

Developing Research Competence to Support Evidence-Based Practice

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This article describes one step in the process that was undertaken to prepare for the introduction of evidence-based practice (EBP) into the curriculum across the Bachelor of Science in Nursing, Master of Science in Nursing, and Doctor of Philosophy programs, as well as the programs that were under development, Clinical Nurse Leader and Doctor of Nursing Practice, at the University of Pittsburgh School of Nursing. Expected research competencies were identified for each level or academic year within each program. Based on these competencies, recommendations on how to modify the curriculum into one that would support students' acquisition and development of the skills necessary to be successful in matriculating through an EBP curriculum were developed. Evaluation mechanisms for the achievement of these competencies vary across the academic programs and will include performance on capstone projects, comprehensive examinations, and program milestones for doctoral students. The establishment of evidence-based competencies provided a foundation for the development of new teaching approaches and the curricular revisions across the three academic programs. Thus, the University of Pittsburgh model of educating for EBP is based on a sequential layering of research competencies throughout the curriculum. (Index words: Curriculum; Evidence-based practice; Nursing; Research competencies) *J Prof Nurs* 21:358–363, 2005 © 2005 Elsevier Inc. All rights reserved.

THE TERM “EVIDENCE-BASED practice” (EBP) was introduced more than a decade ago (Rosenberg & Donald, 1995). Since then, a plethora of literature advocating the use of recent evidence on which to base clinical decisions has become available. In addition, influential organizations such as the Institute of Medicine have advocated the use of EBP in landmark documents (e.g., the Committee on Quality of Health Care in America's publication, *Crossing the Quality Chasm: A New Health System for the 21st Century*, Institute of Medicine, 2001). However, before this shift in clinical practice can occur, approaches to the educational preparation of health care professionals need to be modified. The current model of nursing education promotes teaching students the research process rather than research-based practice (Klassen, Karshmer, & Lile, 2002). Fortunately, several schools of nursing have taken the lead and have implemented EBP in their curricula.

The above-described model of nursing education was in existence at the University of Pittsburgh School of Nursing when its dean formed a task force to develop research-based competencies in preparation for the introduction of EBP into the curriculum across the three levels of academic programs that were in existence: Bachelor of Science in Nursing (BSN), Master of Science in Nursing (MSN), and Doctor of Philosophy (PhD), as well as the two programs that were under development, Clinical Nurse Leader (CNL) and Doctor of Nursing Practice (DNP). The purpose of this article is to describe the evidence-based research competencies that were developed, which required a review of the existing research curriculum and the development of recommendations on how to alter the curriculum into one that would facilitate the development of the EBP-related research competencies.

Background

Traditionally, the teaching of research in nursing curricula has focused on the research process—on

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the design and conduct of research—rather than on the appraisal and application of research findings. At the undergraduate and master's levels, research has been taught in isolation from other courses, failing to have students apply the content within other courses, particularly in the clinical arena. As a result, students at both the undergraduate and master's levels often complain that they do not see the relevance of research in their other courses or in their practice. If a graduate student conducted a study for a master's thesis, it reinforced the application of the research process and conduct of research. However, these studies often did not add to the body of knowledge or change practice because of their limited design and sample size, as well as limited dissemination. More recently, the use of faculty resources to support the conduct of research has been restricted to doctoral-level students. At the same time, master's-level curricula added research practical courses to replace thesis requirements. However, these courses have focused on providing students with a hands-on experience in the conduct of research rather than research application or use in practice. Although a few students developed an enthusiasm for the conduct of research and consideration of further graduate studies as a result of the practicum experience, most did not. In recent years, there has been a shift toward the didactic research courses, including critiquing exercises and replacing the traditional research proposal with the development of a clinical protocol. However, the evolution from a framework of conducting research to one that includes the evaluation of evidence for use of research in practice has been slow.

In summary, traditional approaches to teaching research have resulted in a pervasive lack of appreciation of the value of research among many students at the undergraduate and master's levels—an attitude that was likely caused by the strong clinical focus in the curriculum, the earlier approach to teaching the research process more than use of research findings, and the fact that use of evidence is not always valued in the clinical settings in which students and faculty practice. The introduction of an EBP curriculum represents a paradigm shift that is long overdue.

Development of Evidence-Based Competencies

The school of nursing task force received its charge early in the fall term of the 2004 academic year and proceeded to intensely review academic programs. This review was followed by a very iterative process in

TABLE 1. Level-Specific Competencies Expected of EBP

Year	Competencies
BSN	
Year 1	Demonstrate beginning competence in accessing appropriate and relevant information
Year 2	Demonstrate beginning competence in accessing research-based evidence relevant to identified clinical problems
Year 3	Critically appraise research evidence to apply findings to clinical practice Select appropriate clinical problems
Year 4	Read and evaluate research reports and data-based articles, synthesize findings, and evaluate their applicability to practice
MSN	
	Read and critically appraise data-based literature Synthesize findings and evaluate their applicability to practice Critically evaluate treatment guidelines
CNL	
DNP	
	Demonstrate skills necessary to design and implement an evidence-based clinical protocol (capstone project) Demonstrate competencies as designated by the American Association of Colleges of Nursing (pending)
PhD	
Upon successful completion of the PhD preliminary examination	Demonstrate the ability to critically appraise research and propose alternate designs
Upon successful completion of the PhD overview and comprehensive examination	Plan independent, original research with guidance from dissertation committee members Integrate research findings in a particular topic area Identify gaps in the literature to substantiate the significance of proposed research
Upon completion of the PhD program	Read and critically evaluate the literature, synthesize the literature, and determine where the next level of evidence is needed when addressing a problem Conduct independent, original research to provide the evidence for practice Disseminate research findings/knowledge gained

TABLE 2. Level-Specific Expected EBP-Related Research Competencies for Master's-Level Programs

Program	Competencies
Advanced Specialty Role: Administration	Promote the milieu to facilitate EBP for health care delivery Critically appraise relevant evidence-based literature and apply administrative processes in clinical settings Contribute to the evidence for improving patient outcomes and health care delivery
Advanced Specialty Role: Education	Examine and critique educational processes from an EBP perspective; train students in the methods of EBP and how to teach these processes to others Apply techniques of program evaluation research in a wide variety of educational settings and content areas; design research to evaluate learning effectiveness and identify appropriate learning outcomes; design research to test remediation effectiveness; design basic research to examine cognition and perception with applications to nursing and health sciences; demonstrate beginning applied skills in testing, measurement, and foundational psychometrics Design research to examine facets of critical thinking with applications to nursing and health sciences; demonstrate skills to critically evaluate empirical studies, including quantitative, qualitative, and mixed-methods studies, with a practical emphasis on the interpretation of results and application of findings to nursing education contexts
Advanced Specialty Role: Informatics	Consult in the design or enhancement of integrated clinical information, management, and research systems Analyze the impact of information systems on clinical outcomes and quality of care Interpret relevant law, health policy, and evidence-based literature affecting computerized information management in health care Collect data and identify research questions related to nursing informatics practice Support the integration of standardized nursing language to support the retrieval of nursing data Analyze the capability of information technology to support programs of data integrity and security

TABLE 2. Continued

Program	Competencies
Advanced Specialty Role: Research	Critically appraise clinical research in selected areas Apply research principles and methods to the management of clinical research studies Coordinate research studies following federal guidelines and good clinical practice
CNL	Demonstrate the skills necessary to design and implement a quality improvement project Be able to demonstrate competencies as designated by the American Association of Colleges of Nursing (competencies still pending)

which the task force developed recommendations for competencies across the academic programs, from BSN to PhD, with a focus on constructing competencies that build on previous levels of education and skill achievement and considered the potential role of nurses following each level of education. The task force presented these recommendations at academic department and program council meetings for review and feedback. Each body provided feedback, and the task force responded with revisions to address their concerns; the revised competencies were again taken to the same bodies for review and feedback. The entire faculty voted to accept the research competencies in May 2005. These evidence-based research competencies by program are shown in [Tables 1 and 2](#).

It should be noted that the University of Pittsburgh undergraduate program is based on a 4-year curriculum rather than on a 2-plus-2 curriculum. Thus, the development of competencies began with the freshman year, the first year in nursing. We believe that the sequencing of competencies and the ultimate set of competencies would be relevant for 2-plus-2 programs as well, but the time devoted to any of the competencies might be shortened. A discussion of the specific competencies follows.

Undergraduate-Level Competencies

Freshman undergraduate students are not yet clinically focused; therefore, they should be able to demonstrate beginning competence in accessing appropriate relevant information. The focus in the

first year of courses should be on developing literature searching skills so that students will begin to become competent in accessing and applying relevant findings in the literature. In the sophomore year, where clinical rotations begin in the spring term, students should be able to demonstrate beginning competence in accessing research-based evidence relevant to identified clinical problems. Faculty assist students in identifying clinical problems through selected case examples in which students are then required to search for evidence related to clinical problems presented in an exemplar case, thereby refining literature searching and problem identification skills. Having completed the basic statistics and research courses in the sophomore year, junior students should be able to critically appraise research evidence to apply findings to clinical practice. They also should be able to select appropriate clinical problems, search for the evidence related to the specific problem, and then critically appraise the evidence. Students at the junior level have enough clinical exposure to pose basic questions and have had the coursework to be able to critique or appraise the evidence. Students in the senior year are expected to demonstrate increased competence in critically appraising research reports and data-based articles, synthesizing findings, and evaluating their applicability to practice.

Students will develop these competencies through numerous opportunities to search and appraise research literature in the undergraduate curriculum. Evaluation of student achievement of these competencies will be assessed throughout the clinical and research courses. Student performance on a synthesis paper that is required in their senior year will be a good indicator of their success in developing these competencies.

Master of Science in Nursing-Level Competencies

Master's-level students have varied experiential and educational backgrounds; however, at the completion of their coursework, they need to achieve the same level of competencies. They are expected to ask multilayered clinical questions, to have more extensive skills in accessing and searching the literature for the evidence, and to then read and critically appraise the data-based literature. At this level, students are expected to move from the focus on an individual patient to a broader

application of the clinical problem by reviewing and developing clinical protocols. Master of Science in Nursing students are expected to critically appraise evidence-based treatment guidelines and determine their applicability to a specific clinical population (e.g., the standard guidelines for cardiac rehabilitation, [Agency for Health Care Policy and Research, 1995](#)). Moreover, the students are expected to review the literature when there are no treatment guidelines developed because of insufficient evidence (e.g., the recommendation of daily aspirin for the prevention of a coronary event in women).

The current MSN programs at the school of nursing include five nurse practitioner concentrations (acute care, adult, family, pediatric, and psychiatric primary care), clinical nurse specialist preparation in adult medical/surgical nursing and psychiatric/mental health nursing, nurse anesthesia, and four advanced specialist roles (administration, education, informatics, and research). Applicants to the current MSN programs are required to have completed a prerequisite statistics course with at least three credits. However, it was recommended that a master's-level statistics course that would be a prerequisite to the research courses be added to facilitate the development of the research competencies. A similar recommendation was simultaneously made by the DNP Curriculum Task Force, which also suggested that the statistics content be applicable to nursing practice.

Evidence-based, practice-related expected research competencies for MSN graduates are shown in [Table 1](#). In cooperation with the coordinators of each of the advanced specialist role programs, the task force developed additional EBP-related expected competencies for each of these tracks. These competencies are shown in [Table 2](#).

Achievement of these competencies will be evaluated throughout the MSN curriculum. The students who are pursuing the CNL program will be required to complete a three-credit capstone course. All students must complete the comprehensive examination, which will be another indicator of their success in developing the research competencies identified for this level.

Doctor of Nursing Practice-Level Competencies

[Table 1](#) shows two competencies for DNP-level students: to demonstrate skills necessary to design and implement an evidence-based clinical protocol

and to demonstrate competencies that will be designated by the American Association of Colleges of Nursing. The second competence will be evaluated through the design and implementation of an evidence-based clinical protocol, which will be part of a three-credit capstone course. A comprehensive examination with a component covering critical appraisal of clinical research and evaluation of its applicability to practice will be considered for a second means of evaluating the achievement of the DNP-level competencies.

Doctor of Philosophy-Level Competencies

The objectives of the PhD program remain to be the generation of new knowledge and preparation and development of independent researchers. There are multiple entry points to the PhD program (i.e., BSN to PhD and MSN to PhD). However, the students who enter PhD study after the completion of their baccalaureate program will be expected to meet master's-level research competencies through targeted methodological and statistical coursework. [Table 1](#) identifies milestones in the PhD program with corresponding research competencies (e.g., demonstrate the ability to critically appraise research and propose alternate designs upon completion of the PhD preliminary examination).

Throughout their program, PhD students are expected to critically appraise the literature and to incorporate appropriate scientific evidence into the planning and conduct of their original research. They should also be able to identify gaps in the literature to substantiate the significance of the proposed research. The task force underscored the continued use of EBP teaching in the didactic courses taught (i.e., providing sources and levels of evidence in classroom discussions). Upon completion of the PhD program, graduates will be able to determine where the next level of evidence is needed when addressing a problem, conduct independent, original research to provide the evidence for practice, and disseminate research findings/knowledge gained.

General Recommendations to Support EBP Competencies

Acceptance of the competencies by the faculty dictated curricular revision and development of new approaches to teaching, as well as the development of

new critical appraisal tools, which is currently an ongoing process. It also required the recognition that faculty need to rely more on the use of the current evidence-based literature and less on the use of standard textbooks to develop critical appraisal skills in students. Moreover, it required a philosophical shift in the approach to teaching; that faculty teach students how to search for evidence rather than provide them with evidence. Finally, these approaches and content need to be incorporated into all courses. The idea of basing practice on evidence becomes pervasive in the curriculum.

Summary and Conclusions

The task force approached the introduction of EBP into the school's curriculum by first establishing the evidence-based competencies that were expected across the three academic levels. These competencies provide the foundation for curricular revisions and development of new teaching methods that are currently underway. The task force's development of the evidence-based competencies and review of the research curriculum in preparation for introducing EBP occurred concurrently with two other curriculum reviews by two additional school of nursing task forces. These included the CNL Curriculum Task Force and the DNP Curriculum Task Force. In retrospect, this was an efficient process because the educational programs offered by the school of nursing were viewed as a continuum and from multiple perspectives and permitted the task force to develop the layers of competencies on which they could build as students progress in their educational programs. To continue the momentum gained through the processes described in this article, school of nursing faculty are using the established competencies as a basis on which to develop new approaches to teaching literature searching skills, develop critical appraisal tools, and revise the research courses.

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References

Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC: National Academies Press.

Klassen, P. G., Karshmer, J. F., & Lile, J. L. (2002). Research-based practice: Applying the standard in nursing education. *Journal of Nursing Education, 41*, 121-124.

Agency for Health Care Policy and Research. (1995). *Cardiac rehabilitation—Clinical guidelines*. Bethesda, MD: Author.

Rosenberg, W., & Donald, A. (1995). Evidence-based medicine: An approach to clinical problem-solving. *British Medical Journal, 310*, 1122-1126.