The application of research findings to practice is critical for improving patients’ outcomes and for ensuring that nursing practice is both cost-efficient and effective. Unfortunately, research findings that clearly should be used are not always implemented, a fact termed the “research-practice gap.” In 2000, as a result of the interest of staff nurses in establishing evidence-based practice, nurses from 7 adult critical care units at the University of California Davis Health System, Sacramento, Calif, began discussions on how to implement such a practice. A critical care research utilization committee was formed with representation from each of the adult critical care units, the emergency department, and the postanesthesia care unit. This committee was responsible for reviewing and revising each critical care policy and procedure on the basis of the best available evidence. The impetus for this project was a concern that current policies and procedures were, in part, based on tradition rather than on science and did not always reflect rapid changes in critical care, including use of new equipment, new treatments, and new findings. This project produced a number of beneficial outcomes. Policies and procedures were revised on the basis of scientific evidence, new research questions were generated on the basis of gaps in the literature, and the number of clinical nurses involved in using research to improve practice increased. (American Journal of Critical Care. 2003;12:361-366)
tice, is a critical step in improving nursing care and ultimately patients’ outcomes.7

We describe how research utilization was implemented in the critical care units of the University of California Davis Health System in Sacramento. Specifically, we review barriers related to the implementation of research utilization, describe a process for using research findings to guide practice, and discuss overcoming barriers to research utilization.

Barriers to the Use of Nursing Research

Although research in nursing dates to Florence Nightingale, nurses have historically relied on sources of knowledge other than research to guide practice. Despite the endeavors of Nightingale, nursing research has evolved slowly. It was not until the 1970s that nursing research began to focus primarily on clinical practice and the improvement of patients’ care.8

Notwithstanding improvements in clinical nursing research and the high priority placed on using the findings to improve clinical practice, implementation of findings at the bedside has been limited.9 Finding ways to implement research findings within the service setting is difficult, and several barriers to the use of research findings exist.10 The 3 most commonly cited ones10 are

1. lack of knowledge about nursing research,
2. lack of institutional support, and
3. limited research findings applicable to nursing practice.

Nurses’ lack of knowledge and negative attitudes about nursing research are among the most significant barriers to the use of research findings. Criticisms relative to nursing research include the following10:

• research findings are communicated to other researchers, not to practitioners;
• findings often cannot be used in clinical practice;
• findings are not expressed in terms understood by practitioners; and
• practitioners do not know how to apply research findings.

Learning to read and critique the literature is a crucial step in research utilization.4 Many practicing nurses have not been prepared by the educational system to critically read and synthesize research findings.10 In a survey of approximately 2000 nurses, lack of awareness of research findings, the need for advanced education, and limitations in the research knowledge base were listed as the primary barriers to research utilization.10

Another barrier to the implementation of research findings is a perceived lack of institutional support.9 Institutional support includes

• adequate library facilities, including access to nursing research journals;
• time for staff nurses to read research and attend research conferences;
• responsibility and accountability for nurses to change nursing practice; and
• administrative support, including financial assistance for meetings, committee work, and attending conferences.

Although these resources entail expenditures not generally included in most nursing budgets, significant cost savings may be realized with the implementation of changes in nursing care that are based on research findings.4

The third most cited barrier to research utilization is the lack of nursing research applicable to clinical practice. Many nursing studies rely on nonrandom samples with small sample sizes that are insufficient for making decisions about practice. For research to be ready for application to clinical practice, replication is needed.10 In addition, research findings are generally communicated via research journals rather than practice journals and may not be readily accessible to practitioners.10

Research utilization involves critically appraising research findings for applicability to clinical practice, determining the need for changes in nursing practice, and implementing the changes.4 Overcoming the barriers is an essential first step for integrating research into the practice setting. The following approach for implementing research findings has been used with great success at the University of California Davis Health Center.

Implementing Evidence-Based Practice in Critical Care

In 2000, as a result of the interest of staff nurses in establishing evidence-based practice, nurses from 7 adult critical care units at the University of California Davis Health Center began discussions on how to implement such practice. These nurses asked the following questions:

• When examining practice, what guidelines do nurses rely on?
• How do novice nurses learn what to do when faced with a new challenge?
• What standards guide nursing practice?

Answering these questions led to the policies and procedures developed for the intensive care units and the process used to review and revise the policies and procedures. To begin the process of using research findings to improve practice, the nurses decided to begin with the written policies and procedures for the facility. This decision led to the formation of the Critical Care Research Utilization Committee.
Establishment of the Committee

The Critical Care Research Utilization Committee was initially formed by clinical nurses committed to evidence-based practice. One or two nurses from each of 7 adult critical care units and the emergency department were recruited to participate in this project. Participants were selected on the basis of their commitment to research utilization and their clinical expertise. In addition, because of the time required to become comfortable reading and critiquing the literature, participants agreed to remain on the committee for a minimum of 2 years.

The goal of the committee was to ensure that, when possible, all critical care procedures were based on the best evidence available. The impetus for this project was a concern that current policies and procedures were, in part, based on tradition rather than on science and did not always reflect rapid changes in critical care, including use of new equipment, new treatments, and new findings.

During the initial meetings, it became apparent that although the committee was composed of clinical experts—most members had 10 to 12 years of nursing experience, CCRN certification, and/or designation as a unit-based educator—the members were not familiar with searching the literature or with the criteria for critiquing research findings. Educational preparation of committee members varied from associate degree to doctoral degree.

On the basis of the educational needs identified by committee members, nurse researchers in the Center for Nursing Research taught a series of classes on literature review and critique. The Center for Nursing Research is a department within the hospital; its primary role is to assist with the implementation of evidence-based practice in nursing. The center’s staff consists of 3 nurses with doctorates who serve as a resource to nurses interested in any aspect of nursing research, from locating research data to applying research findings to practice to conducting research. Although primarily responsible for assisting nurses in the Davis Health System, researchers in the center also meet with graduate students from throughout the Sacramento area who are interested in conducting clinical research. One of the researchers, who has a background in critical care, is a member of the Critical Care Research Utilization Committee.

The Critical Care Research Utilization Committee is now made up of 12 nurses who provide critical care for adults. Members of the committee review and critique the literature, compare research findings with current practice, and make changes in the policies and procedures as needed. On average, committee members spend approximately 12 hours per month in these activities. In addition, the committee meets as a whole twice a month for 2 hours. During these meetings, research findings are presented, changes in policies and procedures are discussed, and revisions in policies and procedures are made and approved. For each procedure, the process may take several months, depending on the complexity of the procedure and the quality and quantity of literature available.

Because the committee was to review every critical care policy and procedure, the first procedures selected for review were based on the recommendations and interests of committee members. The committee was concerned that if the group had little or no interest in the first procedures reviewed, enthusiasm for the process would suffer and initial efforts would not be successful. Currently, procedures are reviewed on the basis of recommendations from the administration, changes in practice such as the implementation of new medical procedures that affect nursing care, and/or identification of problems at the staff level. Assignments are based primarily on the interests and expertise of the members of the smaller subcommittees (see following).

The Process

Because having all 12 members of the research utilization committee review each policy and procedure is inefficient, the members decided to form smaller subcommittees for work on specific procedures. Subcommittees, varying in size from 2 to 6 members, are formed on the basis of the complexity of the procedures under review and the expertise of the committee members. For example, a subcommittee might consist of nurses from the burn unit, the surgical intensive care unit, and the emergency department. This subcommittee would then be charged with reviewing procedures on care of trauma patients or care of wounds. With the institution of smaller subcommittees, anywhere from 2 to 4 policies are under review at any time.

After being assigned the procedure to be reviewed, committee members do an extensive review of the literature. When the research utilization committee was first started, members would brainstorm possible search terms to be used in the literature search. The purpose of the brainstorming was to help committee members who were unfamiliar with the use of electronic databases. For example, for research on tracheostomy care, search terms might include any combination of the following: tracheostomy, complications, inner cannula, pneumonia. As members gained experience and became more comfortable searching...
Levels of evidence

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Randomized, prospective, controlled investigations&lt;br&gt;Meta-analysis</td>
</tr>
<tr>
<td>2</td>
<td>Nonrandomized, concurrent or historical cohort investigations</td>
</tr>
<tr>
<td>3</td>
<td>Theory based, expert consensus group</td>
</tr>
<tr>
<td>4</td>
<td>Peer-reviewed state-of-the-art articles, review articles</td>
</tr>
<tr>
<td>5</td>
<td>Non–peer-reviewed published opinions&lt;br&gt;(textbooks, organizational publications, manufacturers’ recommendations)</td>
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the literature, they were able to identify appropriate search terms independently.

Depending on the volume of research found, members divide the reading into manageable amounts (2-3 articles per member), or each member of the group may decide to read all available literature. The number of articles reviewed varies, depending on the amount of research that has been reported. For example, the literature search for information on care of patients who have lumbar drains after surgery for repair of thoracoabdominal aortic aneurysm yielded a total of 10 potentially suitable research-based articles. On the other hand, in a literature search on care of patients who require emergent thoracotomy and internal cardiac defibrillation, no research-based articles were found. In the beginning, every member of the committee read every article, and then the committee met to discuss and critique the findings. Now, most members are comfortable reading and critiquing the literature independently. As new members join the group, additional assistance is provided by both the members of the group and the clinical nurse researcher.

As the committee began to critique the literature, it was determined that a method of ranking the different types of evidence was needed. The members decided that each reference would be rated as to its research merit and applicability to nursing practice. The evidence guidelines of the American Association of Critical-Care Nurses and the Agency for Healthcare Research and Quality were reviewed and discussed. Neither of the guidelines was considered appropriate, primarily because of the need to include manufacturer’s recommendations and expert opinion when current research was lacking and no other guidelines were available on which to base practice. As a result, the committee developed ratings of the levels of evidence (see Table). A rating of 1 indicates the highest quality of evidence, such as that from controlled clinical trials or meta-analysis, whereas a rating of 5 indicates the lowest level of evidence, such as that from manufacturer’s recommendations.

In order to help anyone reading a policy or procedure determine the strength of evidence used to guide the development of the policy or procedure, a list of relevant articles rated according to the levels of evidence and a key describing the ratings are included at the end of each policy or procedure. In addition, including the list and key provides the committee a mechanism for determining if enough evidence exists to support change and provides nurses information on the scientific basis for the procedures they use in practice.

After reading and critiquing the literature, procedures are evaluated on the basis of the following assessments:

- Current standards of practice are not consistent with research findings, and changes in policies and procedures and in practice are needed.
- Too little information is available, and new or additional research is needed.
- The available information is adequate, but it does not address the needs of a particular population of patients, setting, or practice, and replication of previous research is needed.
- Current standards of practice are consistent with the research findings, but not everyone adheres to those standards of practice, and reeducation of nurses is needed.

When the committee or a subcommittee determines that current policies and procedures are not consistent with research findings, the members of the committee as a whole review and approve recommended revisions to reflect current findings and forward the revisions to the critical care administrative team for final approval. If the research base is not adequate for recommending changes, the procedures are revised on the basis of the best available evidence. If a determination is made to reeducate nurses, the unit-based educators are notified.

The use of isotonic sodium chloride solution for endotracheal suctioning is a procedure that was changed as a result of our review of research findings. Instillation of isotonic sodium chloride solution to facilitate removal of secretions is a common nursing practice, although its efficacy is unsupported by research.\textsuperscript{11} An extensive review of the literature\textsuperscript{12–14} indicated that instillation of isotonic sodium chloride solution leads to significant increases in heart rate and decreased oxygenation and may result in dispersion of microorganisms into the lower part of the respiratory tract. Although most of the studies reviewed were
small in scale and based on convenience samples, in the absence of any data to support use of isotonic sodium chloride solution, the decision was made to discontinue routine use of the solution for endotracheal suctioning in patients receiving mechanical ventilation. The policy and procedure were revised, and the unit-based educators were charged with implementing the change. Because this change is new, an evaluation has not yet been done.

**Issues and Remedies**

Often, the committee determined that the knowledge base was inadequate for changing practice and that additional research was needed. The charge for this committee is research utilization, not the conduct of research. Therefore, the Center for Nursing Research maintains a list of research questions and topics that need to be addressed. This list is used to stimulate interest in developing and implementing research in the Davis Health System.

In some instances, a need to reeducate nurses was identified, either because practice was not consistent with current policies or because changes were extensive and required presentation to the staff for update and review. The committee made the unanimous decision not to take on the extensive educational process needed. The commitment was to stay focused on research utilization and not become sidetracked by additional responsibilities. Therefore, each newly revised policy and procedure is sent to the unit-based clinical nurse educators. They are then responsible for revising criteria for clinical competencies and for educating staff. This process provided a key link for ensuring that any required education or competency changes were made and disseminated.

**Overcoming the Barriers**

**Nurses’ Knowledge of the Research Process**

Most healthcare facilities do not have a nursing research department or the level of research support available in the University of California Davis Health System; thus, other resources should be explored. Potential sources for the educational support and expertise needed to implement research utilization include using advanced practice nurses and collaborating with local schools of nursing. Advanced practice nurses have completed course work on the critical evaluation of nursing research and have the expertise needed to help nurses implement research utilization. Faculty from area schools of nursing are another valuable resource. In addition to having an educational background in research, many faculty members are interested in doing clinical research, and collaboration with a clinician in a community healthcare facility provides access to patients for the faculty members’ research studies.

**Institutional Support**

Our facility is a “Magnet-designated” institution, and the nurse administrators foster a climate in which nursing research is valued. The Magnet program of the American Nurses Credentialing Center recognizes excellence in nursing services, development of a professional milieu, and growth and development of nursing staff. As a result of administrative support, considerable interest in nursing research exists in the Davis Health System, as evidenced by participation in research classes offered by the Center for Nursing Research, implementation of journal clubs at the unit level, and dialogue among nurses on the use of research to improve practice. Institutional support includes paid administrative time for committee members to attend meetings and classes and paid time for reviewing the literature and revising policies and procedures. An indication of the value placed on these activities is the fact that nurses have never been pulled from committee meetings to provide care to patients. Secretarial support is provided for finalizing each procedure. Because the Davis Health System is an academic medical center, the availability of journals that report research findings of importance to nursing is more than adequate. Journals not carried by the medical library are requested from other libraries. Each nursing unit has computers with access to electronic databases, a medical library is on site, and the medical librarians provide support for literature searches.

As noted, the Center for Nursing Research serves as a resource for nurses interested in doing research, either on the nurses’ own interests or on topics identified through review of the literature by the Critical Care Research Utilization Committee. Nurses may consult with the clinical nurse scientists in the center for assistance in developing and conducting research. Clinical nurses have conducted a number of research studies, and the findings have been disseminated at conferences and in publications. Travel costs for nurses who have a study accepted for presentation at a nursing conference are provided by the nursing administration. In addition, each year 2 nurses are sent to a research utilization conference with all costs assumed by the Department of Patient Care Services.

**Conclusion**

This project has produced a number of beneficial outcomes. Policies and procedures have been revised on the basis of scientific evidence, new research ques-
tions have been generated on the basis of gaps in the 
literature, and the number of clinical nurses involved 
in reviewing and revising procedures has increased. 
Before implementation of this project, nurse managers 
and clinical nurse specialists revised most policies and 
procedures. Now all critical care procedures are 
reviewed and revised by the practitioners who provide 
direct care to patients. The success of this project has 
served as a model of hospital-wide change, with the 
development of additional research utilization com-
mittees in the medical-surgical and pediatric units.

A great strength of this process has been the clini-
cal expertise within the committee. As policies and 
procedures are revised, members share practice con-
cerns, best practices from each unit, alternative views, 
and clinical expertise. Committee members have ben-
efited from this learning environment, because they 
better understand the needs of other units. Nurses 
throughout the facility benefit because changes are 
made on the basis of the best evidence and the clinical 
expertise of a diverse group of professional nurses. 
Finally, the enthusiasm shared by members of the 
committee has changed the perceptions of other nurses 
regarding nursing research. Nurses on the research 
utilization committee share their excitement about 
research with colleagues and look for ways to improve 
practice through the utilization of research findings.

ACKNOWLEDGMENTS

We acknowledge the contributions of the members of the Operations and Practices 
Critical Care Subcommittee: Karin Arnal, RN, Heidi Dahlke, RN, Sandra Emroo, RN, 
Ellen Fong, RN, Judy Hall, RN, Joan Mallum, RN, Patty Lemus, RN, Linda McDonald, RN, 
Marilyn Smith, RN, and Dave Wagner, RN. We especially acknowledge the tremendous 
support of Carol Robinson, RN, MPH, CSM, senior associate director of 
patient care services at the University of California Davis Health System, whose 
commitment to excellence in nursing made this process possible. Finally, we 
acknowledge Meg Bagley, RN, who spearheaded the initial efforts to use research to 
improve practice.

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