

Evidence-Based Practice in Rehabilitation Nursing

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KEY WORDS

evidenced-based practice
research

How to use research is a learned skill. With this skill rehabilitation nurses can help ensure that their practice is based on the best evidence available. Evidence-based practice is a balance of using external research-based clinical evidence and clinical expertise. The purpose of this article is to show rehabilitation nurses how to build the skills for using evidence, rather than just doing research. This involves asking questions, finding and appraising relevant data, and putting that information into everyday practice. When evidence-based practice is merged into a clinician's daily routine, the result is a more analytical and, ultimately, effective clinical practice.

Rehabilitation nurses can look at the following three cases related to practice. Case one: "I have used the neurodevelopmental technique to restore movement and normal function when caring for people with stroke for many years, and now some researchers have shown that it is not effective. How do I know whether to believe them or not?" Case two: "Several studies indicate that a short, intensive, outpatient therapy intervention for persons with back pain is more effective than inpatient rehabilitation therapy for a longer time period. What are patient satisfaction rates and cost implications of this type of service delivery?" Case three: "The rehabilitation service for which I work is beginning a new program designed to improve physical tolerance and function for persons with chronic obstructive pulmonary disease. We need to demonstrate that outcomes of this program are excellent. How do I find assessment tools to evaluate patient outcomes after participating in this program?"

Rehabilitation nurses involved in these and other similar types of cases need high-quality information on which to base clinical and management decisions, as well as the efficacy of changes in practice. Certainly, these cases demonstrate the need to actively participate in the research process, but they also illuminate the need for evidence-based practice.

Evidence-Based Practice

Evidence-based practice is nothing more than a problem-solving approach to the care that we deliver that takes into consideration the best evidence from research studies in combination with clinical expertise and the patient's preferences and values (Burns & Grove, 2004; Craig & Smyth, 2002; Melnyk & Fineout-Overholt, 2005; Sackett, Strauss, Richardson, Rosenberg, & Haynes, 2000). When clinicians make healthcare decisions for a population or group of patients using research evidence, this can be described as evidence-based healthcare. Making patient-care

decisions with current information and one's clinical expertise enhances the ability to provide the best practice. Thus, evidence-based practice is a process that begins with knowing what clinical questions to ask, how to find the best evidence, and how to critically appraise the evidence for validity and applicability to the particular care situation. The best evidence then must be applied by a clinician with expertise in considering the patient's unique values and needs. The final aspects of the process involve evaluating the effectiveness of care and continually improving the process.

Becoming an Evidence-Based Rehabilitation Nurse

A prerequisite to becoming an evidence-based rehabilitation nurse is to become a reflective professional. Knowledge develops at many different levels simultaneously within a discipline and in collaboration with other disciplines. Individual nurses develop throughout their careers, benefiting from other's experience and gathering their own information and insights from beginning to end. In educational or prelicensure programs, students become aware of their beliefs, ideas, and attitudes and learn strategies for questioning. As they begin their practice, students begin to generalize their ideas, determine which practice methods are effective, and test basic knowledge and beliefs. As an experienced professional emerges, successful therapeutic techniques are hypothesized, methods for evaluating effectiveness are established, and the results are shared with colleagues. Expert nurses evaluate methods of intervention, critique others' work, and share knowledge with a larger network.

Rehabilitation nurses, especially those in leadership roles that involve coordinating services and identifying problems, have a collective responsibility to contribute to evidence-based practice. The growth of knowledge in a discipline is possible only



when clinicians discuss ideas and share information. Collective insights form as a result and questions are formally examined. Then, as findings emerge from these data with the answers, new information can be learned.

Many practice problems cannot be solved with a single discipline viewpoint. Members of professional communities have several responsibilities. First, they must remain open to one another's ideas. Second, they must continue to be aware of how decisions made by several disciplines may impact the individuals being served. Third, they must recognize and facilitate awareness about different approaches to problem solving and knowledge development for each discipline. Finally, nurses and professionals across disciplines must recognize opportunities and collectively develop knowledge. The dialogue among a professional interdisciplinary team advances the knowledge of a professional community by adding different perspectives. These strategies lead to producing evidence for rehabilitation practice.

Applying the Evidence-Based Process

Rehabilitation nurses ask questions, find and appraise the relevant data, and use that information every day in practice. At any minute, nurses may be involved with a number of issues or problems to which they need to apply strategies for evidence-based practice. Thus, nurses are at various stages of this process at different times.

Formulating Questions in Search of Evidence

The first step toward evidence-based practice is a well-designed question that not only affects quality of care, but is of interest to the rehabilitation nurse and is encountered in practice on a regular basis.

Where do questions come from? Questions usually come from four sources. The most common source is the rehabilitation practice itself. Participation in a journal club or a research, policy, or procedure committee may help formulate researchable questions to answer practice problems. For instance, a patient may have an unusual visual-spatial problem that neither the nurses nor their colleagues know how to manage. The clinical question might be: "What is the most appropriate treatment for this patient?" Another common source for questions is analyzing professional trends. For example, there is a push to use alternative service providers rather than registered nurses on many rehabilitation units. Using this knowledge, a question could be developed to better understand a particular occupation. A question could also be developed from existing published resources.

Journal articles may raise questions that lead to further exploration of the literature. On the other hand, the literature may lead the reader to gaps in knowledge and to develop a question to explore these gaps in more detail. Existing theory is the fourth area for question development. As an illustration, a particular model or frame of reference, such as Orem's (2001) self-care deficit nursing theory, applied in the classroom, may lead to a critical comparison of what is being done in the practice arena.

How might one construct an answerable question? Constructing a careful and thoughtful question makes searching for evidence easy and straightforward. Elicit and combine the appropriate terms needed in the query language. Adapted from Newman and Harries (2003), questions must be specified clearly so they include a specific patient group or population; an assessment, treatment, or other clinical problem; and the outcome of interest. In reality, the gap in knowledge is converted into a precise question to seek the best answer. Prepared questions should be direct, crystal clear, and focused. A common mistake is to ask a question about a whole process of care rather than a specific clinical issue. For example, rather than ask, "What is the impact of the day treatment program on patient quality of life?" the nurse may ask, "Can the incidence of falls be decreased by an agency-wide, proactive, prevention program?"

Searching for the Evidence

Once a researchable question has been developed, the next step is to identify and search different sources of evidence. A large part of this search is distinguishing relevant from irrelevant information and deciding which source contains the best and most credible information.

Identifying traditional sources of evidence. Scholarly publications include peer-reviewed journals and books, and professional magazines that are not peer reviewed. Articles published in peer-reviewed journals are considered accurate and relevant and of higher quality than publications that are not peer reviewed. Peer-reviewed articles have been scrutinized by experts in the field for accuracy of content, quality of research, and relevance to the field.

Generally, books are one source of evidence that can be focused on a specialty topic (i.e., spinal cord injury treatment) or more general in nature (i.e., rehabilitation nursing), either of which may or may not be peer reviewed. In establishing credibility of any book, it is important to consider the credentials of the author(s) and the reputation of the author of the preface along with the reputation of the publisher; the reviews of the book from reputable sources;

the targeted audience (i.e., lay public versus professional); and the quality, currency, and extent of the citations and references (Renaud, 2002). If using professional magazines that are not peer reviewed, it is important to bear in mind that the content may or may not be reviewed by the editor or editorial staff and may be biased toward a targeted audience. While many of these types of publications are of high quality, it is not wise to depend solely upon them to answer questions. Nonetheless, these publications tend to get into print fast, and therefore, can be more current about trends and controversies in the field of interest.

Identifying Web-based sources of evidence. Electronic bibliographic databases and the Web are other important sources for gathering evidence. These databases are compilations of published research, scholarly activities, books, government reports, and newspaper articles. There are many different databases, each with a particular focus; some publications may be listed in more than one database (Newman & Harries, 2003). The Cochrane Database of Systematic Reviews (www.cochrane.org) serves as an example. This database contains summaries of evidence that are highly structured (i.e., reviews of results from random controlled trial research studies) included/excluded on the basis of specific quality criteria to minimize bias (Craig & Smyth, 2002). In **Table 1**, examples of electronic bibliographic databases that are pertinent to rehabilitation nurses for evidence research are presented.

The Web also contains published articles as well as program descriptions, personal opinions, government documents, and information on businesses, organizations, and agencies. The content of these Web sites is not always evaluated for accuracy or value and may contain dubious, out-of-date, false, or even dangerous information. It is up to the reader to determine the usefulness of these unfiltered sites. However, there are criteria for judging these sources. In addition to evaluating scope, coverage, and relevancy, an examination of a Web site needs to focus on its authority, accuracy, objectivity, currency, and commercialism. Criterion for sample questions adapted from Barker (2004), the California State Library (2006), Pierce (2002), and Standler (2004) are displayed in **Table 2**. In addition, some college and university library home pages include criteria for evaluating Web sites, such as the University of Northern Iowa at www.library.uni.edu/instruction/evaluating.shtml or Vanderbilt University at www.library.vanderbilt.edu/romans/polsci/evalweb.html.

Evaluating the Evidence

Once traditional and electronic publications are retrieved, they must be evaluated for their suitability for answering the question. This task of evaluating published research can be daunting for many

Table 1. Examples of Electronic Bibliographic Databases

Database Name	Description
AgeLine	AgeLine focuses on publications related to older adults and aging.
CANCERLIT	CANCERLIT contains citations and abstracts for cancer literature.
CANE	The Clearinghouse on Abuse and Neglect of the Elderly is the nation's largest computerized collection of elder abuse resources and materials.
CINAHL	Cumulative Index to Nursing and Allied Health Literature contains publications from nursing and allied health professionals.
CDSR	Cochrane Database of Systematic Review contains full-text summaries of randomized trials for the effects of treatments and, when appropriate, the results of other research on a particular topic.
ERIC	Education Resource Information Center displays materials from the field of education.
MEDLINE	MEDLINE [National Library of Medicine] is a compilation of medical and biomedical related publications.
MedlinePlus	MedlinePlus presents health information from the National Library of Medicine and has extensive information from the National Institutes of Health and other trusted sources.

Table 2. Sample Criteria for Evaluating Web Sites

Criterion	Question
Authority	Who is the author of this information? What are his or her qualifications and associations?
Accuracy	What are the sources of this information? Are these facts verifiable?
Objectivity	Is the information biased in any way?
Currency	When was the Web site produced? How frequently is it updated?
Scope	What kind of information does it have?
Coverage	Who is the intended audience?
Relevance	Does it meet the needs of the intended audience?
Commercialism	Does the Web site have a corporate sponsor? Is the site selling something?

Adapted from Barker, 2004; California State Library, 2006; Pierce, 2002; Standler, 2004

rehabilitation nurses, but evidence classification systems are available to make the task easier. No evidence classification system is absolutely right or wrong; however, various research study designs have different levels of rigor built into them. There is a common myth that quantitative research methods are of higher quality than qualitative methods. The fact is that knowledge generated from quantitative or qualitative research designs is equally important. According to Norwood (2000), it is important to keep in mind that both research approaches are

scientific, in that they both involve rigorous, systematic, data-based inquiry. The most appropriate design depends more on the research question and the knowledge required than on prior ideas about best methods. However, there is evidence that randomized controlled trials in quantitative research may be the strongest design to support cause-and-effect relationships (see **Table 3**).

Research evidence using quantitative methods. More than 100 grading scales are in use for rating the strength of the evidence (Agency for Healthcare Research and Quality, 2002) based on the design of the study. Sometimes rating levels of 1 to 3 are used for evaluating individual studies and an A, B, C or Roman numeral rating is used for groups of articles. For instance, the rating system developed by Ebell, Siwek, Weiss, Woolf, Susman, and Ewigman, et al. (2004) includes ratings of A, B, or C for the strength of the recommendation for a body of evidence with the quality of individual studies rated on a 1-, 2-, or 3-point scale. Thus, caution is needed in interpreting these scales, as a level B recommendation may not mean the same thing as a level B recommendation in another.

Nonetheless, several scientists, such as Greenhalgh (1997) as well as Hadorn, Baker, Hodges, and Hicks (1996); Melnyk and Fineout-Overholt (2004); and Sackett, Strauss, Richardson, Rosenberg, and Haynes (2000), whose work is displayed in Table 3, have outlined categories of evidence and stratified them in order from strongest to weakest to evaluate published research. For example, according to Greenhalgh, quantitative research designs can be ranked from most to least rigorous in the following order: 1) systematic reviews and meta-analyses, 2) randomized controlled trials, 3) cohort studies, 4) case controlled studies, 5) cross-sectional studies, and 6) case reports.

Systematic reviews, i.e., The Cochrane Database of Systematic reviews at www.cochrane.org and The York Database of Abstracts of Review Effects at www.york.ac.uk/inst/crd/crddatabases.htm, and meta-analyses, i.e., subsets of systematic reviews, are ways to summarize the results of many studies using a statistical summary in an unbiased manner (Norwood, 2000). Second, a randomized controlled trial is a study in which the subjects are by chance assigned to either a control or experimental group. This way, if such a large number of subjects are involved that the average composition of the control and experimental groups are the same, any differences in the outcome can be attributed to the treatment of interest and not an individual difference. Third, cohort studies follow one or more groups of subjects for a defined amount of time to investigate a particular phenomenon. Similar to cohort studies are case controlled studies, but they

are retrospective in nature. Next, cross-sectional studies are characterized by data collection concerning a certain fact or issue at a single point in time. Finally, case reports are designed to be a written summary of a clinical suspicion or possibility and are the basis for future work and investigation using higher levels of evidence available. While case reports are the lowest level of evidence, this in no way means that they cannot convey important evidence (Norwood).

All information gathered from any of these study designs needs to be judged for validity (e.g., in a broad sense, the truth of a claim), reliability (e.g., free from measurement error), and most importantly, clinical applicability (e.g., results helpful in caring for patients). Examples of general questions to guide scientific evaluation of a study, adapted from Norwood, are presented in **Table 4**. A more detailed evaluation tool for a critical review of quantitative research studies by Long (2003) can be located at www.fhsc.salford.ac.uk/hcprdu/tools/quantitative.htm.

Research evidence using qualitative methods. Oftentimes qualitative studies, similar to expert opinion in levels of evidence, may be deemed as less trustworthy, less reliable, or more vulnerable to bias (Burns & Grove, 2004). Melnyk and Fineout-Overholt (2004) have included qualitative studies at Level V/VII and VI/VII of their hierarchy for rating the evidence (see Table 3). The focus of qualitative research is usually broad, and it is conducted to generate meaning and discovery that may pave the way for future quantitative research.

There are many types of research designs or approaches used in qualitative research. In rehabilitation research ethnography, phenomenology, and grounded theory are seen more often. According to Norwood (2000), ethnography attempts to uncover and describe a particular culture's or group of people's daily life patterns, meanings, and beliefs. Phenomenology focuses on providing insights into and understanding the lived experiences of the person or group of people. The primary purpose of grounded theory is to generate data based on explanations of how people make sense of their reality (Norwood).

Criteria used to evaluate qualitative research should be appropriate for the qualitative method chosen, as the application of quantitative methods evaluative criteria is not appropriate. When evaluating qualitative research, it is important to focus on the theoretical issues and study design, methods, sampling, and data collection and analyses, as well as findings that include interpretation and trustworthiness, implications, and limitations. Table 4 contains examples of questions used to evaluate scientific merit. A more in-depth set of criteria for evaluating qualitative studies (Bromley, Dockery, Fenton, Nhlema, Smith, & Tolhurst, et al.,

Table 3. Strongest to Weakest for Evaluation of Published Research

Level	Level	Level
<p>A = A well-conducted randomized control trial (RCT) with 100 patients or more (including multicenter and meta-analyses); well-conducted RCT with fewer than 100 patients (one or more institutions and meta-analyses).</p> <p>B = A well-conducted case-control study, poorly controlled or uncontrolled studies (including RCT with one or more major or three or more minor methodological flaws), observation studies with high potential for bias (case series with comparison to historical controls), case series or case reports, conflicting evidence with more support.</p> <p>C = Expert opinion</p>	<p>I = Systematic review or meta-analysis of all relevant RCTs or evidence-based clinical practice guidelines based on systematic reviews of RCTs.</p> <p>II = At least one well-designed RCT.</p> <p>III = Well-designed controlled trials without randomization.</p> <p>IV = Well-designed case control and cohort studies.</p> <p>V = Systematic reviews of descriptive and qualitative studies.</p> <p>VI = A single descriptive or qualitative study.</p> <p>VII = Opinion of authorities and/or reports of expert committees.</p>	<p>1A = Systematic review of RCTs.</p> <p>1B = Individual RCTs with narrow confidence interval.</p> <p>1C = All or no case studies.</p> <p>2A = Systematic reviews of cohort studies (selection of large population of individuals who have the same condition and/or receive a specific intervention and are followed over time and compared to a group not affected by the condition).</p> <p>2B = Outcomes research (a larger group of individuals who receive the same intervention and are evaluated retrospectively for their outcomes).</p> <p>3A = Systematic review of case-controlled studies (two patients or two groups of individuals exposed to two different interventions in which the investigator retrospectively looks back to determine which patient or group achieved a better outcome).</p> <p>3B = Case-controlled studies.</p> <p>4 = Case series and poor-quality cohort and case-controlled studies.</p> <p>5 = Expert opinion.</p>
(Adapted from Hadorn, Baker, Hodges, and Hicks [1996])	(Adapted from Melnyk and Fineout-Overholt [2004])	(Adapted from Sackett, Strauss, Richardson, Rosenberg, and Haynes [2000])

Table 4. Examples of Questions that Evaluate Scientific Merit of Research Studies

Quantitative Studies	Qualitative Studies
What are the aims of the study and are the procedures grounded in current knowledge about the problem of interest?	Is the purpose of conducting the research adequately described and justified?
Does the sample represent the target population, and is it appropriate and adequate for the aims of the study?	Is the research approach consistent among sampling, data-collection, and analyses methods?
Were the measurements used reliable and valid?	Were quality-control strategies used in the research process (i.e., is the decision trail clear?)
Were threats to internal validity (or truth value) controlled by the research design, sampling strategies, data-collection procedures, and analysis techniques?	Are the findings relevant (i.e., adequately represent the data), and do the excerpts provided substantiate the themes?
Do the findings support the conclusions?	Are the implications clearly detailed and is there adequate discussion of the limitations?

Source consulted Norwood, S. (2000). *Research strategies for advanced practice nurses*. Upper Saddle River, NJ: Prentice Hall.

2002) is located at www.liv.ac.uk/lstm/learning_teaching/masters/masters_docs/criteria_eval_qual_studies.pdf.

Using the Evidence

Using evidence has rehabilitation nursing practice implications. Premature hospital discharge and emergency department visits without admission means that persons with a higher level of risk and

severity are returning to or remaining in the community. Patients who are admitted to inpatient facilities experience shortened length of stay with a focus on productivity and effectiveness. Caregivers of these individuals with illness or chronic disease experience increased burden, as communities generally lack adequate levels of support services. These trends in healthcare demand approaches that are efficient and provide quality with enhanced responsiveness.

Evidence-Based Practice in Rehabilitation Nursing

If rehabilitation nurses are truly committed to providing patients with the most effective treatments, then it is important to start with treatments supported by Level A, Level I, or Level 1 study designs, as described in Table 3. Nurses must seek and use interventions that have been shown to have statistically significant effects with well-controlled research studies. However, if there are no systematic reviews or meta-analyses, then guidance must be sought from lower level study designs.

There are a number of models for evidence-based practice in nursing. The Stetler Model of Research Utilization to Facilitate Evidence-Based Practice (Stetler, 2001) and the Iowa Model of Evidence-Based Practice to Promote Quality Care (Titler, Kleiber, Steelman, Rakel, Budreau, Everett, et al., 2001) serve as excellent examples. The Stetler Model provides a comprehensive framework to enhance the use of research findings, creating a vehicle to change policies and procedures. The Iowa Model infuses research into practice to promote quality care, providing direction for the development of evidence-based practice. The Stetler and Iowa models focus on individual nurses or institutions to facilitate evidence-based practice (Stetler; Titler, et al.). Using evidence to establish clinical practice guidelines, care pathways, and nursing diagnoses and interventions that guide day-to-day routines is essential, so standardized practice is both responsive and accountable to consumers and funding agencies.

Clinical practice guidelines. These guidelines are systematically developed statements that provide direction for rehabilitation nurses and other professionals in making healthcare decisions for specific clinical circumstances (Field & Lohr, 1992) and are usually focused on high-risk, rare, or unusual situations. Guidelines may reflect scientific evidence, as well as the clinical expertise and experience of the writers, and may be regional, facility-wide or unit specific, or based on case types.

Guidelines classify categories of evidence, offer recommendations for care, and are prescriptive in nature. Examples include: 1) guidelines for palliative care that were developed by the National Consensus Project for Quality Palliative Care (www.nationalconsensusproject.org), a consortium of associations to help the rapidly growing number of hospitals, nursing homes, hospices, and health systems establish programs that provide high-quality and state-of-the-art care of advanced illness; and 2) guidelines for management of constipation in adults that were developed by the Association of Rehabilitation Nurses and the Rehabilitation Nursing Foundation (www.rehabnurse.org/profresources/index.html#bcg) and address an unmet need for nurses, physicians, and dietitians in rehabilitation and long-term care and in home health, ambulatory,

and community settings. These were developed to guide decision-making in the assessment and treatment of constipation in adults and are based on the best available scientific knowledge and expert consensus; their use facilitates implementation of the most up-to-date research findings. Other examples of guidelines that are important to rehabilitation nursing practice can be located at the National Guideline Clearinghouse™ (www.guideline.gov), an initiative of the Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services. Specific guidelines from this site include prevention of falls in older persons, prevention and management of pressure ulcers, management of urinary incontinence in the elderly, management of severe traumatic brain injury, and rehabilitation of the patient with osteoporosis. Clinical practice guidelines can form the foundation of evidence upon which care pathways are built.

Care pathways. The care pathways are a framework, developed by industry leaders or local professionals, that identify expected measurable patient outcomes against a timeline for a specific case-type group (Zander & Hill, 1995). Each pathway is a tool that sets agreed-upon clinical standards based on the best available evidence for managing a specific group of patients. They identify anticipated outcomes, healthcare provider interventions, and anticipated intervention times. Examples of standard care pathways include management of dementia found at www.kingshill-research.org/kresearch/pathway.ASP (Naidoo & Bullock, 2001), management of continence located at www.dva.gov.au (Australian Government Department of Veteran's Affairs, 2005), and stroke found at www.update-software.com/abstracts/AB002924.htm (Kwan & Sandercock, 2006).

Nursing diagnoses and interventions. Under the direction of the Rehabilitation Nursing Foundation, a panel of Association of Rehabilitation Nurses (ARN) members generated a comprehensive list of 75 patient problems and nursing diagnostic categories (Smith, Culross, Pietsch, & Schmidt, 2006). Using that list with a random sample survey of 20% of the ARN membership, 13 priorities for patient problems were identified. Panel members performed extensive literature reviews in each of the patient problem areas, e.g., bowel and bladder dysfunction, chronic pain, cognition, depression, and potential for falls. An evidence section was included for each problem based on the literature and opinions and experiences of various rehabilitation-nursing experts. Nursing diagnoses (North American Nursing Diagnosis Association, 2005-2006) were suggested and commonly associated disease states were identified, as well as general interventions that could be individualized to specific patients. Practice specialists reviewed the text to ensure that no relevant document

or intervention was omitted (Smith, et al.). The intent of this handbook is to point the way in choosing appropriate interventions for various nursing diagnoses and provide evidence-based literature along with expert opinion to support those decisions.

Clearly, these clinical practice guidelines, care pathways, and nursing diagnoses and interventions by themselves do not change practice. They must be placed into everyday use. Together these tools can assist rehabilitation nurses and interrelated healthcare disciplines with provision of optimal care in an era of fiscal restraint and public accountability.

Conclusion

Linking research to practice seems logical and sounds simplistic. Rehabilitation nurses and interdisciplinary team members need to use research. When evidence-based practice is integrated into nurses' and other rehabilitation professionals' daily routines, a shift occurs toward more analytical and, ultimately, effective clinical practice.

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