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An Acute Care Nurse Practitioner Model of Care for Neurosurgical Patients

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The use of acute care nurse practitioners (ACNPs) began in the early 1990s, fueled predominantly by economic forces such as managed care and changes in training of residents that emphasized primary care versus in-hospital acute care.¹ Continued momentum for integration of ACNPs into the healthcare system since then has been provided by additional forces such as legislative restrictions in the amount of care provided by residents (ie, reduction to an 80-hour work week) and increasing concerns about

continuity of care because of the increasing acuity of patients and the shortening of hospital lengths of stay. In addition, concerns related to achieving positive clinical and economic outcomes have increased the interest in using ACNPs in a number of acute care models.²⁻⁴

Overall ACNP Role

Typically ACNPs have a mix of medical and nursing responsibilities, medical responsibilities only, or nursing responsibilities with emphasis

on the care management of specific populations such as neurosurgical patients.⁵⁻⁸ Similar to other advanced practice personnel, nurse practitioners fill clinical, educational, leadership, and research roles, but the primary element is management of patients' care.⁹ This primary clinical focus is what differentiates nurse practitioners from clinical nurse specialists (CNSs). In contrast to a nurse practitioner, a CNS focuses on addressing the needs of patients through education and staff development as well as through application of evidence-based changes that support care delivery.

Acceptance and application of ACNPs depend on the skills and knowledge of the individual practitioners, the administrative and clinical support for ACNPs, and how well the ACNPs fulfill role expectations. Although many components of the ACNP role may be similar between institutions, variations do exist, making comparisons difficult and the development of similar roles a challenge. In this article, we describe the development of the role of the neurosurgical ACNP in 2 different institutions in 2 different states. This role has evolved to bridge the gap in care that has resulted from external forces (eg, reduced hours for house staff, shorter stays for patients).¹ Because of the success of ACNPs in both institutions, we hope that this article will provide guidance to others considering use of ACNPs in a neurosurgical setting. To that end, the role of neurosurgical ACNPs, barriers to the role, and outcomes are described.

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Overview of the Neuroscience ACNP Roles in 2 Institutions ACNPs at the University of Virginia

The University of Virginia Health System (UVA) is a 550-bed academic institution located in Charlottesville, Va. In 1999, 2 respected clinicians designed an “outcomes management approach” to the care of the neurosurgical patients in an intensive care unit (ICU) and a busy neurosurgical unit. The clinicians were ACNP students at the time and sought to test the outcomes management model of care for neurosurgical patients and to establish a role for themselves after graduation. Use of the model, which incorporated elements of managing patients’ care with monitoring of outcomes, resulted in positive clinical and financial outcomes.³ As a result, the use of neurosurgical ACNPs was officially accepted and implemented by the institution.³ In addition to managing patients’ care and monitoring data, ACNPs at UVA serve as advanced practice nurses, providing teaching, research, change agency, and consultation.

Currently, UVA employs 2 full-time nurse practitioners and 1 part-time nurse practitioner in the acute care areas. The practitioners are hired by the hospital, report to the unit nurse manager, and have collaborative practice agreements with 9 neurosurgeons. The nurse practitioners manage all adult neurosurgical patients Monday through Friday from 7:30 AM until approximately 7:30 PM. Two of the nurse practitioners share management responsibilities for 25 to 35 neurosurgical patients according to geographic location every day except Friday, when a single nurse practitioner is responsible for all patients. To maintain consis-

tency, the nurse practitioners manage the same patients throughout the patients’ hospital stay. Although most neurosurgical patients are cared for in 2 acute care neuroscience units, when the number of patients increases, the practitioners may manage patients’ care in other units as well.

ACNPs at Riverside Methodist Hospitals

Riverside Methodist Hospitals (RMH) is a 1000-bed teaching hospital in Columbus, Ohio. Use of neurosurgical ACNPs at RMH began in 1996 in a fashion similar to that at UVA. Creation of the ACNP position began when a respected neuroscience nurse negotiated for the implementation of the position after graduation from a nurse practitioner program. An ACNP model based on collaborative practice was chosen, with the initial focus of care management encompassing all neurosurgical patients. With this model, the ACNP reports to a physician director for clinical issues and to a nursing director for issues related to professional practice, program development, and system improvement.⁹ In 2001, a second ACNP was added when the number of hospital neurosurgeons expanded to 9. Both ACNPs are employed by the institution and are accountable to a director of nursing and a director of neurosurgery. Currently the ACNPs have collaborative practice agreements with 11 neurosurgeons and communicate daily with them about patients’ plans of care. Clinical management of the 50 to 70 acute and critical care patients is divided equitably between the ACNPs by capitalizing on the backgrounds and preferences of the ACNPs. The ACNP based in the neu-

rosience step-down unit works 7:30 AM to 4 PM Monday through Friday, and the ACNP based in the ICU works from 6 AM to 4 PM every weekday except Wednesdays. The neuroscience step-down unit and ICU roles mirror the UVA model with one exception. Because of the critical nature of the ICU patients, the collaboration between intensivists and hospitalists and the ACNP based in the ICU is more frequent than is collaboration with the ACNP from the neuroscience step-down unit. When consulted, intensivists do rounds with the ACNP, discuss radiographs, and get input from the bedside nurse, pharmacist, and respiratory therapist to ensure that all key aspects of care are being optimally treated.

Collaboration With Physicians

In the neurosurgical unit at UVA, physicians on duty generally are an intern doing a month-long surgical rotation and an on-call neurosurgical resident. However, some months, no surgical intern is assigned to the neurosurgical service. The neurosurgical resident on call is responsible for all new consultations (including those in the emergency department), admissions, and all neurosurgical inpatients. The on-call resident provides care from 7 AM to 7 PM; after that time, a resident is assigned to provide care as needed at night for several units. Care provided by physicians at RMH is similar to that at UVA. Each month, care is supplied by interns doing an emergency department/general surgery rotation; the number of interns varies from 0 to 3, depending on the month. A neurosurgical chief and a junior resident from a local university-based

hospital provide care for periods of 6 months at a time. Once early morning rounds and notes are completed, the focus of the neurosurgical resident shifts to experiences in the operating room. Care provided by interns at RMH is similar to that provided at UVA by the on-call resident and includes consultations in the emergency department and the neuroscience units, direct admissions, postoperative evaluations, and primary management of patients not located in the neurosurgical acute and critical care units. Nighttime care at RMH is accomplished by using moonlighting physicians. "Moonlighters" are resident physicians paid by RMH to provide neurosurgical care at night as needed when currently assigned interns or residents have the night off. Moonlighter hours are generally from 6 PM to 6 AM; daytime hours are added as needed to provide care on weekends or during nurse practitioners' vacations.

Rounds for attending physicians at both institutions are varied and depend on operating room and clinic schedules. In acute or admission situations, attending physicians are updated promptly and consulted about patients' assessments to collaboratively develop plans of care. Nonacute questions are processed either in person or during a daily telephone update. These communications ensure that patients' care is consistent and reflects the preferences of the neurosurgical attending physician and the collaborating nurse practitioner.

Procedures

Many procedures are done by the ACNPs; however, in order to ensure training of house staff, interns

are first given the opportunity to perform the procedures. Examples of procedures currently performed by ACNPs at UVA and RMH include management of ventriculostomy/lumbar drains, drain removal, insertion of arterial catheters, insertion of lumbar drains with and without fluoroscopy, and shunt reprogramming. Procedural competence evolves from an academic base or from on-the-job training.

Collaboration With Nurses

Collaboration with a multitude of care providers throughout the day is crucial to seamless care of patients and successful use of ACNPs. Exchange of information between a patient's bedside nurse and the ACNPs about the patient's daily plan and ongoing status provides the necessary foundation for care delivery. The bedside nurse is the daily expert on the patient's status. The ACNP provides in-depth knowledge of the patient's case and the overall plan. Collaboration between the bedside nurse and the ACNP is the perfect tool for comprehensive care delivery.

The ACNP is physically present in the units, a situation that makes it easy for bedside nurses to communicate changes in patients' conditions. Together the nurse and the ACNP examine the patient, noting differences. If a patient has a deterioration or change in neurological condition, the ACNP orders the appropriate diagnostic tests and/or interventions. Depending on the change, the ACNP may independently provide orders, collaborate with the attending physician or chief resident, or involve an intensivist, hospitalist, or appropriate consultant. These actions result

in prompt entry of orders and timely supportive interventions (ie, diagnostics, comfort measures, or discharge of the patient). The ACNP's presence in the unit promotes the development of an educational and collaborative practice environment. The ACNP reviews the flow sheets, medications, and the laboratory and radiological findings of the patients in addition to seeking inclusion of the bedside nurses' assessments and thoughts related to each patient's plan of care.

Teaching occurs in the moment. For example, a computed tomography scan might be shown to and discussed with the assigned nurse. The ensuing discussion enables a collaborative matching of the findings of the nurse and the ACNP with the results of computed tomography. Both the ACNP and the nurse can then share the information with the patient and the patient's family in a timely manner.

Multidisciplinary Collaboration and Discharge Planning

Planning is essential to ensure the appropriate and timely discharge of neurosurgical patients. Some patients are able to return home, but many require rehabilitation or further care. Identifying these patients early, educating patients and their families about patients' diagnoses and discharge plans, and organizing the interdisciplinary team are key components of the ACNP's management of care. Collaborations with social services; physical, occupational, and speech therapy services; bedside nurses; and consulting services ensures that appropriate referrals are made for home health, skilled nursing facilities, or inpatient rehabilitation.

To achieve this goal, ACNPs at both UVA and RMH lead daily multidisciplinary discharge rounds. Discussions during rounds address clinical plans as well as social services and psychosocial issues, enabling consistent care to be provided by all practitioners. To assist further with care continuity, the ACNP may contact primary care physicians by telephone or in writing if follow-up is needed or changes have occurred that require special attention after discharge.

Nurse practitioners' interactions and partnerships with unit managers, educators, outcome managers, and CNSs further strengthen the infrastructure for delivery of patients' care. As advanced practice providers of direct care, ACNPs are exposed to system processes that directly affect the quality of care. Responsibilities of unit managers, CNSs, and outcome managers often encompass elements of direct care with an emphasis on system processes. Collaboration, which results in the melding of the skills, talents, and perspectives of a nurse practitioner, a CNS, an outcome manager, and a unit manager, enhances system and care management. Nurse practitioners work with educators in a variety of ways. Several examples include real-time education for implementation of new technology or situations in patients' care. ACNPs are also able to note areas of needed education and may work collaboratively with an educator or a CNS to accomplish the goal.

Overview of Daily Routine

At both UVA and RMH, the day begins with a resident physician leading rounds of patients that culminate in a discussion about the medical plan for the day. Because

these rounds generally focus primarily on the neurological system, the ACNP ensures that all other systems are also assessed and treated if necessary. Specific elements of management include head-to-toe assessments, focused history taking and physical examinations, review of results of laboratory tests and other diagnostic tests, review of medications for appropriateness and interactions, discussions with and/or referrals to consulting teams, discussions with staff and members of other involved disciplines, and the education of patients and patients' families.

The ACNP's nursing background overlies all of the medical components of patients' care provided by the practitioner. Consequently, evaluation of the psychosocial aspects of a patient's experience and staff education are intertwined with daily interventions performed by the ACNP. As noted earlier, interactions with neurosurgeons and consultants occur throughout the day, with increased frequency if a patient's situation dictates. At the end of the day, the ACNPs provide a status report to interns and residents.

Barriers

Barriers to implementing the use of ACNPs include difficulty in clarifying the role and delineating its responsibilities, attitudes toward the role and its acceptance by others, restrictions on the scope of practice, lack of privileges, high caseload, difficulty obtaining reimbursement, lack of administrative support, and inadequate level of preparation for required elements of patients' management.^{6,10,11}

Although some of these barriers were present at the hospitals described

here, many were not. For example, administrative support was present at both facilities from the beginning. The educational preparation of nurse practitioners at both UVA and RMH was not a barrier because all had completed a master of science in nursing in an ACNP program and had received training appropriate to the management of neuroscience patients. In addition, both institutions were comfortable with allowing time for on-the-job training and evolution of the role as an ACNP's skills, knowledge, and confidence increased. Barriers that were present included difficulty in clarifying the role and responsibilities of an ACNP and a lack of acceptance of the ACNP's role.

Acceptance by Nurses

Acceptance by the nursing staff is crucial in order for the ACNP role to be beneficial and effective. Because the first ACNP in the neurosurgical areas at both facilities was an experienced neurosurgical nurse who had worked with the same nursing staff before the role change, the ACNP's expertise was not in question. Regardless, the ACNP role was new, and some confusion and occasionally "testing" of the nurse practitioner occurred. Examples of testing include contacting attending physicians and residents after orders had already been obtained from the ACNP or challenging orders given by the nurse practitioner. Educating staff about the ACNP's scope of practice, consistently providing care as described, and communicating with nurses helped the needed acceptance increase. By having the ACNP work closely with the nursing staff, trust and open communication were established.

Acceptance by Physicians

At both institutions, acceptance of the ACNP role by neurosurgery physicians occurred easily. Most of the attending physicians were directly involved with the ACNP training, so signing of practice agreements occurred relatively quickly. Although provision of neurosurgical critical care by a nurse practitioner was not entirely new at RMH, before the second ACNP was hired, the evolution of care provided by the lone nurse practitioner was focused predominantly on the neurosurgical step-down unit. Therefore, when a second nurse practitioner was added, the provision of critical care seemed new. As a result, the second nurse practitioner faced a similar testing period at first.

Because the nurse practitioner practiced with 11 neurosurgeons, interactions occurred over time. By learning the specific preferences and communication styles of the attending physicians, the nurse practitioner was able to work with the attending physicians to establish a comfortable working relationship. The physicians in turn, learned more about the nurse practitioner's skills, knowledge base, and intentions. By having the ACNP engage in open communication, demonstrate sensitivity to the need for training of residents and interns, and initiate multiple formal and informal educational sessions with the attending physicians, the initial fears of some physicians related to the ACNP's practice eventually were resolved. These communications, along with exposure

to the nurse practitioners during especially challenging situations with patients, worked to strengthen the nurse practitioners' credibility.

As a part of the UVA ACNP program, ACNP students' clinical training includes a rotation with house staff as part of the medical team. Thus, night call is a part of the rotation. In large part because of these student rotations, the neurosurgical team and the house staff residents understood the role and responsibilities of the ACNP. For both institutions, educating new residents and interns about the role of the ACNP is a continuous process. With time and exposure, the residents and interns have come to view the ACNPs as an integral part of the team and a valuable resource.

Acceptance of ACNP practice by consulting physicians required additional education and perseverance. Initially, the physicians did not want to be consulted by the ACNP. However, as the consulting physicians became more familiar with the nurse practitioner's knowledge and abilities, resistance decreased and relationships became more collegial. In fact, many consultants at both facilities now look for the nurse practitioners, appreciating the ACNPs' availability as consistent members of the healthcare team and the information the practitioners provide. The value of ACNPs continues to increase at RMH. For example, hospital administrators have been approached by attending physicians who express their desire for hospital-wide expansion of the ACNP role.

Ongoing Challenges and Barriers

Acceptance by Patients and Their Families

Ongoing barriers to the use of ACNPs include lack of awareness of the ACNP role among patients and their families, restrictions of scope of practice and reimbursement, limitation of privileges, and high caseload. Without prior exposure, patients and their families often require education about the use of ACNPs. Confident, accurate, and clear communication updates from the ACNP enable families to quickly come to appreciate the ACNP role. Patients and their families often see only the medical aspects of the ACNP role. Diligently clarifying what it means to be an advanced practice nurse assists patients and their families along the educational continuum. The informed bedside nursing staff

assist in teaching patients and patients' families about what they can expect from the neurosurgery nurse practitioners. Further, as patients and their families interact with nurse practitioners, appreciation for the ACNPs' accessibility and knowledge base ensues.

Scope of Practice

Scope of practice for advanced practice nurses is set nationally, but application varies by state, institution, and collaborating physician practice. In Ohio and Virginia, advanced practice nurses prescribe medications from a restricted formulary. Although ACNPs prescribe medications from the largest formulary, some restrictions affect the ACNPs' ability to provide care to neurosurgical patients. Adjustments or changes in Schedule I and II narcotics require contacting the collaborating physician or resident. Institutional restrictions also limit some procedures that an ACNP can perform. For example, intubations and insertions of hemodynamic catheters are still restricted to physician counterparts despite ACNP training. As time passes, and positive experiences with advanced practice nurses increase, legislative and institutional amendments should follow.

Caseload

Large caseloads continue to be a challenge for all medical caregivers. Specific challenges for neurosurgical ACNPs are multifactorial and are influenced by nursing, physician, and institutional reasons. Nursing components include the evolving shortage of nurses. With fewer nurses entering the profession, recruiting and retaining nurses who

enjoy and choose neurosurgery as their preferred field may become more difficult. Temporary staffing may fill gaps, but lack of consistent caregivers to provide high-quality specialty care may create a condition that makes information flow more challenging for nurse practitioners. Additionally, nurses who are less familiar with neurosurgical care often require more supervision by or interaction with the nurse practitioner to make appropriate decisions.

Because specialty malpractice rates have increased, and reimbursement has decreased, the number of attending physicians providing neurosurgical care has decreased in some areas. Patients in underserved neurosurgical areas are being transported to facilities that provide specialty care.¹² At both UVA and RMH, legislative decisions in surrounding states have created an influx of out-of-state neurosurgical patients. This influx of patients coupled with restrictions on the number of hours residents can work has resulted in a mismatch in available resources to cover the needs of the growing neurosurgical population.

The circumstances just listed increase the need for ACNPs. Unfortunately, decreases in institutional reimbursement place budgetary constraints on hiring more advanced practice nurses. Consequently, large caseloads often lead to working beyond the scheduled times; 8-hour shifts are really 9 or 10 hours and 10-hour shifts become 11 or 12 hours in an effort to provide the necessary care. The association between use of ACNPs and positive outcomes for patients will be increasingly important so that appropriate use of ACNPs occurs.

Outcomes and Benefits

Advanced practice nurses are increasingly being asked to demonstrate outcomes related to the effectiveness of their role.⁸ By definition, outcomes are the result of specific processes. A favorable outcome is defined as one that results in achievement of a defined goal. What defines an acceptable or a desirable outcome within healthcare is relative and varies by payer, provider, and patient.¹³ For many institutions, the effectiveness of the ACNP role is measured in financial outcomes (ie, decreased length of stay). As shown in previous research, the ACNP clinical and financial outcomes are improved significantly by identifying patients at risk, monitoring for

complications, and having ACNPs manage the patients.^{3,8} In a study by Russell et al,³ 2 clinical outcomes, urinary tract infections and skin breakdown, were significantly improved in the patients managed by an ACNP. More importantly, patients identified as at risk (ie, those who have no social or family support and have neurological deficits) whose care was managed by an ACNP had better outcomes than did those whose care was not managed by an ACNP. The ACNP, as described earlier, worked from the time of admission to find appropriate support so that the patient's length of stay in the hospital was not adversely affected. The investigators reported a reduction in total patient days and

a 1-year cost savings of more than \$2 million.

Meyer and Miers¹⁴ described the effectiveness of ACNPs in improving both patients' outcomes and economic outcomes. The investigators compared 2 groups of adult patients for whom postoperative cardiovascular care was directed by either cardiovascular surgeons alone or cardiovascular surgeons in collaboration with an ACNP. Compared with care directed by the cardiovascular surgeon alone, collaborative postoperative care directed by cardiovascular surgeons and the ACNP resulted in significantly decreased lengths of stay. The total length of stay was decreased by 1.91 days, and the cost savings to the healthcare

system for each patient receiving collaborative care was more than \$5000.

Sarkissian and Wennberg¹⁵ showed that the total cost per patient within an epilepsy monitoring unit, including the cost of the hospital bed and the laboratory tests performed during hospitalization, declined steadily after use of ACNPs was implemented. Assessing and documenting the outcomes of ACNP practice in studies such as this one are needed to show the benefits of using advanced practice nurses to manage patients' care.¹⁶

Although these types of measurements are important and helpful in externally validating ACNPs as fiscally responsible providers, less tangible outcomes and benefits have been experienced when an ACNP was used to provide care. Bedside nurses and multidisciplinary members at both UVA and RMH described easy access to expert clinicians for obtaining clinical advice, orders, and immediate education of patients' families as benefits of the ACNP's presence. Additionally, because the ACNP is a direct care provider, potential opportunities for system enhancement to support patient care can be recognized. Because ACNPs have been educated about change management, they are well suited to identify issues and help design and implement improved processes of care. Ultimately improved outcomes for patients and staff outcomes such as satisfaction may result.

Summary

Increasingly, reports of outcomes related to the use of ACNPs indicate that they are safe, effective, providers of high-quality care in a variety of settings.^{4,15,16} The implementation of

use of a neurosurgical ACNP at UVA and RMH as described is an effective approach by the 2 facilities to meet the changing needs of their healthcare systems. Other hospitals faced with similar challenges to the delivery of patient care may use a model similar to that described here to bridge the gap in care provision that exists for many populations of patients.¹⁶

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