurse educators use introductory research courses to teach the basic skills of EBP: introducing electronic database searching, research study evaluation, and decision making about applying study findings to practice (Kessenich et al., 1997).

Ambiguity concerning the appropriate year in which to initiate EBP skills training also exists. The McMaster University, a leader in evidence-based nursing practice, currently introduces EBP in the junior year but has considered introducing it earlier (Kessenich et al., 1997; Jenny Ploeg, personal communication, May 4, 2005). The available literature shows that other nursing colleges/universities implement EBP skills in the junior year nursing research course as a stand-alone activity later applied in clinical rotations or as a curriculum thread first introduced in foundational baccalaureate courses (Kessenich et al., 1997; Callister, Matsumura, Lookinland, Mangum, & Loucks, 2005). Interestingly, students who have had EBP introduced in their junior level stated better preparation in finding answers to problems in clinical rotations as seniors (Kessenich et al., 1997). However, students for whom EBP was introduced earlier in the curriculum identified an increased interest in evidence-based nursing practice and research, enhanced critical thinking skills, motivation to continue professional growth and pursue graduate studies, better consumption of research findings, and greater understanding of real world clinical research as benefits of thread-

ing EBP throughout the baccalaureate curriculum (Callister et al., 2005).

Strategies for Evidence-Based Nursing

Based on previous organizational mandates for core competencies (Table 1) and the available literature, it was determined by faculty from the University of Pittsburgh School of Nursing that EBP concepts should be taught earlier in the curriculum. This placement would foster an evidence-based approach to clinical practice, especially because students begin their clinical experiences in the sophomore year. Because nursing research is not taught until the junior year, the faculty proposed using the freshman

TABLE 2. Curriculum for Freshman Students (17 credits)

Fall	Spring
Chemistry for the Health Professions	Microbiology
Human Anatomy and Physiology I	Anatomy and Physiology II
Human Anatomy and Physiology Lab I	Anatomy and Physiology Lab II
English Composition	Life Span Development
Psychology	Nursing Informatics
Art, Music, Creative Expression, or Literature	Introduction to Professional Nursing
Nursing Freshman Seminar	

introductory nursing courses to begin EBP skills development. Faculty teaching these first-year nursing courses met to design a strategy to introduce EBP concepts to first-year nursing students. Two consecutive nursing courses taken during the first year, Nursing Freshman Seminar and Introduction to Professional Nursing, are used as the points of entry to teach the basic concepts and skills of EBP (Table 2).

NURSING FRESHMAN SEMINAR

The Nursing Freshman Seminar course was originally placed in the curriculum to assist students with the transition from high school to college life. A key focus of the course is an introduction to the university's health science library system (HSLs). That segment of the course has been expanded to include the ability to demonstrate a database search. An HSLs librarian introduces students to the various medical and nursing databases. Students are taught techniques to search electronic databases and identify elements of a standard article citation. Students must, in turn, demonstrate that they can access an electronic database (MEDLINE) and search for journal citations using several types of search strategies, including authors, journal titles, and subject headings. Boolean terminology must be used in the search. Students are asked to limit the retrieval of articles to year of publication, journal type (core nursing journals), and article type (research, review). Finally, students are asked to download or print selected citations and obtain the full text of a journal citation. The search skills learned in Freshman Nursing Seminar provide the foundation for the Introduction to Professional Nursing course of the spring term.

INTRODUCTION TO PROFESSIONAL NURSING

The Introduction to Professional Nursing course provides a synthesis of the issues and trends most relevant to nursing practice in today's interdisciplin-

TABLE 3. Objectives for EBP Class

1. Identify the essential characteristics of EBP
2. Discuss the steps to beginning an evidence-based approach to clinical practice
3. Define EBP
4. Distinguish between the traditional approach to answering clinical questions and an EBP approach to addressing clinical questions
5. Delineate the barriers to using evidence
6. Identify strategies that research has shown to be effective in helping clinicians change their practice and incorporate best evidence

TABLE 4. The Five Steps of EBP

1. Ask the burning clinical question in PICO format
P atient Population: How would I describe a group of patients similar to mine?
I ntervention: Which main intervention, prognostic factor, or exposure am I considering?
C omparison: What is the main alternative to compare with the intervention?
O utcome: What can I hope to accomplish, measure, improve, or affect?
2. Collect the best evidence
Cochrane Database of Systemic Reviews
Evidence-based clinical practice guidelines (www.guideline.gov)
3. Critically appraise the evidence
What were the results of the study?
Are the results valid (as close to the truth as possible)?
Will the results help me in caring for my patients?
Seven levels of Hierarchy of Evidence
4. Integrate evidence, clinical expertise, and patient preferences/factors to implement a decision
5. Evaluate the outcome

ary health care environment. Critical thinking strategies are traditionally introduced in this course. Evidence-based practice follows this content.

Lecture Content

The EBP content is presented in two class presentations. At the end of the presentations, students are expected to have the beginning ability to explain the essential characteristics of and the steps to an evidence-based approach to clinical practice. Objectives for the course are presented in Table 3. During the first class, a background of EBP is provided: Students learn definitions of evidence-based medicine and EBP, historical perspectives of EBP, the difference between research utilization and EBP, and the rationale for the use of EBP. The major focus of the first class, however, is ensuring that students are

TABLE 5. Hierarchy of Evidence

Level I	Evidence from a systematic review or meta-analysis of all randomized controlled trials (RCTs) or evidence-based clinical practice guidelines based on systematic reviews of RCTs
Level II	Evidence obtained from at least one well-designed RCT
Level III	Evidence from well-designed controlled trials without randomization
Level IV	Evidence from well-designed case-control or cohort studies
Level V	Evidence from systematic reviews of descriptive and qualitative studies
Level VI	Evidence from a single descriptive or qualitative study
Level VII	Evidence from the opinion of authorities and/or reports of expert committees

introduced to the five steps of EBP (Table 4). As part of these five steps, students learn to ask clinical questions using the PICO format (*p*atient population, *i*ntervention or interest, *c*omparison intervention or group, and *o*utcome) to retrieve the most pertinent and best evidence, are introduced to the Cochrane Database of Systematic Reviews and evidence-based clinical practice guidelines (www.guideline.gov) to collect the best evidence, and learn the seven levels of the hierarchy of evidence (Table 5) as outlined by Melnyk & Overholt-Fineout (2005). A clinical scenario is used to illustrate the five steps of EBP, particularly the integration of evidence and outcome evaluation steps.

Assignment 1

Two assignments are given to students over the two EBP presentations. During the first presentation, students are provided with an exercise, EBP Handwashing Guidelines. The purpose of the assignment is to provide the students with a beginning understanding of the process involved in critically appraising the EBP literature. The assignment (Table 6) consists of a

TABLE 6. Evidence-Based Practice Handwashing Guideline Assignment (20 points)

Activity	Grade
A. Paper	
1. Obtain a copy of and read your assigned article.	5 points
2. Using the systematic review article of Duffy (2005), provide typewritten answers to the following questions. Points will be awarded based on how completely you discuss your answer.	10 points
a. Describe the type of article (i.e., review article or original research)	1 point
b. Does the review address a clearly defined issue? Explain.	1 point
c. Does the review describe the population studied? Explain.	1 point
the intervention studied? Explain.	1 point
the outcome(s) considered? Explain.	1 point
d. Is the review question clearly and explicitly stated? Explain.	1 point
e. Is a summary of findings provided? Explain.	1 point
f. Are specific directives for new research proposed? Explain.	1 point
g. Were the conclusions supported by the reported data? Explain.	1 point
h. Are the recommendations based firmly on the quality of the evidence presented? Explain.	1 point
3. Attach a cover page (1 point) and reference page (1 point) using APA guidelines to your typewritten paper.	2 points
4. Follow guidelines	1 point
B. In-class discussion and presentation	2 points

TABLE 7. Evidence-Based Practice Independent Search Guidelines

Activity	Grade
A. OVID Literature Search (each student will be assigned a topic)	10 points
Use OVID CINAHL or OVID MEDLINE to find articles that address your topic.	
a. After running your search, examine the results and select four relevant citations.	
b. Using the Results Manager within OVID, save your selected citations to a file and print a hard copy. The hard copy must include your search history.	
c. Select one citation and obtain the full-text article.	
B. Paper	10 points
1. Based on the full-text article citation you selected, answer the following questions in a typewritten paper (one-page text).	
a. Describe the key finding(s)	2 points
b. How will you apply the key finding(s) in the skills lab and/or the hospital setting?	2 points
2. Use APA style guidelines to complete your paper.	2 points
3. Attach a hard copy of your search results (including search history).	1 point
4. Attach a copy of the full-text article that you selected.	1 point
5. Follow guidelines.	1 point
6. Observe correct spelling and grammar.	1 point

paper and an in-class discussion and presentation. For the paper, students are asked to read an assigned article and critically appraise it based on a faculty-designed instrument and loosely based on criteria identified by Duffy (2005). Students are to bring their completed review to the following class, where they will work in an assigned group whose members read the same article. Working within their assigned groups, students discuss their reviews and prepare for presentation. The designated presenter from each group provides a 5-minute report to the class. This report covers the results of the collective group reviews and the level of evidence that best fits the assigned article. Flip charts made during the group work are used as visual aids in the presentation.

Assignment 2

The second assignment, EBP Independent Search Guidelines, is designed to provide students with a beginning understanding of the process involved in searching for and appraising EBP literature. The purpose of the exercise is to have students search and retrieve full-text clinical research literature upon which clinical practice is based. The topics were searched in advance by a health sciences librarian who

determined if current full-text literature could be retrieved for each topic by using databases (MEDLINE, CINAHL) and search strategies familiar to novice researchers to increase the likelihood that students are successful in their literature searches.

Each student is assigned a search topic for which he or she must perform an independent MEDLINE search and write a paper (Table 7). Topics are developed in collaboration with the course instructor who identifies areas of interest. These topics address common clinical practices for which an evidence base exists. Assignments include subject matters such as effects of body positioning on blood pressure, white coat hypertension, use of thermometers to measure body temperature in infants and preschoolers, and use of protective clothing to decrease the incidence of nosocomial infections.

For the search, students are instructed to identify keywords for searching CINAHL or MEDLINE. If more than 300 citations appeared, students are asked to limit searches to those published in the English language and within the last 10 years. Students must select four citations, save the relevant citations, and print a hard copy, including the search history. A copy of the full-text article for one citation is to be retrieved. Students must write a one-page paper describing the key findings of this citation and how

these findings could be applied in skills lab or the clinical setting.

In summary, lecture content and class assignments are provided to freshman nursing students so that they may begin to understand the concepts of EBP and perform these skills at a beginning level. Students are taught search strategies in the Freshman Nursing Seminar course and core concepts of EBP in the Introduction to Professional Nursing course. Literature searches and retrievals, critical appraisals, presentations, and papers provide students with guided hands-on EBP skills training.

Evaluation

This is the first year that EBP has been incorporated into the freshman nursing curriculum at the University of Pittsburgh School of Nursing. Albeit early, the introduction of the concepts of EBP and its required skills into established foundational nursing courses has proven to be successful. Students are evaluated on their knowledge of EBP via questions in the final examination and papers and presentations due in class. The outcomes of these measures have shown success in the students' ability to learn basic EBP skills early in the curriculum.

References

- American Association of Colleges of Nursing. (1998). *The essentials of baccalaureate education for professional nursing practice*. Washington, DC: American Association of Colleges of Nursing.
- Beyer, B. K. (1985). Critical thinking: What is it? *Social Education, 49*, 270–276.
- Callister, L. C., Matsumura, G., Lookinland, S., Mangum, S., & Loucks, C. (2005). Inquiry in baccalaureate nursing education: Fostering evidence-based practice. *Journal of Nursing Education, 44*, 59–64.
- Chaboyer, W., Willman, A., Johnson, P., & Stockhausen, L. (2004). Embedding evidence-based practice in a nursing curriculum: A benchmarking project. *Nurse Education in Practice, 4*, 216–223.
- Ciliska, D. K., Pinelli, J., DiCenso, A., & Cullum, K. (2001). Resources to enhance evidence-based nursing practice. *AACN Clinical Issues, 12*, 520–528.
- Committee on Quality Healthcare in America, Institute of Medicine. (1999). In L. T. Kohn, J. M. Corrigan & M. S. Donaldson (Eds.), *To err is human: Building a safer health system*. Washington, DC: National Academy Press.
- Committee on Quality Healthcare in America, Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC: National Academy Press.
- Committee on the Health Professions Education Summit, Institute of Medicine. (2003). In A. C. Greiner, & E. Knebel, (Eds.), *Health professions education: A bridge to quality*. Washington, DC: The National Academies Press.
- Duffy, M. E. (2005). Systematic reviews: Their role and contribution to evidence-based practice. *Clinical Nurse Specialist, 19*, 15–17.
- Estabrooks, C. A., Floyd, J. A., Scott-Findlay, S., O'Leary, K. A., & Gushta, M. (2003). Individual determinants of research utilization: A systematic review. *Journal of Advanced Nursing, 43*, 506–520.
- Estabrooks, C. A., Winther, C., & Derksen, L. (2004). A bibliometric analysis of the research utilization literature in nursing. *Nursing Research, 53*, 293–303.
- Foster, R. L. (2004). Challenges in teaching evidence-based practice. *Journal for Specialists in Pediatric Nursing, 9*, 75–76.
- Hallas, D., & Melnyk, B. M. (2003). Evidence-based practice: The paradigm shift. *Journal of Pediatric Health Care, 17*, 46–49.
- Kessenich, C. R., Guyatt, G. H., & DiCenso, A. (1997). Teaching nursing students evidence-based nursing. *Nurse Educator, 22*, 25–29.

Maher, J. V. (2004). Presentation to the Council of Deans. University of Pittsburgh.

Melnyk, B. M., Fineout-Overholt, E., Feinstein, N. F., Li, H., Small, L., & Wilcox, L., et al. (2004). Nurses' perceived knowledge, beliefs, skills, and needs regarding evidence-based practice: Implications for accelerating the paradigm shift. *Worldviews on Evidence-Based Nursing, 1*, 185–193.

Melnyk, B. M., & Overholt-Fineout, E. (2005). *Evidence-based practice in nursing & healthcare*. Philadelphia: Lippincott Williams & Wilkins.

National Council of State Boards of Nursing. (2003). *NCLEX-RN Examination. Test plan for the National Council Licensure Examination for Registered Nurses*. Chicago, IL: National Council of State Boards of Nursing, Inc.

Pearson, M., & Craig, J. V. (2002). Evidence-based practice in nursing. In J.V. Craig & R. L. Smith, (Eds.), *The evidence-based practice manual for nurses* (pp. 3–20). New York: Churchill Livingstone.

Rambur, B. (1999). Fostering evidence-based practice in nursing education. *Journal of Professional Nursing, 15*, 270–274.

Tanner, C. A. (1999). Evidence-based practice: Research and critical thinking. *Journal of Nursing Education, 38*, 99.

Van Gelder, T. (2005). Teaching critical thinking: Some lessons from cognitive science. *College Teaching, 45*, 1–6.