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The Neuroscience Nursing 2005 Role Delineation Study: Implications for Certification

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Abstract

A task force appointed by the American Board of Neuroscience Nursing conducted a role delineation study to define current practice in neuroscience nursing. The results were used to validate the content matrix for future Certified Neuroscience Registered Nurse (CNRN) examinations. The study employed a survey design for which the Nursing Intervention Classification taxonomy was the guiding theoretical framework. The eligible sample include all current CNRNs and all members of the American Association of Neuroscience Nursing. An invitation to participate in an online survey was successfully emailed to 2,462 neuroscience nurses; the survey was completed by 477 respondents. They rated the performance and importance of 175 neuroscience nursing activities. On the basis of data analysis conducted by Schroeder Measurement Technologies, Inc., the task force recommended revisions to the CNRN examination matrix to reflect current practice in neuroscience nursing.

Certification, as defined by the American Board of Nursing Specialties (ABNS), “is the formal recognition of the specialized knowledge, skills, and experience demonstrated by the achievement of standards identified by a nursing specialty to promote optimal health outcomes” (ABNS, 2006). The American Board of Neuroscience Nursing (ABNN) was established to design, implement, and evaluate a certification program for professional nurses involved in the specialty practice of neuroscience nursing (American Association of Neuroscience Nurses [AANN], 2006). Since 1978, the certification granted by ABNN to nurses practicing in this specialty is the Certified Neuroscience Registered Nurse (CNRN) designation.

Studies of role delineation within nursing specialties are used to provide evidence that a certification examination provided by a certification program is reliable and valid. The Joint Standards for Educational and Psychological Testing (American Psychological Association, 1999) state that “the content domain to be covered by a credentialing test should be defined

clearly and justified in terms of importance of the content for the credential-worthy performance in an occupation or profession” (p. 161). In 2002 ABNS awarded a 5-year accreditation to the CNRN examination, signifying that the examination demonstrated compliance with certification standards. ABNS Standard 7 states, “The certifying organization has conducted validation studies to assure that inferences made on the basis of test scores are appropriate and justified,” and generally recommends that job analyses be conducted within 5 years of the last full analysis (ABNS, 2004). ABNN conducted its most recent role delineation study (RDS) in 2001 (Blissitt, Roberts, Hinkle, & Kopp, 2003). Repeating the process within 5 years is consistent with both the ABNS standard and the practice of other nursing specialty organizations (McMillan, Heusinkveld, Chai, Miller-Murphy, & Huang, 2002; Muenzen, Greenberg, & Pirro, 2004).

This article describes the background, methodology, results, and implications for certification of the 2005 study of role delineation in neuroscience nursing undertaken at the direction of ABNN. The study was conducted by a task force appointed by ABNN.

Review of the Literature

To familiarize themselves with the current state of nursing role delineation and the methods used in the process, the task force members conducted a literature review. The keywords role delineation, practice analyses, practice audit, task analyses, and *job analyses* were used in a computerized search of the PubMed and CINAHL databases for 1999–2005. Additional sources were obtained via an Internet search (Google) for the same terms plus an additional keyword, *nursing certification*. The literature review also included a review of textbooks, journals, and orientation materials that guide current neuroscience nursing practice.

The literature review revealed that nursing specialty organizations have used a variety of methods in their RDSs. The American Board of Occupational Health Nurses used the modified Delphi method to describe the various elements of a job, including duties and tasks, worker characteristics, and working conditions (Salazar, Kemerer, Amann, & Fabrey 2002). However, the most common manner of evaluating role delineation is some form of survey. The following three studies, from the hospice, pediatric, and critical care areas, are representative. The National Board for Certification of Hospice Nurses conducted an RDS of hospice nurses and palliative care nurses by asking participants to rate items according to frequency and importance. The study found minimal difference between the two jobs, and the exam and credential were renamed as a combined specialty: Certified Hospice and Palliative Care Nurse (Anderson, Raudonis, & Kirschling, 1999). The National Certification Board of Pediatric Nurse Practitioners and Nurses (NCBPNP/N) conducted a literature review to generate a Likert-type survey that examined frequency of performance, role responsibilities, and clinical management problems encountered by pediatric nurse practitioners. The survey was critiqued by a panel of experts and then piloted, refined, and sent out to 994 certified pediatric nurse practitioners (Brady & Neal, 2000). The American Association of Critical Care Nurses (AACN), in their latest study of critical care nursing practice, used survey instruments to obtain information on various levels of practice (e.g., entry level, experienced, advanced practice) as well as on patient care problems from system and developmental perspectives (Muenzen et al., 2004).

In this review, various sampling methods for RDSs were identified. The 2001 ABNN study was mailed to all active CNRNs ($n = 1,505$; Blissitt et al., 2003). This methodology was also used by NCBPNP/N for the Pediatric Nurse Practitioner examination (Salazar et al., 2002) and by the Oncology Nursing Certification Corporation (ONCC; McMillan et al., 2002). However, as noted for the 2001 RDS survey for ABNN (Blissitt et al.), this sampling method is limited because it does not include neuroscience nurses who are not certified, and thus the sample may

not be truly representative of the population. Other specialty nursing organizations, including the American Board of Perianesthesia Nursing Certification (ABPANC), AACN, and NCBNP/N (for the Certified Pediatric Nurse exam), have sampled a mix of both certified and noncertified nurses (Barnsteiner, Richardson & Wyatt, 2002; Muenzen et al., 2004; Niebuhr & Muenzen, 2001).

Another methodological variation involved the use of the Internet in such studies. Recently, the ONCC changed the format of its RDS from a mailed survey to a secure, online survey (McMillan et al., 2002). In a pilot test, only 50 of 110 e-mails were actually delivered successfully, yielding a final 12% (13 of 110) response rate (McMillan et al.). In the later national study, 3,000 oncology certified nurses were invited to participate in an online survey via e-mail and a reminder postcard. Because the rate of response was lower than for previous surveys, nonresponders were mailed a shortened version of the e-mailed survey to complete. It is unclear whether responses from nurses completing the survey online differed from those of nurses completing the mailed survey. The authors noted that the survey length (223 items) may have affected online return rates (McMillan et al.).

Theoretical Framework

This study takes its theoretical framework from the Nursing Interventions Classification (NIC), which is a clinically oriented, evidence-based, standardized taxonomy used to document, study, and classify nursing activities (McCloskey Dochterman & Bulechek, 2004). AANN has participated in validating NIC since its inception, and this document has served as the basis for ABNN's last two RDSs, conducted in 1997 and 2001. Core interventions for nursing specialty areas were identified through a survey nursing specialty organizations, including AANN, in 1995–1996, and these have recently been updated (Fig. 1) to reflect the changes in the fourth edition (2004) of the NIC. Table 1 lists the current NIC core interventions for neuroscience nursing. The fourth edition was used (with permission) as the basis for the current study. Other specialty organizations, including ABPANC (Niebuhr & Muenzen, 2001) and the American Society of Pain Management Nurses (Pellino, Willens, Polomano, & Heye, 2002), have used the NIC as the conceptual framework for their RDSs.

Purpose

The purpose of this study was to collect role delineation data on basic neuroscience nursing practice as a basis for defining current practice and validating content for future CNRN examinations.

Method

Study Team and Roles

The trustees of ABNN selected a task force of subject matter experts. Members were recruited through an announcement to all AANN members inviting those interested in participating to submit their curriculum vitae to ABNN. The board selected members with the goal of forming a task force that reflected diversity in practice setting, years of experience, geographic region, and educational preparation. The board also selected a testing methodology company, Schroeder Measurement Technologies, Inc. (SMT), Dunedin, FL, to support the task force with survey development, administration, and analysis. The task force members conducted a review of previous RDSs and other related materials. They also supplied information about the profession, developed the list of interventions and disorders (based on the NIC taxonomy) and the rating scales, created the demographic questionnaire, and established the sampling protocol. The task force worked with SMT staff to restructure the survey instrument for ease of electronic

use, beta-tested the survey, recommended changes prior to its dissemination, and met with SMT staff following data collection and initial analysis to review the findings.

Survey Design

The methodology used was nonexperimental survey design (Polit & Hungler, 1999). An online survey that employed a descriptive research design was developed. The task force viewed an online questionnaire as a cost-effective method of soliciting information from the largest number of participants and addressing limitations from previous RDSs. The online questionnaire consisted of demographic questions and a task inventory specific to neuroscience nursing. Participation was voluntary and anonymous (i.e., responses were not linked to participant names).

Survey Instrument

The survey questionnaire consisted of 255 items requesting three types of information, presented in three sections: demographic data, which enabled the development of a profile of neuroscience nurses and their work environment; the specific neurological disorders encountered and their frequency; and nursing interventions performed, with a ranking of their importance. Depending on the question, respondents were asked to fill in the blank, select the appropriate answer, or write in comments.

Demographics were kept as the first section, as in previous surveys, to promote completion of the survey. In addition to typical questions, the demographics section asked about other certifications and about whether employers provide incentives to obtain and continue certification.

The neurological disorders section listed 74 disorders, grouped into seven areas. Respondents were asked to estimate how often a neuroscience nurse cared for patients with specific disorders. A 4-point scale gave options of *never*, *occasionally*, *fairly often*, and *frequently*.

The section on nursing interventions asked participants to consider both the frequency and importance (i.e., criticality) of interventions as they related to actual nursing practice, not to ideal practice. Participants were asked to consider the importance of the activity in relation to the achievement of optimal outcomes for either the patient or family and not to limit their response to care of the patient. The nursing interventions were based on 175 NIC codes that were divided into 24 areas. Participants were asked to use a 6-point scale that identified whether they performed the intervention and how important they felt the intervention was. The scale values and the scores assigned (in parentheses) were *not performed* (0), *no importance* (1), *little importance* (2), *moderately important* (3), *very important* (4), and *extremely important* (5). Both the neurological disorders and the nursing interventions sections had areas for participants to type in disorders or interventions not otherwise covered in the survey.

Survey Administration

On March 30, 2005, ABNN e-mailed the survey to 3,158 current AANN members and nonmember CNRNs with known e-mail addresses. An end date of April 30, 2005, was given. Of the initial mailing, 696 e-mails were returned as nondeliverable, so the actual sample size was 2,462. The e-mail contained a link to the survey and directions for completing the survey, including how to re-access the survey if it was not completed in one sitting. The message also said that all nurses who completed the survey would be included in a drawing to win a copy of *AANN Core Curriculum for Neuroscience Nursing* or registration for the 2006 AANN Annual Meeting. Completion of the online survey constituted consent to participate in the study. On the basis of beta-testing, the task force estimated that the survey could be completed in about 1 hour. Surveys were received and compiled by SMT.

Procedures and Statistical Analysis

When the survey was completed, SMT transferred the data into SPSS, a computer-based statistical program, for analysis. SMT then ensured that the data met quality requirements and performed analyses. SMT used two calculations to approximate the amount of error and the agreement between respondents. A second statistic established reliability estimates for the respondent group that provided additional confidence in overall reliability.

In May 2005 SMT staff and the task force reviewed the survey analysis and established exclusion criteria that would differentiate between important and unimportant disorders and interventions. SMT and the task force then translated the final items into the matrix that serves as the blueprint for CNRN content development. The task force compared the content area distributions of the new matrix with those of the existing certification exam and reached agreement on the final content distribution for the new CNRN exam.

Results

Survey Response and Demographics

Of the 2,462 e-mail survey invitations sent to active addresses, 477 (19.4%) of the nurses completed the survey. Statistical review of the responses indicated a standard error of 0.046 based on the respondent sample size of 477; therefore, the inferences from the survey are associated with minimal error. To determine the adequacy of the survey, respondents were asked how well the survey covered tasks performed by a competent neuroscience registered nurse. More than 94% ($n \geq 450$) of respondents rated the survey as *adequately* or *completely* covering these tasks. The demographic information from survey respondents is presented in Table 1.

Decision Criteria for Excluding Disorders and Interventions

Six decision criteria for excluding disorders and interventions are described in this section. These rules were used to determine which disorders and interventions would remain on the content outline used for the CNRN examination matrix. Disorders and interventions that were eliminated are listed in Table 2.

Rule 1: Frequency of Disorder. The advisory committee decided that for a neurological disorder to qualify for inclusion, its average rating had to indicate it was cared for more often than *occasionally*. Six disorders were eliminated on the basis of this criterion.

Rule 2: Frequency of Intervention. The analysis of frequency of nursing interventions was based on the percentage of respondents who indicated they did not perform the intervention. Respondents were not asked how often a particular intervention was performed, only whether they performed it. An intervention qualified for inclusion in the content outline if 58% of the respondents indicated they performed it. Eleven interventions did not meet this level and were excluded.

Rule 3: Importance of Intervention. If a respondent performed an intervention, the respondent was asked to rate its importance. To be included in the final content outline, an intervention had to be rated *moderately important* to *very important*. Three additional interventions were eliminated based on this rule; however, one of these, *Patient teaching: Sexuality*, is subsumed under *Other patient teaching interventions*.

Rule 4 and 5: Experience and Location. To determine whether years of experience (Rule 4) or geographic region (Rule 5) altered the mean importance of interventions, SMT analyzed the data in relation to the respondents' years of experience, in the following groupings: 0–10 years,

11–18 years, 19–25 years, and 26 or more years. Mean importance values for all groups were in agreement, and no further interventions were excluded using these rules.

Rule 6: Respondent Comments. This rule allowed the task force to add or exclude additional items based on a review of respondent comments and suggestions on the remaining disorders and interventions. Based on this review, the task force decided to remove *Bioterrorism preparedness*, because it is viewed as not being specific to neuroscience nursing. In addition, on the basis of comments, the committee decided to add one disorder, *Balance and dizziness*, and one intervention, *End-of-life care/dying care*, to the final content outline.

Examination Matrix

The final CNRN examination matrix that resulted from this study process consists of 69 neurological disorders and 161 neuroscience nursing interventions. The latter are organized into seven domains. The committee assigned weights to each of the seven domains based upon the role delineation findings. This weighting figure indicates the relative emphasis of each area as reflected in the content of the CNRN examination. The final matrix is presented in Table 3.

Discussion

In designing the 2005 role delineation study, the task force looked closely at the limitations and recommendations discussed for the earlier study in 2001 (Blissitt et al., 2003). By conducting the role delineation as a secure online survey, we were able to address both the limitations and the recommendations, specifically, the need to obtain both a larger sample size and more diverse respondents. The online survey permitted greater diversity of respondents because it included both AANN members and nonmember CNRNs. Thus, we were able to increase the original sample size from 1,505 to 3,158.

A total of 477 completed surveys were received, for a 19.4% return rate. We felt we achieved the goal of reaching a diverse respondent pool in the areas of job roles, certified versus noncertified status, member versus nonmember status, and educational level of preparation. Of particular note is that, on average, the respondents spend 67% of their time in direct care, with 40.3% employed as a staff nurse and 59.1% certified as a CNRN. Conducting the survey online was seen as a way to increase the number of potential respondents and thus the number of responses.

Despite the increased number of potential respondents, the return rate was lower than for the 2001 study. To encourage participation, reminder e-mails were sent to individuals, and the project was promoted at the AANN Annual Meeting and in the AANN newsletter.

To what can this lower-than-desired response rate be attributed? This study marked the first time the survey was conducted online, and the lack of response may reflect a period of adjustment to electronic surveys. ONCC also noted a decrease in the response rate when it switched to an online format. It is also important to maintain a database with current e-mail addresses and identify why e-mails are returned.

One of the secondary goals of the RDS was to provide validation of disorders previously deleted from the 2001 blueprint (Blissitt et al., 2003). Interestingly although the 2005 survey supported the deletion of three disorders (Tourette's syndrome, Huntington's disorder, and Dandy-Walker syndrome), it supported the reinclusion of the six previously deleted disorders (amyotrophic lateral sclerosis, Bell's palsy, cerebral palsy, Down syndrome, dystonia, and spina bifida). All six are now included in the matrix. The 2005 survey identified three disorders not previously identified for deletion that were omitted from the test blueprint beginning in spring 2006 (toxoplasmosis, muscular dystrophy, and Wilson's disease).

Limitations

Two limitations of the present role delineation have been identified. With a potential pool of more than 3,000 respondents initially and an actual pool of 2,462, only 477 surveys were completed. Although this number was lower than had been hoped for, inferences from the survey are sound, given standard error of .046. The second limitation is shared with the 2001 RDS, namely, that the survey does not include individuals who are neuroscience nurses but are not AANN members or CNRNs.

Recommendations

The task force has several recommendations for future role delineation studies. First, the response rate needs to be increased. Incentives might include offering education hours for completion of the RDS, as other nursing specialty organizations (e.g., AACN) have done (Muenzen et al., 2004). We recommend continuing to conduct the analysis using an online format but with more frequent reminders via e-mail and postcards. A mailed reminder may reach individuals whose e-mail addresses are invalid. Other avenues for increasing response include posting a link on the AANN and ABNN Web sites and sending announcements to the discussion lists hosted by AANN.

A second recommendation is to investigate ways to include neuroscience nurses who are not AANN members or CNRNs. Possible ways to accomplish this are to contact other specialty organizations that are likely to have neuroscience nurses as members (e.g., AACN) to see whether e-mail addresses can be obtained. In addition, AANN members and CNRNs could be invited to forward the survey announcement to fellow neuroscience nurses, in exchange for an incentive.

On the basis of feedback from participants, the rating scale used for the nursing intervention section of the survey needs to be clarified to make it more user friendly, less complicated, and easier to complete. As in the previous study, participants requested the development of an advanced practice RDS. However, in the absence of a scope and standards of advanced practice for this specialty, this project cannot move forward.

The 2005 RDS task force will recommend two changes to the NIC: the addition of one intervention classification not listed currently, *Hypothermia management*; and the deletion of *TENS/spinal cord stimulator* from the core neuroscience nursing interventions, because this intervention was identified for deletion on both the 2001 and 2005 RDSs.

Summary

Neuroscience nursing is a specialty that covers a broad variety of settings, disorders, and interventions. Current neuroscience nursing practice is delineated through the process of conducting an RDS. This 2005 role delineation has provided a mechanism by which the CNRN examination matrix has been updated and validated. Limitations and recommendations from the 2001 RDS have been incorporated into this current role delineation. Future role delineations will address the limitations and recommendations of the current analysis.

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Airway management
Anxiety reduction
Behavior management
Body image enhancement
Bowel management
Cerebral edema management
Cerebral perfusion promotion
Cognitive stimulation
Communication enhancement: speech deficit
Communication enhancement: visual deficit
Delirium management
Energy management
Environmental management: safety
Fall prevention
Intracranial pressure monitoring
Medication administration
Medication management
Neurologic monitoring
Pain management
Positioning: neurologic
Seizure management
Seizure precautions
Sleep enhancement
Subarachnoid hemorrhage precautions
Surveillance
Swallowing therapy
Temperature regulation
Tube care: Ventriculostomy/lumbar drain
Unilateral neglect management
Urinary catheterization: intermittent, urinary elimination management

Note: Adapted from Nursing Interventions Classification (4th ed.), edited by J. McCloskey Dochterman and G. M. Bulechek, 2004, St. Louis: Mosby. © Elsevier. Used with permission.

Fig 1.
Neuroscience nursing core interventions

Table 1
Demographic Characteristics of Respondent Sample (*N* = 477)

Characteristic	<i>n</i>	%
Years practicing nursing	474	
1–10		24
11–20		31
21–30		34
31–40		10
41–46		1
Years practicing neuroscience nursing	474	
1–10		24
11–20		31
21–30		34
31–37		10
Level of initial preparation	477	
Practical/vocational		4
Diploma		21
Associate		28
Bachelor's		45
Master's		2
Highest educational degree	477	
Diploma		7
Associate		13
Bachelor's		40
Master's		36
Doctorate		4
Primary work setting	471	
Community hospital		21
Regional medical center		19
University-affiliated medical center		39
Managed care or insurance provider		<1
Government institution		3
School of nursing		2
Ambulatory care setting		6
Long-term care facility		<1
Rehabilitation facility		<1
Other		7
Practice time by setting	443	
Acute care		34
Critical care		32
Ambulatory care		28
Rehabilitation		4
Long-term care		2
Unit	477	
Neurology		11
Neurosurgery		26
Combined neurology-neurosurgery		45
Mixed (neurology and nonneurology)		17
Primary job role	454	
Staff nurse		40
Nurse administrator		7
Nurse practitioner		15
Clinical nurse specialist		12
School of nursing faculty		2
Researcher		2
Case manager		3
Nurse educator		6
Other		13
Practice by population	477	
Pediatric (0–18)		14
Adult (19–65)		57
Older adult (>65)		38
CNRN certification	457	
Yes		59
No		41

Table 2

Entries Deleted from CNRN Test Matrix with Corresponding Elimination Rule

Rule 1: Disorder occurs with low frequency.	Rule 2: Intervention is performed with low frequency.	Rule 3: Intervention is not rated as important.
Toxoplasmosis Muscular dystrophy Dandy-Walker syndrome Huntington's disease Tourette's syndrome Wilson's disease	Position: intraoperative Surgical assist Ventricular reservoir medication administration Chemotherapy management Respite care Endotracheal extubation Radiation therapy management Medication administration: inhalation Home maintenance assistance Group teaching Sexual behavioral therapy	TENS/spinal cord stimulator Sexuality, patient teaching Impulse control training

Table 3

Final CNRN Examination Matrix

Intervention	% of Exam	No. of Questions	Neurological Disorder				
			Trauma (12.68%)	Cerebrovascular (22.72%)	Tumors (15.54%)	Immune/ Infection (14.16%)	Seizure (2.08%)
Basic physiologic ^a	37	58					
Complex physiologic ^b	28	43					
Behavioral ^c	16	28					
Safety ^d	9	14					
Family	3	2					
Health system ^e	7	14					

^a Activity and Exercise Management, Elimination Management, Immobility Management, Nutrition Support, Physical Comfort Promotion, Self-Care Facilitation, Electrolyte and Acid-Base Management

^b Drug Management, Neurological Management, Perioperative Care, Respirator Management, Skin/Wound Management, Thermoregulation, Tissue Perfusion Management

^c Behavioral Therapy, Cognitive Therapy, Communication Enhancement, Coping Assistance, Patient Education

^d Crisis Management, Risk Management

^e Lifespan Care, Health System Management, Information Management