

Teaching Strategies to Support Evidence-Based Practice

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Evidence-based practice is an expected core competency of all health care clinicians regardless of discipline. Use of evidence-based practice means integrating the best research with clinical expertise and patient values to achieve optimal health outcomes. Evidence-based practice requires nurses to access and appraise evidence rapidly before integrating it into clinical practice. Role modeling and integrating the skills necessary to develop evidence-based practice into clinical and nonclinical courses is an important part in developing positive attitudes toward evidence-based practice, an essential first step to using evidence to guide practice decisions. The step-by-step approach to evidence-based practice proposed by Melnyk and colleagues provides an excellent organizing framework for teaching strategies specifically designed to facilitate nurses' knowledge and skill development in evidence-based practice. (*Critical Care Nurse*. 2012;32[3]:49-54)

Nurses are required to adhere to accepted standards of practice and professional performance. These standards mandate the use of evidence-based interventions and the integration of research findings into practice.¹ According to the American Nurses Association,¹ the science of nursing is based on a critical-thinking framework that serves as the foundation of clinical decision making and evidence-based practice (EBP). The importance of evidence is echoed by the American Association of Critical-Care Nurses,² which calls on nurses to use the best

available evidence, including research findings, to guide practice decisions.

The call for EBP is not limited to nursing. The Institute of Medicine (IOM)³ has included EBP as 1 of 5 core competencies that every health care clinician should have, regardless of his or her discipline, to meet the needs of the 21st-century health care system. As the health arm of the National Academy of Sciences, the IOM advises US decision makers on issues of health and health care, including acute care nursing practice and nursing education.⁴ Collaborators at the IOM Interdisciplinary Health Professions Education Summit³ noted that their vision to educate all health professionals to deliver patient-centered care as part of an interdisciplinary team, emphasizing EBP,

quality improvement approaches, and informatics, had not been incorporated into the basic fabric of the education of health care providers.

As a result of educational deficiencies related to the incorporation of EBP into educational settings, the American Association of Colleges of Nursing,⁵ the association that guides baccalaureate and graduate nursing education curricula, identified "scholarship for evidence-based practice" as an essential of baccalaureate nursing education. At the master's level, the goal of the research component of the curriculum is to prepare clinicians who are proficient in the use of research.⁶ The American Association of Colleges of Nursing has identified research findings as the basis for clinical and organizational decision making at all practice levels. These recommendations are supported by the American Association of Critical-Care Nurses⁷ through the group's advocacy of lifelong learning, inquiry, and critical thinking to enable nurses to make optimal contributions.

In this article, we describe EBP processes and present strategies to integrate EBP into academic nursing education. The strategies can be used by faculty and nursing preceptors

Table 1 Steps in evidence-based practice^a

Step	Description
1	Ask a clinical question
2	Search for the best evidence
3	Critically appraise the evidence
4	Decide to integrate the evidence into practice
5	Evaluate the outcomes

^a Based on information from Fineout-Overholt et al.⁸

who are teaching acute and critical care content in undergraduate and graduate nursing programs.

According to the IOM,³ using EBP means integrating the best research with clinical expertise and patient values to achieve optimum care and participating in learning and research activities to the extent feasible. To achieve the standards outlined by the IOM, the American Nurses Association, and the American Association of Colleges of Nursing, nurses must master competencies

to rapidly access, evaluate, and integrate evidence into professional nursing practice^{8,9} (Table 1).

Many barriers have affected the advancement of EBP. In a 3-state study¹⁰⁻¹² conducted to evaluate rural nurses' access to and use of research in practice, nearly 50% of the respondents reported that research articles are not easily understood, and approximately 20% lacked confidence in their ability to evaluate the quality of research studies (Table 2).

As reported by Melnyk et al,¹¹ nurses who believed they were knowledgeable about EBP were more likely to teach EBP to others, making incorporation of EBP competencies an important element of nursing education.

Integrating EBP Into Acute and Critical Care Academic Nursing Education

In recognition of the importance of integrating research findings into

nursing practice, nursing faculty have used a variety of strategies to integrate EBP concepts into nursing courses, including courses that provide clinical experience in acute and critical care. The steps in the EBP process (Table 1) are used in the following material as an organizing framework.

Cultivate Inquiry

EBP begins by encouraging and fostering a spirit of critical inquiry¹³ and intellectual curiosity about practice in all levels of nursing students. Because undergraduate nursing students have had less exposure to clinical settings, they often ask "how" and "what" questions, making the integration of EBP a natural process in the professional socialization of these future nurses. More advanced students often ask "why" questions, providing faculty members the opportunity to foster intellectual curiosity by encouraging the students to think beyond the obvious and identify alternative explanations to explain patient data. For example, in response to a student's questions about elevated creatine kinase levels in an elderly patient who experienced a traumatic crush injury, students in the class can be asked to identify 3 potential reasons to explain the elevation. Encouraging this kind of exploration encourages students to look for explanations beyond the obvious and facilitates a spirit of inquiry.

Ask a Clinical Question

Teaching students to frame clinical questions in the PICOT format¹⁴ (Table 3), a mnemonic used to describe the 5 elements of a good clinical question, will help the students clarify the key elements of the

Table 2 Barriers to evidence-based practice^a

Inadequate knowledge, beliefs, and skills related to evidence-based practice
Lack of training in informatics that enables easy access to the literature
Professional education programs that focus on the conduct of research instead of the process of evidence-based practice
Research articles that are not easily understood by nonresearchers
Lack of skills in critical appraisal of evidence

^a Based on information from O'Lynn et al¹⁰ and Melnyk et al.^{11,12}

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Table 3 PICOT format for clinical questions: simple to complex^a

Mnemonic	Examples
P: Population of interest I: Intervention or area of interest C: Comparison intervention or group O: Outcome T: Time	In full-term infants with signs of respiratory distress (P), which interventions (I) are considered initial stabilization maneuvers (T)?
	In children after aortic valve repair (P), how effective is as-needed dosing of pain medication (I) in controlling pain (O) immediately after surgery (T)?
	In men and women (P) admitted to the intensive care unit, do earplugs (I) or headphones (C) improve self-perceived quality of sleep (O)?
	In women after percutaneous coronary intervention (P), are written educational materials on cardiac risk reduction (I) as effective as electronic educational materials, such as videotapes and DVDs (C) on knowledge of cardiac risk factors (O) at 3 months (T)?
	In adult patients after myocardial infarction (P), is music therapy (I) or relaxation therapy (C) more effective than other interventions in decreasing stress (O) (apical heart rate, peripheral temperature, and self-reported evaluative data) immediately after the infarction (T)?

^a Based on information from Melnyk and Fineout-Overholt.¹⁴

question. These key elements can then be used as search terms to find empirical evidence in a variety of databases. Table 3 includes examples of PICOT questions of increasing complexity.

Search for the Best Evidence

A common strategy used by nursing faculty is to require students to find empirical evidence that identifies and supports nursing interventions implemented during clinical experiences. For example, a student assigned to a critical care nursing preceptor was caring for a patient with an intra-aortic

balloon pump. The clinical instructor encouraged the student to find evidence in journal articles and other sources that discussed the indications for and potential complications of this therapy, which could then be used to guide nursing interventions for the plan of care. On the basis of findings from the literature and knowledge gleaned from discussions with experienced critical care nurses, the student confirmed the indications supporting the use of an intra-aortic balloon pump and identified monitoring the

patient's hourly urine output, peripheral pulses, insertion site, hemodynamic parameters, and neurological status as important assessment interventions.^{15,16} Encouraging the student and preceptor to share these results with the other students during postclinical conferences provided an opportunity to discuss the nursing interventions, levels of evidence, and the quality of resources used to gather the information^{17,18} (Table 4). Including the preceptor in the discussion with the nursing students acknowledges the preceptor's

Table 4 Levels of evidence and evaluation of resources

	Levels of evidence ^a	Evaluation criteria ^b
A	Meta-analysis of multiple controlled studies or meta-synthesis of qualitative studies with results that consistently support a specific action, intervention, or treatment	Accuracy
B	Well-designed controlled studies, both randomized and nonrandomized, with results that consistently support a specific action, intervention, or treatment	Authority/Author credentials and expertise
C	Qualitative studies, descriptive or correlational studies, integrative reviews, systematic reviews, or randomized controlled trials with inconsistent results	Currentness/Clinical applicability
D	Peer-reviewed professional organizational standards, with clinical studies to support recommendations Theory-based evidence from expert opinion	Scope of coverage
E	Theory-based evidence from expert opinion or multiple case reports	Objectivity
M	Manufacturers' recommendations only	

^a Based on information from Armola et al.¹⁷

^b Based on information from Hendrickx and Winters.¹⁸

expertise, engages him or her in the EBP process, and provides a role model of collegial collaboration and patient care planning practices.

Looking for empirical evidence is enhanced when the skills needed to effectively access and search the literature are introduced early in the nursing curriculum and are integrated into each nursing course. Important resources to provide students include orientation to library services; contact information for the designated reference librarian for their college or school of nursing and medical center; introduction to commonly used online databases, such as PubMed; and strategies for effective literature searches. Accessing and retrieving information to promote EBP is best accomplished when active, hands-on experiences that encourage critical appraisal are provided as part of the learning process.^{19,20} As part of the learning process, faculty may want to require students to complete the online tutorial on searching PubMed, the National Library of Medicine journal literature search system. The program can be found online at the National Library of Medicine website.²¹

Critically Appraise the Evidence

Although nursing students may excel at identifying clinical questions, they usually require guidance from nursing faculty and preceptors to answer the questions. Faculty members who recognize that nursing students need guidance in the critical appraisal of evidence often weave opportunities to hone this skill throughout the students' courses. Critical appraisal involves assessing and interpreting evidence by systematically considering the validity

(truthfulness) and usefulness (clinical applicability) of the evidence to a particular context.²² Useful critical appraisal tools can be obtained online from the Centre for Evidence Based Medicine²³ at the University of Oxford in the United Kingdom. In a world where answers to questions are a few computer keystrokes away and online resources such as Google and Wikipedia provide instant information, evaluation of sources is important to ensure validity of the information used to guide nursing practice.^{18,20} Wikipedia is a free online encyclopedia that anyone can update. Examining these and other online resources for accuracy, authority, currentness, scope of coverage, and objectivity is imperative.¹⁸

Appraisal of information should be integrated throughout the teaching-learning environment in classroom and clinical courses. Nursing faculty can act as role models of this behavior by including a "focus on EBP" section for each content area covered in class. Research articles and practice guidelines can be assigned as readings to augment classroom learning. Faculty members can use the results from research studies and recommendations from practice guidelines as a foundation for discussions of the applicability and relationship of the material to the students' clinical experiences. The National Guideline Clearinghouse²⁴ is an excellent online source for EBP guidelines, syntheses, and expert commentary.

Integrate the Evidence With Clinical Expertise, Patient Preference, and Values

Opportunities to reinforce EBP often occur during clinical experi-

ences. **Clinical conferences provide students with time to discuss situations in which "real world" practice is seemingly incongruent with classroom teaching.** For example, a nursing student shared that he was asked by a new staff member to "strip" a patient's chest tube to prevent obstruction and the buildup of drainage fluid in the pleural space. The clinical instructor was able to use reference to this outdated practice as an opportunity for the students to discuss their clinical experiences and knowledge and review current evidence on the topic. After the discussion, the student who brought up this topic was able to share his knowledge with the new staff member.

Other strategies used by clinical faculty include asking students to identify hospital policies that could be updated to be consistent with current evidence-based guidelines or to compare standing order sets and protocols with current information by using EBP skills. Collaborating with clinical managers to hold joint journal club meetings of students, faculty, and staff from several disciplines is a good way to discuss clinical experiences, practice-based articles, reports of research studies, and newly published clinical guidelines in a stimulating environment.

Evaluate the Outcome

In the clinical setting, faculty and preceptors should call students' attention to the importance of monitoring, evaluating, and reporting the outcome of the students' interventions. This interaction is especially important when supervising students at the beginning of their clinical rotations and when they are moving to new clinical areas and populations

of patients. Did the intervention have the expected effect? Was the outcome consistent with results noted in previous clinical experiences and in the literature? If not, what may account for the discrepancy? What changes, if any, need to be made to achieve the intended results? These questions will yield important information to share with the clinical faculty, preceptor, and peers.

In the classroom, problem-based learning strategies can be implemented to cultivate critical thinking and EBP.²⁵ Using scenarios from clinical practice, students can develop clinical questions; collect information from a variety of sources, including clinical experiences, encounters with patients, and peer-reviewed journals, to answer questions; evaluate the strength and relevance of the evidence; and apply and integrate this information with previously learned knowledge. Problem-based learning strategies are useful for encouraging learning of complex critical care concepts that may initially seem overwhelming for nursing students. Faculty can collaborate with critical care nurses to develop case studies that encourage students to actively explore topics, including hemodynamic monitoring; mechanical ventilation; and nursing care of patients with acute lung injury, sepsis, myocardial infarction, and chest or head trauma. The processes used in problem-based learning and EBP

have many similarities, encouraging a smoother transition from classroom to practice.²⁵⁻²⁷

At the graduate level, students in advanced practice nursing courses often use clinical journals to promote critical thinking and EBP. Barksdale and Nasir²⁸ described how this learning tool is integrated into the education of the students. The students complete clinical journals that outline the management of actual patients seen during the students' rotations. Using references on current EBP, students describe the applicability of the evidence to the plan of care for each patient. This assignment uses reflection to encourage deliberate application of theory into practice and allows faculty members an opportunity to evaluate and provide feedback, further ingraining the learning process.

Shifting focus from traditional undergraduate and master's level nursing research courses that prepare nurses to generate new knowledge to a focus on the use of evidence to improve clinical practice will provide support for the development of EBP. Faculty members who teach these courses may want to progress from a lecture format to a format that requires students to participate in ongoing research and EBP projects. These activities can take many forms, such as joining an existing research team for the semester and completing a discrete project such as a literature search; working side-by-side with the study's research assistants to collect clinical data; or assisting the principal investigator with data analysis. Another example is to involve students in an ongoing quality improvement project being conducted at a local health care

agency. Last, with a faculty member serving as a mentor, students could take responsibility for a clinical project identified as a priority by one of the community's acute or critical care nursing directors. In each instance, class time could include discussing these activities and problem solving real-world issues faced during implementation of the project.

Disseminate the Results

An important part of EBP projects is to provide an opportunity for dissemination of the students' work. The results of unit-focused activities can be shared with nurses during staff meetings and during annual competency day events at the student's clinical sites. The outcomes of other opportunities can be disseminated via poster presentations at local conferences and university-wide events that focus on students' scholarship. EBP projects, such as the examples described earlier, provide students with the opportunity to begin building the necessary skills needed to effectively integrate EBP into their future nursing practice, whether they work at the bedside or in formal leadership roles.

Putting It All Together

A variety of teaching strategies and curricular approaches can be used to prepare nursing students with competencies to support EBP. A common thread in many of these approaches is having faculty members and clinical mentors act as role models of these skills.

Faculty members can teach by example. Education does not occur in a vacuum and much of what is



To learn more about evidence-based practice, read "Inside Looking In' or 'Inside Looking Out'? How Leaders Shape Cultures Equipped for Evidence-Based Practice" by Margo Halm in the *American Journal of Critical Care*, 2010;19(3):375-378. Available at www.ajconline.org.

learned comes from observed behavior, interactions, and the norms of the learning environment.⁵ Lack of value for research in practice has been identified as a key barrier to EBP.²⁹ Integrating the skills necessary to develop EBP into clinical and nonclinical courses and acting as a role model of what is taught in the classroom and the clinical unit is an important part in developing positive attitudes toward EBP.

According to the IOM,³⁰ patients should receive care based on the best available scientific knowledge, and although individual patient preferences and resources should be considered, care should not vary illogically from clinician to clinician or from place to place. The IOM identified the use of EBP as 1 of 5 essential core competencies for health care educational programs. Three important nursing organizations—the American Nurses Association, the American Association of Colleges of Nursing, and the American Association of Critical-Care Nurses—concur that all nurses should practice from an evidence base. Teaching undergraduate and graduate students the processes and skills necessary to access, appraise, and integrate evidence into practice is essential to professional nursing in the 21st century. **CCN**

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