Clinical Scholars Review is a biannual, peer-reviewed publication focused on presenting articles that demonstrate clinical excellence in the application of evidence-based practice of doctoral nursing. Articles submitted for consideration discuss clinical practice and patient care; case studies; practice issues, including management, scope of practice, and reimbursement; ethical dilemmas, legal issues, and business practices; innovative methods of teaching and evaluating advanced practice and profiling the scholarly nature of clinical practice of nursing.

The mission of the Clinical Scholars Review is to support the advancement of the doctoral practice of nursing.

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The manuscript should conform to the Publication Manual of the American Psychological Association, 5th Edition, 2001, in matters of style and formatting, including the text, references, and tables. Digital files for any figure should conform to tiff at 300 ppi or eps. Please include written permission for previously published materials.

A brief abstract (no more than 200 words) should accompany the manuscript. Authors should supply a list of four keywords describing the scientific content of the article and which should be used for indexing in bibliographic databases.

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We are thrilled with the initial response to our new journal and believe that the mission and content fulfill a need expressed by Doctor of Nursing Practice (DNP) faculty and graduates around the country. From legal and ethical issues to the business of advanced practice to case studies, the *Clinical Scholars Review* will continue to focus on subject matter relevant to today's doctorally prepared nurse clinicians.

Doctoral-level nurse practitioners, nurse anesthetists, and nurse midwives are now being offered the opportunity to be certified by the American Board of Comprehensive Care (ABCC)—the certification arm of the Council for the Advancement of Comprehensive Care (CACC). Founded in 2000, CACC is the leading academic organization for the promulgation of doctoral-level clinical nursing. The council is a consortium of distinguished academic and health policy leaders committed to assuring high standards of doctoral nursing practice. To distinguish DNP graduates who have achieved a high level of competence in comprehensive care, CACC and the National Board of Medical Examiners (NBME) have agreed to offer a certification examination that will validate the advanced clinical competency of these graduates.

The purpose of this exam is to test DNP graduates' medical knowledge and understanding of clinical science considered essential for the sophisticated practice of comprehensive care, with emphasis on patient management in ambulatory care settings. This provides evidence of the competence necessary to assume independent responsibility for providing comprehensive care to patients. DNP competencies developed by CACC (2003 and 2006) and published by the American Association of Colleges of Nursing (2006) are covered in this exam. Successful DNP candidates will be designated diplomates in comprehensive care.

We hope that all DNP graduates from programs with a clinical focus will take this groundbreaking examination.

**Call for Papers**

For a fall 2009 conference on evidence-based practice/practice-based evidence, please submit your recommendations for a top 10 article of the year. The criteria for submission are the article must be written by a nurse author and it must address some aspect of doctoral-level clinical care. Send submissions to: Jennifer Smith, Editor, Clinical Scholars Review, 630 West 168th Street, New York, NY 10032.

Jennifer Smith, MBA, MPH, DNP
Editor

The editor and board of the *Clinical Scholars Review* note with regret the death of board member and Dean of the UCLA School of Nursing, Marie Cowan, PhD. Her wisdom and contributions to the profession and to this journal were profound and will be sorely missed.
American Board of Comprehensive Care Certification (ABCC): Too Close to Medicine?

Mary O’Neil Mundinger, DrPH
*Columbia University School of Nursing, New York, NY*

Some skeptical members of nursing and medicine have been challenging the landmark ABCC certification from perspectives that appear different but are stunningly similar: Should nursing utilize testing of medical knowledge as part of its new certification for doctors of nursing practice?

Though this is the common query, it arises from different concerns. Some nursing organizations (the National Council of State Boards of Nursing [NCSBN], for example) worry that using a medical exam would facilitate medicine’s increased oversight of nursing practice. NCSBN officers worry that if doctors of nursing practice (DNPs) prove they can practice comprehensive generalist medical care then doesn’t that lead to organized medicine regulating nursing practice? Shouldn’t all testing and certification be solely from nursing?

Medicine sees something else; if DNPs can prove they can practice generalist comprehensive medical care, won’t the public be bamboozled into thinking a physician is caring for them when that professional is, in fact, a nurse? This argument led to two recent American Medical Association (AMA) resolutions. One opposed the National Board of Medical Examiners (NBME) for agreeing to develop a test for ABCC to measure DNPs for the same competency as the U.S. Medical Licensing Examination (USMLE) Step 3 examination for physicians’ competency. The resolution also requested that the AMA adopt a policy that DNPs must only practice under physician supervision. A second resolution protects the “doctor” and “resident” titles so that in a medical setting they apply only to physicians, dentists, and podiatrists. These resolutions as well as thousands the AMA has passed previously have no regulatory authority.

These nurse and physician groups (and some individuals) are queasy about the same issue: Aren’t DNPs looking too much like physicians? And if so, is that a bad thing?

With any evolution, progress is minute and unrecognizable until certain barriers are breached. Just as lobefinned fish grew limbs and swam like conventional fish before they walked out of the water toward the next pond, advanced practice nurses developed a broad medical knowledge base before announcing they were ready to be measured against conventional medical doctors. Looking back, that progress has been quite visible and has been charted carefully by federal and state regulation. Nursing experienced and celebrated this progression, but medicine turned a blind eye (at least conventional generalist medicine did). Physicians in the specialties saw this evolution coming and celebrated the new partnership. So what exactly is a DNP, and why add medical measurements to a nursing certification?

A DNP is a nurse with extensive, sophisticated education resulting in practice that incorporates distinctive nursing—and medical—competencies in comprehensive care. This new hybrid professional is exquisitely prepared for independent care of sick individuals who require initial diagnosis and treatment and coordinated care across sites (office/emergency room/hospital/long-term care), and over time, from a variety of clinicians.

This is more than primary care and more than conventional generalist medicine. DNPs learn to provide comprehensive medical care and embed this knowledge and skill set in a nursing approach that embraces the patient as a member of a family and a community and as an individual who requires education, advocacy, and support.
Patients who choose a DNP for their comprehensive care provider should be assured that the clinician has the requisite medical skills and knowledge. How better to do this than to have DNPs take an exam testing the same competency as a medical doctor? Patients deserve proof of this unquestionable standard.

Nurses have been on a path to this ultimate degree and certification for over 40 years. Slowly and surely after the nurse practitioner arrived on the scene in 1965, nurses with advanced skills in medical diagnosis and treatment have been recognized by federal (Medicare) and state (Medicaid) reimbursement. Medicine took little notice because most patients were poor or lived in undeserved or rural communities where there were few physicians and therefore no competition between physicians and nurse practitioners. This all changed in 1997, when Columbia University School of Nursing nurse clinicians opened a primary care practice in midtown Manhattan, challenging the idea that mainstream commercially insured patients would only choose a physician for their care. The New York State Medical Association took notice—after 30 years—and decided that nurses providing primary care were practicing medicine and should be shut down. It was too late. The fish had limbs, and the next pond was within walking distance. Formalizing these new and expanded skills in the DNP degree was clearly the next step. The bridge was secured.

Adding an (NBME) exam to the ABCC certification process, testing the same competency as medical doctors, is the gold standard for quality and safety as DNPs assume independent positions in comprehensive care. The NBME sees its mission as providing reliable standards that promise high quality care and patient safety. The exam helps meet this mission. If nursing alone develops a certification exam, the bridge is broken; the argument would then have to be made that certification by nursing is equivalent to certification by medicine. The public simply will not buy this, and nursing will continue as a second-tier profession.

Medicine cannot regulate the nursing profession, especially as it moves increasingly into an area of independent practice. The NBME exam is only one of four components in the certification process, with the other three developed solely from within nursing. ABCC provides a nursing certification measuring nursing at its highest level of practice.

Nurses who earn the DNP will be called “doctor,” just like others in health care disciplines who have reached the highest level of clinical proficiency. Dentists, psychologists, podiatrists, social workers, and nurses provide distinctive services and are each appropriately called “doctor.” Although there are many shared competencies among health care professionals, this does not confuse patients who know the difference and value the distinctions.

Comprehensive care is new and different. It is an amalgam of nursing and medicine. It will be the new and better “primary care,” which is in steep decline in medicine. The public needs this new professional and needs to know that DNPs are not only exemplary nurses, but that they also have the medical competency to deliver and coordinate patient care.

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Case Study

A 30-year-old female patient arrives in your office for a routine physical exam with concerns about breast cancer. Her mother died of breast cancer 5 years ago. She is worried that she may have the BRCA 1/2 “gene” that she heard about in the news and requests genetic testing, but she is fearful about what the tests may reveal and her potential options for treatment.

The completion of the Human Genome Project (HGP) in 2003 was an unprecedented event of the 21st century. The sequencing and subsequent mapping of human genes is a great source of discovery that has unlocked the possibility of establishing the mysteries of gene functioning and the mechanisms that trigger human diseases. At the same time, the knowledge of genetics and the human genome raises several broad ethical issues not only for individuals and society but also for practitioners in a position to offer genetic tests and therapies to their patients. Advanced practice nurses should be informed about ethics and genetics because genetics information may be relevant to the future health care needs of their patients and patients’ family; genetic testing may predict disease for which there are no existing treatments and/or assurances; and genetics knowledge has implications for both the patient and his/her family that might require difficult choices and value conflicts (Burgess, Laberge, & Knoppers, 1998).

Today, genetic tests “aimed at identifying the presence of a gene mutation or a gene protein product” (Grady, 1999, p. 391) are readily available for more than 1,500 genetic disorders (Hudson, Holohan, & Collins, 2008). Indeed, the Internet provides immediate public access to genetic testing companies that will analyze an individual’s DNA sample for health conditions that range from HIV/AIDS progression to familial Alzheimer’s disease. As illustrated by the case example, hereditary genetic testing for breast cancer (BRCA1 or BRCA2) can help women determine their risk of developing the disease, but it cannot tell them whether cancer will actually occur. As more members of the public seek safe, credible, and reliable genetic testing and information through different venues, they will ultimately need professional assistance and counseling to help them make sense of the possible social, psychological, physiological, and economic implications of the results. But how should health care providers communicate probabilistic, complex information that might or might not result in disease?

Several ethical principles can provide guidance to the communication of genetics-related information. These include respect for persons, beneficence, and justice (The National Commission for the Protection of Human Subjects, 1978). First, it is important for clinicians to assess patients’ understanding of their risk of illness, reason(s) for wanting genetic testing, and possible outcomes so they can make informed, knowledgeable health care-related decisions. Informed consent acknowledges a patient’s right to make autonomous decisions that reflect his or her personal values and beliefs about their genetic
information. Informed consent relies on the capacity of an individual to make voluntary decisions about his or her health care after adequate disclosure of the specific elements of the genetic-related test, research, or procedure in question. Such disclosure should include an explanation of the nature and purpose of the genetic testing, the risks and benefits, the statement of confidentiality, the right of refusal without penalty, and the alternatives.

The ethical principle of beneficence obligates clinicians to do no harm to their patients and to maximize the possible benefits and minimize the possible harms of genetic information and testing. However, both genetic testing and genetics-related research studies may result in psychological distress to the patient and his or her family. For example, there may be misunderstandings and anxiety associated with risk estimates of carrying a specific genetic marker or predictive genetic test results or diagnoses (especially when there are no treatment options). Some individuals will feel pressure from family members and concern about the impact on future generations or uncovering misattribution of parenthood and other related issues (Burke, 2002; Wilfond, 2000).

Additional ethical concerns of privacy, confidentiality, and discrimination surface because of the possibility of recognizing a patient’s unique identity and possible repercussions from employers and health care insurance companies. Patients have the right to expect confidentiality and protection of their personal health-related information, including genetic information. This is a matter of justice and what is considered fair, due, or owed to persons; genetic mutations or variations should not preclude individuals from equal access to employment or health care insurance. Although there is minimal evidence of actual discrimination by health care insurers, several studies report participants’ concerns about health insurability discrimination and employability of relatives because of the proband’s genetic results. Regrettably, health insurability concerns have been shown to be associated with decisions to forgo genetic testing and counseling for hereditary cancer diagnoses (Armstrong et al., 2003; Hadley et al., 2006; Plantinga et al., 2003).

The Genetic Information Nondiscrimination Act (GINA) was passed by both houses of Congress and signed into law (H.R. 493) by President Bush in May 2008. In effect, it will become illegal for workplace employers and health care insurers to discriminate against any person with a known genetic predisposition to a disease. By no means, however, will the bill constrain health care providers; “they may still use their clinical judgment to decide whether or not to recommend genetic testing to patients under their care” (Collins, 2008; Hudson et al., 2008, p. 2662). This includes essential core nurse

<table>
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<th>TABLE 1. Genetic Resources for Advanced Practice Nurses</th>
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<tbody>
<tr>
<td>Genetics Web Resource</td>
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<tr>
<td>American Board of Genetic Counseling (ABGC)</td>
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<tr>
<td>International Society of Nurses in Genetics</td>
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<tr>
<td>National Coalition for Health Professional Education in Genetics (NCHPEG)</td>
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<td>National Human Genome Research Institute</td>
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</table>

competencies for genetics and genomics as outlined by Jenkins and Calzone (2007), such as (1) conducting a thorough health and physical assessment and construction of a pedigree for genetic risk factor influences, (2) discussing the potential benefits and risks of genetic testing with patients, (3) addressing concerns of privacy and confidentiality of results as well as issues of discrimination, recognizing that each state varies in its protections of genetic information, (4) discussing and interpreting the results of genetic testing with patients in person and encouraging them to bring supportive persons with them, if available, (5) referring the patient(s) to a genetic counselor or other specialized services depending on the clinician’s expertise and comfort level in discussing genetics information, and (6) working with third-party payers to facilitate reimbursement for genetic services as needed (see Table 1).

It behooves clinicians to maintain an open dialogue with patients about their genetic, environmental, and lifestyle risk factors and how genetic testing can help guide preventive care or treatment for some patients. Ultimately, the patient must choose his or her best course of action. Knowledgeable providers can, however, advocate for the responsible use of genetic information while at the same time recognizing its limitations. Thinking through the ethical principles of respect for persons, beneficence, and justice can assist providers as they continuously weigh the benefits and risks of genetic information and its impact on the health and well-being of individual citizens and future generations.

References


Acknowledgments. The opinions are the personal views of the authors and do not reflect the official policies or positions of the Department of Health and Human Services, NIH, or the Public Health Service.

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When I started practice as a nurse practitioner (NP) in the mid 1970s, charging for NP services in the ambulatory care setting was not done on a routine basis for the services we delivered. Most charges were either bundled with the physician charges or written off as bad debt. If we did charge, we did at a much discounted rate. When charges and a subsequent invoice were generated it was extremely controversial. The arguments we received from insurance companies and physician groups related to quality of service, costs of NP care versus physician care, education levels and the costs of that education, tradition of not billing for nursing services, legal issues, or simply that patients wouldn't pay to see a nurse practitioner when they could see a “real” doctor. The arguments against NPs charging for services were many, yet so were our contra arguments. We eventually triumphed and were reimbursed for our services.

Thirty-four years later, charging for and being reimbursed for NP services is a given—albeit not at the levels we would like—but billing and reimbursement for services rendered is generally accepted as the norm. We still have equity reimbursement issues with which we struggle, but ambulatory care billing and reimbursement have come a long way over the years.

Today, in the acute care setting, we face the same issues we faced 34 years ago in the ambulatory care setting—legal, political, equity, policy, and even opinions. This month's featured business article by Dr. Elizabeth Ellis highlights a relatively new concept for many NPs—charging for NP services in an acute care setting. Though some NPs who visit patients in the hospital have generated charges and have eventually been reimbursed by various insurance companies for many years, the concept of institutional (i.e., hospital) NP charges is not widespread. Though many acute care institutions have entertained the concept, few have attempted it. Those who have attempted it are not satisfied with the process or result, and many have abandoned the practice altogether due to the complexities and issues involved. Dr. Ellis's article reflects on the issues related to charging for NP services in the acute care setting and discusses how one model is moving in that direction.

Learn and practice.

Thomas A. Mackey, PhD, FNP-BC, FAAN, FAANP
Modeling the Health and Medical Care Spending of the Future Elderly

Policymakers face the challenge of understanding and managing future Medicare spending. Under current projections, it will rise from 2.6% of gross domestic product today to 9.2% in 2050. Demographics will be key: The first wave of baby boomers turns 65 in 2010. But what if some biomedical advance revolutionizes medical practice? What if a cure were found for one of the deadliest diseases? What if the health status of the elderly continues to improve? What if prevention efforts become more effective? Would such changes ease Medicare’s financing problems?

To answer such questions, a team of economists and physicians from the RAND Corporation, Stanford University, and the VA (Veterans Affairs) Greater Los Angeles Healthcare System explored how changes in medical technology, disease, and disability would affect health care spending for the population age 65 and older (see Table 1). Their key findings: Medical innovations will result in better health and longer life, but they will likely increase, not decrease, Medicare spending. Eliminating any one disease will not save a great deal of money, but reducing obesity might be an important exception. Also, prevention efforts focused on the most important risk factors for disease, especially those requiring costly treatments, could be very cost-effective.

Modeling the Future

Economist Dana Goldman and his colleagues developed the Future Elderly Model (FEM), a demographic and economic model to predict future costs and health status for the elderly (see Figure 1). The model uses a representative sample of approximately 100,000 Medicare beneficiaries age 65 and over drawn from the Medicare Current Beneficiary Surveys, national surveys that ask Medicare beneficiaries about chronic conditions, use of health care services, medical spending, and health insurance coverage. Each beneficiary in the sample is linked to Medicare claims records to track actual medical care use and costs over time.

<table>
<thead>
<tr>
<th>TABLE 1. Key Findings</th>
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<tr>
<td>• Medical innovations will improve health and extend life, but they will probably increase, not decrease, Medicare spending.</td>
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<tr>
<td>• Eliminating any one disease, with the possible exception of obesity, will not save Medicare money mainly because of valuable life extension.</td>
</tr>
<tr>
<td>• Better prevention could decrease costs and improve health, but the value of specific prevention efforts reflects both clinical outcomes and demographic trends.</td>
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The model begins with the health status of the sample in the current year; estimates the medical services beneficiaries will use; and simulates the change in their health and functional outcomes, including death, over the course of the year. One of the important innovations of this model is its incorporation of information about the health of younger cohorts that will eventually age into Medicare. Specifically, a new set of 65-year-olds is added every year through 2030, and their health is also predicted based on the health of younger cohorts as described in the National Health Interview Study, another national survey. Rolling the model forward year after year makes it possible to predict medical costs and health status far into the future.

The research team used FEM to explore how future Medicare costs might be affected by health status trends, medical innovations, reduction of chronic diseases, and the number of elderly who are obese.

Effects of Health Status on Medicare Spending

The health of the population over age 65 has been improving since the early 1980s. But recent increases in chronic disease, obesity, and disability suggest that future Medicare beneficiaries might be less healthy than current ones. To understand the net effect of these trends on Medicare spending, the research team used the model to estimate the health of future Medicare beneficiaries under three sets of assumptions.

- In scenario A, the research team forecast the health of new beneficiaries using all the information available, including the health of younger cohorts. This is the scenario the team deemed most credible.
- In scenario B, the team assumed that entering cohorts would have the same constellation of diseases and disabilities as the healthy cohorts from the 1990s; this scenario ignores information about disease and disability in younger cohorts.
- In scenario C, the team assumed continued improvement in the health status of the entire elderly population and of the entering cohort; this scenario has the most favorable assumptions for Medicare spending.

The team found that lower disability rates do translate into lower health care costs per beneficiary (see Table 2). Under scenario A, in which the estimate uses information about the health status of younger cohorts, spending is projected to be $11,206 per beneficiary in 2030. In the more optimistic scenario C, spending per beneficiary is 8% lower at $10,275.

However, total Medicare spending under these three sets of assumptions does not differ much. As Figure 2 shows, by 2030, scenario A and scenario B differ by only 2% per year. Even under the most optimistic assumptions (scenario C), the cost savings are only 6%.

The reason is simple: Cumulative Medicare spending is relatively unaffected by the health status of new beneficiaries because healthier people live longer. Thus they have more years in which to accumulate costs.

There is another reason that lower disability rates do not translate to lower overall Medicare spending. FEM was used to examine relative spending on the disabled over time. During the period 1992 to 2000, medical spending grew most rapidly among the least disabled community-dwelling elderly. Thus, reducing disability rates will not result in substantial Medicare savings, not only because...
beneficiaries who live longer have more time to accumulate medical costs, but also because spending increases are greater among less disabled beneficiaries.

**Effects of Technological Innovation on Medicare Spending**

The discussion above assumes the practice of medicine will not change significantly in the coming decades. But what if it did? How might technological innovation affect future Medicare spending?

To identify technologies to examine, the analysts conducted a systematic literature review and then elicited consensus from panels of distinguished experts in cardiovascular disease, cancer and the biology of aging, and neurologic disease—the three clinical domains in which innovations were judged to have the greatest potential effect on health status and costs. The team chose to analyze the 10 technologies that the experts thought were most likely to be widely adopted (see Table 3, “Key Technologies Identified by the Panels of Experts”).

The team assessed how each innovation affected spending and life years saved over the period 2002–2030, assuming that each innovation was fully adopted by 2002. Table 4 highlights the researchers’ key findings. Several striking patterns emerge.

**Figure 2.** Total Medicare spending under the three scenarios, 2002–2030 (2005 dollars).


**TABLE 3.** Key Technologies Identified by the Panels of Experts

<table>
<thead>
<tr>
<th>Technology</th>
<th>Annual Treatment Cost, 2030 (Billions of 2005 Dollars)</th>
<th>Percentage Increase in Health Care Spending in 2030</th>
<th>Cost per Additional Life Year (2005 Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antiaging compounds (healthy)</td>
<td>93.1</td>
<td>13.8</td>
<td>11,245</td>
</tr>
<tr>
<td>Cancer vaccines</td>
<td>1.0</td>
<td>0.4</td>
<td>23,330</td>
</tr>
<tr>
<td>Treatment of acute stroke</td>
<td>5.6</td>
<td>0.4</td>
<td>28,024</td>
</tr>
<tr>
<td>Antiaging compounds (unhealthy)</td>
<td>93.8</td>
<td>70.4</td>
<td>38,105</td>
</tr>
<tr>
<td>Telomerase inhibitors</td>
<td>8.2</td>
<td>0.5</td>
<td>79,170</td>
</tr>
<tr>
<td>Alzheimer’s prevention</td>
<td>62.8</td>
<td>8.0</td>
<td>102,774</td>
</tr>
<tr>
<td>ICDs</td>
<td>26.5</td>
<td>3.7</td>
<td>131,892</td>
</tr>
<tr>
<td>Diabetes prevention</td>
<td>26.4</td>
<td>3.2</td>
<td>188,316</td>
</tr>
<tr>
<td>Anti-angiogenesis</td>
<td>66.4</td>
<td>8.0</td>
<td>638,141</td>
</tr>
<tr>
<td>LVADs</td>
<td>18.2</td>
<td>2.3</td>
<td>654,968</td>
</tr>
<tr>
<td>Pacemakers for atrial fibrillation</td>
<td>17.4</td>
<td>2.3</td>
<td>1,795,846</td>
</tr>
</tbody>
</table>

*Figure 2. Total Medicare spending under the three scenarios, 2002–2030 (2005 dollars).*
Some Technologies Will Be Extremely Expensive.
For example, intraventricular cardioverter defibrillators (ICDs) are very effective for patients with life-threatening arrhythmias. A recent coverage decision expands prophylactic ICD use to patients at high risk of sudden death from ischemic cardiomyopathy. But if use is expanded to patients with other heart problems, then costs could rise quickly. The research team simulated the effects of expanding ICD use to half of elderly patients with new cases of heart failure or heart attack. This would result in approximately 374,000 procedures annually in 2015 and 550,000 in 2030 and total treatment costs of $14 billion and $27 billion, respectively. The cost per additional year of life would be about $132,000.

Some Technologies Improve Health but at a Very High Price. For example, antiangiogenesis, pacemakers for atrial fibrillation, and left ventricular assist devices (LVADs) are all costly relative to their known health benefits. If these technologies are broadly applied, costs per additional life year would be very high.

Some Technologies May Have Modest Costs per Additional Year of Life Saved, but They Will Increase Health Care Spending Substantially. For example, an antiaging compound would increase health care spending by 14% in 2030 because, if the compound had been taken by healthy beneficiaries starting in 2002, there would be 13 million more Medicare beneficiaries in 2030. However, the cost per additional year of life is only $11,000. If the compound is keeping unhealthy people alive longer, total health care spending in 2030 would be 70% higher: There would be more elderly people in poor health. The cost per additional life year of $38,000 is still relatively modest.

The case of antiaging compounds underscores the tension inherent in medical innovations: They keep people alive longer, but as a result people incur more health care costs. Overall, however, society would consider the additional years well worth the additional dollars.

Effects of Reducing Chronic Illness on Medicare Spending
Chronic illnesses such as heart disease, cancer, and diabetes are expensive to treat. As a consequence, the relatively small proportion of Medicare beneficiaries with such diseases account for a disproportionate share of Medicare spending—perhaps as much as three-quarters of the total. Could reducing the prevalence of chronic illness among beneficiaries improve Medicare’s financial outlook?

Economist Geoffrey Joyce and his colleagues used FEM to examine how seven of the most common chronic illnesses affect average life expectancy and health care spending among Medicare beneficiaries from age 65 until death. The diseases they focused on were hypertension, diabetes, cancer (lung, breast, prostate, colon, uterine, throat, bladder, kidney, and brain), chronic obstructive pulmonary disease (COPD) (chronic bronchitis, emphysema, and some forms of asthma), acute myocardial infarction, coronary heart disease, and stroke.

Table 5 highlights their key policy findings.

Chronic diseases clearly affect both life expectancy and health care costs. Reduction in life expectancy ranges from 0.3 years for a beneficiary with hypertension to about 3 years for a beneficiary with stroke or diabetes.

All of these diseases increase annual health care costs over the cost incurred by a similar individual without the disease. However, cumulative health care spending is only modestly higher for those with chronic diseases, ranging from about $5,000 to $18,000. Put another way, beneficiaries with chronic disease do not cost Medicare a great deal more than those without such diseases because the chronically ill live fewer years.

Chronic illness has a similar effect on Medicare payments, although the level of spending is slightly lower. Annual Medicare expenses increase by about $750 to $2,000 for persons with a serious chronic illness at age 65.

TABLE 5. Changes in Average Life Expectancy and Medical Spending Associated With Selected Chronic Conditions at Age 65

<table>
<thead>
<tr>
<th>Disease Condition at Age 65</th>
<th>Average Reduction in Life Expectancy (Years)</th>
<th>Annual Lifetime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>3.0</td>
<td>1,777  4,870</td>
</tr>
<tr>
<td>COPD</td>
<td>2.8</td>
<td>1,951  7,878</td>
</tr>
<tr>
<td>Hypertension</td>
<td>0.3</td>
<td>878  12,343</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>0.6</td>
<td>1,078  14,957</td>
</tr>
<tr>
<td>Cancer</td>
<td>2.1</td>
<td>1,787  15,709</td>
</tr>
<tr>
<td>Diabetes</td>
<td>3.1</td>
<td>2,469  16,672</td>
</tr>
<tr>
<td>Acute myocardial infarction</td>
<td>2.3</td>
<td>1,966  17,574</td>
</tr>
</tbody>
</table>

Note. Dollar figures are inflated from 1999 to 2005 using the medical Consumer Price Index.

while cumulative Medicare expenses increase by $2,500 to $15,000 across the seven chronic conditions.

There are two primary reasons why cumulative expenditures are only modestly different for those with and without the disease at age 65. First, many beneficiaries without a condition at age 65 will develop it in subsequent years. Thus the cost savings from better health at age 65 do not accrue indefinitely. Second, the costs incurred in the final year of life are substantial and largely unchanging in relation to disease condition or age. Extending life by several years reduces the high (discounted) costs incurred prior to death, but they cannot be avoided altogether under the current system of care.

Many of these chronic diseases are preventable or their burden can be greatly reduced. Prevention and screening for these conditions could be effective public health measures. However, such efforts will only modestly reduce Medicare’s future health care costs.

Effects of Cancer Treatment on Medicare Spending

Cancer is largely a disease of old age. For example, about 60% of cancer patients in 2001 were age 65 or older. Because cancer treatment is expensive, changes in cancer treatment would certainly affect Medicare spending. A team of analysts used FEM to project spending on cancer care among the elderly through 2030.

To capture the uncertainty about the nature of future cancer treatment, the team estimated the future costs of treatment using five widely varying scenarios of technological change:

- Cancer treatment technologies existing in 2000 remain the same until 2030.
- New drugs developed between 2000 and 2004 improve treatment outcomes.
- Cancer screening technologies improve significantly.
- A cancer vaccine is developed.
- A cure for cancer is discovered.

These scenarios, which range from very pessimistic to very optimistic, reflect the judgments from a panel of experts on cancer and the biology of aging. Some of the scenarios would keep some people alive long enough to contract other diseases. If these diseases are expensive to treat, a relatively inexpensive and effective cancer treatment could end up increasing Medicare spending. An important feature of FEM is its ability to model the outcomes of such competing mortality risks.

Figure 3 shows FEM’s projection of cancer prevalence among the elderly, based on each of these scenarios.

(Prevalence is the number of individuals age 65 and over reporting having cancer in a given year divided by the total number of individuals age 65 and over in that year.)

If there is no change in treatment, cancer rates decline from close to 20% in 2000 to about 16% in 2015 and then remain unchanged through 2030. The decline reflects the fact that people aging into Medicare between 2000 and 2015 were healthier than previous beneficiaries because the former group had lower smoking rates. By 2015, this replacement process reaches a steady state.

In two cases, the scenarios increase the prevalence rate. New drugs could increase the survival rate so that at any given time there would be more people alive with cancer. Better screening technologies would increase cancer prevalence because previously undetected cancers would be found at an early stage, and early stage cancer patients are more likely to survive.

Both a vaccine and a cure would reduce cancer prevalence. In the case of a vaccine, prevalence would essentially reach zero after the remaining cancer survivors die. In the case of a cure, cancer prevalence would drop immediately to zero.

However, none of these scenarios would significantly affect total Medicare spending. In every case, total medical spending for the elderly will increase dramatically between 2005 and 2030 because the elderly population will increase dramatically during that period. Demographics swamp the effects of even the most impressive technological developments.

Effects of Obesity on Medicare Spending

Analysis using FEM suggests that eliminating any one disease will not dramatically affect future health care costs.
But obesity might be an exception to this rule. If it is, then combating obesity could have important implications for Medicare because close to half of the U.S. population is overweight. Obesity is a “double whammy” for Medicare because it raises annual health care expenditures but does not affect longevity and thus the number of years spent in the Medicare system.

Darius Lakdawalla and his colleagues used FEM to track the health conditions, functional status, and Medicare and total health care spending for obese and nonobese 70-year-old Medicare beneficiaries. The team divided the sample into four categories based on body mass index (BMI): underweight (BMI 20 or less), normal (BMI 20–24.9), overweight (BMI 25–29.9), and obese (BMI 30 or more). (BMI is weight in kilograms divided by height in meters squared.) For each weight class, they predicted three sets of health indicators: expected years spent healthy or frail, prevalence of disease in old age, and medical spending in old age.

The research team found no difference in overall life expectancy between an obese 70-year-old and one of normal weight. However, weight has a strong effect on the number of disability-free years that a 70-year-old can expect (see Figure 4). The obese can expect only 4 disability-free life years. They will spend 40% more time disabled than their normal-weight counterparts, who can expect nearly 7 years without disability.

Greater disability translates into higher health care spending. Figure 5 highlights the high costs to Medicare of obese beneficiaries.

Starting at age 70, an obese person will cost Medicare about $149,000, the highest level of any group. Medicare spending on an obese person is 20% higher than for the next closest group, the overweight, and 35% higher than spending on a person of normal weight. Thus, Medicare could experience considerable financial burden from the increase in obesity nationwide, spending about $38,000 more over the lifetime of an obese 70-year-old than it will spend on a beneficiary of similar age and normal weight.

However, Lakdawalla and his colleagues argue that the disability effects of obesity, rather than increased spending, might be the more important component of the social burden of obesity.

**The Value of Preventing Disease Among the Elderly**

The studies summarized above suggest that medical innovations will improve health and extend life but are likely to increase rather than decrease Medicare costs. In addition, with the possible exception of obesity, eliminating any one disease will not save Medicare money. But what about forestalling expensive diseases? The panel of experts described above who identified the medical technologies most likely to affect the health of future elderly noted that the most dramatic improvements in population health would result from lifestyle changes and better prevention.

Dana Goldman and his team used FEM to explore the nature and magnitude of such improvements. The researchers examined the cost and health effects of reducing/eliminating the key risk factors linked to heart disease, one of the leading causes of mortality among the elderly. The risk factors they modeled—hypertension, smoking, obesity, and diabetes—were identified by the expert panel as areas where prevention could have the greatest potential effects.

To determine the greatest possible benefit from prevention, the team made the following assumptions:
• Hypertension is effectively treated in all elderly.
• A smoking cessation program is 100% effective.
• Rates of obesity are cut in half, returning them to levels in the 1980s.
• Diabetes is perfectly controlled.

Identifying how prevention efforts affect costs and health involves tracking complex interactions between clinical outcomes and demographic trends. For example, a completely successful smoking cessation program does not substantially reduce heart disease among the elderly because (1) smoking cessation is less effective in reducing heart disease among the elderly, and (2) not smoking keeps people alive somewhat longer and age, by itself, puts people at risk for heart disease.

The analysts combined health and population changes into an overall effect—disability-adjusted life years (DALYs). Table 4 highlights potential benefits of prevention in terms of both DALYs and spending for the 108 million Medicare beneficiaries who will enter the program between 2005 and 2030.

Eliminating hypertension would result in 75 million additional DALYs and reduce total Medicare spending by about $890 billion. Perfectly controlling diabetes would result in even more additional DALYs; however, spending would increase. Why? Because individuals who develop diabetes are sicker before its onset than people who develop hypertension, so eliminating diabetes keeps these “more expensive” people alive longer. On the other hand, perfectly controlling hypertension reduces heart disease, which is expensive to treat.

Because FEM makes it possible to model the results of competing health outcomes and mortality risks, it provides insight to the most effective allocation of prevention resources, depending on the goal. For example, as noted above, obesity has no effect on mortality. However, it does affect both heart disease and diabetes. In fact, it is this pattern that produces the large reductions in medical spending shown in Table 6 when obesity is substantially reduced. Reduced obesity does not keep people alive very much longer, so they do not have more time to incur medical costs, but the years that they do live will be relatively disability free. So if the goal of obesity prevention is to save lives, then interventions have to happen early; if the goal is to reduce costs, interventions can wait until obese people are older.

**Ongoing Applications of the Future Elderly Model**

FEM is a powerful, flexible tool enabling policy analysts to understand future trends in health, health spending, medical technology, longevity, labor supply, and earnings.


<table>
<thead>
<tr>
<th>Prevention</th>
<th>Changes in Total DALYS (Millions)</th>
<th>Change in Total Spending (Billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension is eliminated</td>
<td>75.3</td>
<td>−890</td>
</tr>
<tr>
<td>The smoking cessation program is 100% effective</td>
<td>32.4</td>
<td>293</td>
</tr>
<tr>
<td>Obesity is reduced by 50%</td>
<td>16.4</td>
<td>−1,201</td>
</tr>
<tr>
<td>Diabetes is perfectly controlled</td>
<td>90.0</td>
<td>246</td>
</tr>
</tbody>
</table>

It is being used to examine such trends in individuals over age 50 in the United States and seven European countries (Germany, Sweden, the Netherlands, Spain, Italy, France, and Denmark). For example, analysts are using FEM to investigate how a reduction in smoking will affect the Social Security trust funds. FEM is also being used to examine how market size and pricing policies affect future innovation in the pharmaceutical industry and how alternative policy schemes affect the future health and welfare of consumers. With such efforts, policymakers will be better equipped to design social programs that improve health with the least possible public and private expenditures.

**This Highlight Summarizes RAND Health Research Reported in the Following Publications**


Goldman DP, Shekelle PG, Bhattacharya J, Hurd M, Joyce GF, Lakdawalla DN, Matsui DH, Newberry SJ, Panis CWA, Shang B, *Health Status and Medical Treatment of the Future*


Acknowledgments. Abstracts of all RAND Health publications and full text of many research documents can be found on the RAND Health Web site at www.rand.org/health. The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world. RAND’s publications do not necessarily reflect the opinions of its research clients and sponsors. RAND® is a registered trademark.
DNP Residency: A Model for the Clinical Doctorate

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The doctor of nursing practice clinical residency is a key component of doctoral nursing education that combines clinical practicum with scholarly reading and seminars to provide an in-depth experience for students. During the residency students integrate and synthesize knowledge by demonstrating competency in an area of nursing practice and completing a scholarly project. This article describes a doctor of nursing practice residency for students whose focus is the delivery of care to a panel of patients across clinical settings over time.

Keywords: doctor of nursing practice; residency; clinical; doctoral nursing education

Residency is becoming an integral part of nursing education. To address the transition from newly educated nurse to competent professional nurse, the American Association of Colleges of Nursing (AACN) and the University Health Systems Consortium collaborated to develop and evaluate a nurse residency program (http://www.aacn.nche.edu/Education/pdf/NurseResidencyProgramExecSumm.pdf). Institutionally based nurse residency programs have also emerged to address the staff nurse shortage. This trend is beginning to occur in educational programs for advanced practice nurses (APN). Traditionally, APN curricula are configured with simultaneous didactic courses and complementary clinical experiences and have not included cumulative practica. “The Essentials of Doctoral Education for Advanced Practice Nurses” (AACN, 2005) provides standards for practice doctorates and delineates criteria for an integrative end of program practice experience. The article discusses the need for in-depth practice experience that facilitates achievement of the essential and specialty competencies required for graduates of a doctor of nursing practice (DNP) program. The immersion experience at the end of the program provides an opportunity for students to integrate and synthesize knowledge acquired by demonstrating competency in an area of nursing practice and completing a scholarly project.

The Columbia Clinical Residency Model

Columbia University School of Nursing’s (CUSN) residency model is consistent with the CUSN DNP program purpose, which is to provide APNs with the knowledge and skills necessary for fully accountable, evidence-based care for patients across clinical sites over time. The goal of the residency is to provide DNP students with training and supervision to apply a model of comprehensive and continuous care in a seamless structure in order to encompass the ultimate scope of this level of advanced practice.

The CUSN DNP residency is an intensive yearlong clinical experience that occurs during the final year of the program. Clinical experience is the foundation of this residency. DNP students are expected to pursue independent study and participate in presentations, rounds, and seminars. Students integrate didactic instruction, seminars and clinical experience to develop case studies that demonstrate increasingly complex and proficient practice. The residency is guided by the DNP Competencies (Council for the Advancement of Comprehensive Care, 2003, 2006) (see Table 1). These competencies represent essential and complex cognitive, interpersonal, and psychomotor abilities. They provide the framework for the residency outcomes. Specific measurable...
performance objectives are derived from these competencies. The DNP Portfolio Objective Worksheet (Figure 1) outlines the performance objectives and the frequency that these objectives are demonstrated in portfolio case studies. This worksheet provides structure for case studies for DNP residents and to demonstrate achievement and for the faculty to evaluate successful performance (see Figure 1).

**Admission to the DNP Residency**

The model of education in the CUSN residency is structured and focused. The residency combines clinical experience with scholarly reading and seminars. The course director and portfolio advisers serve as faculty, coordinate the clinical placements, and maintain student evaluation in partnership with the residency mentor. The residency mentor is either a physician or DNP who agrees to precept and directly supervise the DNP resident in all clinical aspects of the experience. The course directors, portfolio advisers, and residency mentor monitor, guide, and evaluate the clinical competence of DNP residents.

The residency must provide access to, and authority for, care across site and over time within the student’s APN specialty. Students secure their own residency site, which may or may not be in the New York metropolitan area, and residency mentor. Students are encouraged to identify potential residency sites and mentors soon after admission to the program. The program director facilitates this process. The residency site may include a paid position. When considering paid positions, students are advised to consider the position responsibilities as well as their learning needs and negotiate unpaid time for academic experiences, clinical learning opportunities, and clinical scholarship, which are all part of the residency. The residency experience broadens the student’s exposure within his or her APN specialty and deepens and enriches the resident’s clinical ability in that specialty. Students do not acquire a new specialty. All residents are required to fulfill all the competencies and demonstrate the same performance objectives regardless of their specialty.

Students apply for the residency phase following successful completion of all required course work with a GPA of 3.0 or above and successful completion of a comprehensive examination. In addition, students are responsible for submitting the following documentation:

- Name of CUSN faculty member who acts as portfolio adviser
- Name and curriculum vitae of residency mentor

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**TABLE 1. DNP Competencies**

Provide health promotion, anticipatory guidance, counseling, and disease prevention services to healthy or sick patients in any clinical setting based on age, developmental stage, family history, ethnicity, and individual risk, including genetic profile.

Apply principles of epidemiology, environmental health, and biostatistics to identify population or geographically based risks to health of specific patients, and take action to reduce their risk.

Formulate diagnostic strategies to deal with ambiguous or incomplete data in developing differential diagnoses for patients who present with new conditions and those with complex illnesses, comorbid conditions, and potential multiple diagnoses with attention to scientific evidence, safety, cost, invasiveness, simplicity, acceptability, adherence, and efficacy in all clinical settings.

Determine the need for emergency evaluation and/or inpatient admission and manage/comanage and coordinate the care of patients in the emergency, acute, and subacute settings.

Identify and select appropriate interventions that incorporate cultural values that meet the needs of specific patients at all levels of acuity in the most appropriate setting.

Establish and utilize a collaborative network of specialists while maintaining primary responsibility for patient care and accept referrals from other health professionals and agencies to provide optimum care.

Manage chronic illness utilizing specialists, other disciplines, community resources, and family, maintaining continuity of care to provide a seamless flow of patient data and continuity of care when the focus of care shifts among office, hospital, home, chronic care facility, or community settings.

Identify gaps in access and/or reimbursement that compromise patient’s optimal care and apply current knowledge of the organization and financing of health care systems to ameliorate negative impact and/or reduce barriers to patient access.

Introduce and guide the process of planning end-of-life care by facilitating understanding of diagnoses and prognosis, clarifying patient desires and priorities, promoting informed choices through discussion with patient, family, and members of the health care team.

Utilize the principles of legal and ethical decision making to identify and analyze dilemmas that arise in patient care, interprofessional relationships, research, and practice management and take action to resolve the issues.

Utilize and synthesize evidence and use informatics tools to extract data from clinical information systems and patient databases to perform data mining. Analyze data to generate evidence from practice that improves patient care.

*Note.* Revised July 20, 2008.
• Description of the primary setting for the experience and the anticipated cross-site settings
• Individualized objectives
• Letter of agreement and support between DNP student and residency mentor

**Description of the DNP Residency**

The residency is structured to assure that the DNP graduate possesses the advanced knowledge and applied skills to provide evidence-based quality care across settings and over time. Components of the residency are scholarly activities combined with documented outcomes achieved in multiple settings and sites of care. DNP residents are integral to the provider team and assume an expanded scope of practice for a panel of patients. Although settings vary, the principles of coordinated care are paramount. Of necessity, these experiences include all sites where DNP residents’ patients require care. Gaps in clinical experience are identified at regularly scheduled conferences with portfolio advisers, and individual arrangements are made to enhance and expand the practicum.

During the residency, monthly conferences include a full class seminar where residents share their scholarly...
work in progress for peer and faculty appraisal. Residents attend formal symposia clinically relevant to doctoral outcomes. At these monthly conferences, residents meet with their advisers to assess progress and performance and set long- and short-term goals.

**Direct Patient Care Component of the Residency**

DNP residents have ongoing experience in all settings, including ambulatory, inpatient and long-term, rehabilitative and subspecialty care. In addition, DNP residents participate in rotations as needed. All encounters in direct care are logged into an online tracking system.

The clinical component consists of longitudinal modules and rotations. Longitudinal modules are ongoing and include sessions in a continuity ambulatory care setting and when applicable to patients' needs, home care, rehabilitative, and residential care.

Rotations are in the emergency care department, acute inpatient setting, and specialty or subspecialty departments.

**Academic Components of the Residency**

Although the clinical experience is central, students participate in multiple academic activities. Each resident attends at least four conferences and/or seminars every week. Residents attend and make presentations at Grand Rounds and/or seminars, Journal Club, morbidity and mortality conferences, and spend at least 8 hours/week in individual scholarship. The academic aspects of the residency are logged into an online tracking system. Possible venues for these academic activities are listed in Table 2.

In addition, residents are required to be involved and contribute to interdisciplinary initiatives. Throughout the experience, residents are expected to participate at different levels, including the assumption of leadership roles.

**Evaluation of the Residency**

The residency is evaluated using several methods. Residents' successful completion of the residency is one method of evaluation. End of course online evaluation is an important evaluation tool. Comments in residents' online evaluation have included, “the residency for the DNP has been extraordinary in terms of experience and new opportunities for growth” and “the residency course focuses on providing high-quality, evidence-based care to patients, which is the most important reason I took on this doctoral program.”

**TABLE 2. Venues for Academic Components of the Residency**

| Specialty grand rounds |
| Conferences |
| Medical grand rounds |
| Patient conferences |
| Journal club |
| Practice-based lectures |
| Research lectures |
| Morbidity and mortality rounds |
| Interdisciplinary committees |
| Quality improvement committees |

DNP portfolios, described in a previous article (Smolowitz & Honig, 2008), are the residents' scholarly project, providing evidence of successful DNP competency attainment. A faculty committee evaluates each portfolio. During the evaluation, the committee assesses the effectiveness of the residency to provide appropriate settings and individualized learning experiences that are meaningful for the clinical doctorate. A resident's attainment of individual objectives, discussed in the admission documents, is considered in the evaluation. The portfolio represents an outcome assessment for the individual resident, and when collated with other portfolios, the aggregate serves as a program evaluation. All evaluative materials are incorporated into the full DNP curriculum review and may result in program revisions.

All graduating students meet with the program director for a structured exit interview. The residency is specifically questioned in the exit interview. Past graduates' comments have included:

Without question, the concept of following my patient through the hospital experience and taking responsibility as one of their care providers was the biggest change to my practice. I was never compelled to do that before the program.

I think that my residency required the unique skills of a DNP to work in any setting. To me, this is a critical difference between master's degree prepared NPs and DNPs. I was seeing patients in the clinic, ER, and as inpatients. I do not think my master's degree family nurse practitioner program prepared me to deal with inpatients, and the DNP residency filled this gap for me.

In all of my experience during my residency and portfolio cases, my patients received a different level of care overall. My clinical focus and specific requirements allowed me to evaluate and assess patient problems and outcomes at a different level.
Conclusion

We have described the CUSN integrative residency practicum. The format and clinical focus of the residency builds upon the DNP content, DNP essentials, and CUSN course work. The summative clinical experience is transformational and provides the venue for students to transition across the spectrum of advance practice toward the goal of doctoral clinician. For those programs focused on the provision of direct clinical care, a residency grounded in direct care supports these outcome objectives.

References


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Increased clinical scrutiny by regulatory agencies and health care payers, as well as expectations of patients and families on the delivery of quality patient care, challenges nurses across the world today. Many adverse patient care events precipitated by health care workers occur because of the fragmented, frequently interrupted, chaotic work environment, and they produce over 1 million preventable injuries and over 98,000 deaths at a cost of over $29 billion annually (Weaver & Hongsemeier, 2005). Splashed across the newspapers daily are articles about health care issues and injuries that focus on the patient during the provision of care.

The challenge today for chief nurse officers and nursing administrators is to bring research and clinical quality outcomes into a busy health care environment and help nurses understand how critical outcomes measures impact the provision of care. Increasing emphasis on outcomes management mandates monitoring quality performance. Though this is a complex undertaking, it is one of the best initiatives an organization and nursing administration can do to promote the provision of safe quality patient care. Change is difficult in all environments, and health care is not different in this challenge, but movement toward quality patient care as evidenced by outcome measurement is a major issue and challenge in health care today.

Many patient quality outcome indicators have changed over the last several years. Nursing-sensitive outcomes, defined as variables responsive to nursing interventions, are a major indicator of quality patient care (Agency for Healthcare Research and Quality [AHRQ], 2006). These nursing-sensitive outcomes include prevention and management of urinary tract infections, pneumonia, shock, upper gastrointestinal bleeding, longer hospitalizations, failure to rescue, and pressure ulcer development. Adverse events including medication administration errors and falls, 30-day mortality measures, and patient satisfaction measures have all been related to nursing care (Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002). Nursing-sensitive outcomes or complications are generally reported to increase length of stay by over 3% and increase resource utilization by over 32% (Clark, Leddy, Drain, & Kaldenberg, 2007). Adverse medication events account for over 19% of injuries a patient receives while hospitalized, with an estimated cost of $1,900 to $5,900 per event, some of which result in severe patient impairment and even death (AHRQ, 2006). These medication events are estimated to cost the health care industry over $2 billion dollars annually and are often attributed to chaotic work processes across the health care organization (AHRQ, 2006). Up to 70% of these events are considered to be preventable (Buerhaus & Needleman, 2000). It is increasingly clear, therefore, that hospitals will have to take decisive action now and in the future to ensure the provision of quality care and to remain fiscally responsible and competitive in the provision of that quality patient care. As we have moved into the next era of health care with managed care, pay for performance, and a more educated health care consumer, emphasis on quality patient care and outcomes will escalate. Any high-performing health care organization wants to focus on the processes that impact the provision of quality patient care within its organization.

**Change**

To move toward a comprehensive outcomes management process, leadership should develop an action plan to address the gap between “what is” and “what needs to be” at the organization level regarding what outcomes to monitor and the organization’s priorities. Following Donabedian’s *Nine Steps of Monitoring and Improving Clinical*
Performance, an administrator can guide any health care organization through assessment of clinical practice and monitoring performance improvement measures (Donabedian, 2003). These steps guide organizations in determining what to monitor and what the priorities are, the selection of a monitoring approach, and the formulation of criteria definitions of how to monitor and bring about a behavior change in the organization to improve clinical performance and the provision of quality patient care. According to Donabedian, “outcomes, by and large, remain the ultimate validators of the effectiveness and quality of medical care” (2005, p. 692).

First, the support of the organization’s administration is vital to foster an environment that promotes and supports patient-centered clinical outcomes, to foster collaborative relationships among the stakeholders, and to promote and empower staff for initiating the change strategies required (Block, 2006). Administration must also direct resources toward this change as well as communicate and educate staff about the outcomes priorities and monitoring, how they will be completed, what they mean to the organization as well as to staff and patients, how monitoring will be completed, and finally what the results mean and how they may impact patient care.

The second step for change will be the creation of the vision and global promotion of the outcomes assessment/monitoring. Effective communication of the initiatives is the catalyst igniting the momentum for change. By advertising for team participation within the organization, the organization can build a team that will bridge the gap between the outcomes measured and the health care practice. Plans for the first meeting of the team should include defining the vision and mission of the team, outlining goals, developing an action plan for monitoring clinical practice measures, and improving clinical performance when warranted.

It is important to educate the team members about the principles and processes of outcomes management. This includes how to design measurements and disseminate the findings to promote quality patient care (which could require changes to patient care based on the evidence) and how to ensure compliance with continued data collection and analysis of the outcome measures. The overall goals of the education will be for staff members to acquire a sense of ownership of this initiative, to enhance their commitment, to acknowledge their professional accountability, to increase buy-in, and to spread excitement regarding patient care outcomes across the organization.

After promoting the change toward outcomes-based management, the next step in the process will be aimed at sustaining change and embedding the practice into the culture of the organization. By promoting small wins through simple outcomes, projects will help sustain the momentum of the team. This will also give the members confidence to discuss patient measures and any required change in clinical practice with their peers, thus promoting outcomes across the organization. This helps build employees’ excitement about making a change in practice that could positively impact patient care outcomes. Moving toward a practice base using the best possible evidence can help the organization meet the goals of outcomes management in the provision of quality patient care.

Performance improvement and monitoring the quality of change resulting from the implementation of outcomes management into practice will become important. The quality of the clinical performance will need to be defined and evaluated. The investigation, data collection, and analysis of the changes implemented will evaluate whether there has been any improvement in outcomes such as patient satisfaction scores, a decreased length of stay, better patient outcomes, and less adverse events. Promoting positive outcomes to senior administration certainly should occur based on a benefit to the patient as well as cost analysis.

By following John P. Kotter’s Eight-Stage Process of Creating Change (1995), specific steps can be used to promote this organizational change and can be used by any business or health care organization. These steps include (1) creating a sense of urgency, (2) creating the guiding coalition (team), (3) developing a strategy and vision, (4) communicating the vision, (5) empowering the action, (6) generating short-term wins, (7) consolidating gains and producing more change, and (8) anchoring new approaches in the culture (Kotter, 1995). These eight steps should be present in any action plan to promote change. Some of Kotter’s steps may coincide with other steps as an organization moves through the change process, but most should be incorporated into the plan to promote a successful change in practice. When it is time to begin the change process, being the catalyst for change in any health care organization and moving through the steps will help create sustainable change to benefit all patients.

Conclusion
As the national trend to judge quality and award reimbursement based on clinical quality outcomes increases, quality performance measures can and should be used to promote clinical performance improvement in the delivery of quality patient care. Organizational leadership in health care is obligated to promote the provision of
quality patient care and to do the right thing ALL the time. Outcomes management is a way to measure quality and to promote quality patient care in health care today.

References


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A Systematic Review: Dexmedetomidine Versus Placebo to Decrease the Incidence of Emergence Delirium/Emergence Agitation (ED/EA) in Pediatric Patients

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Background: Emergence delirium/emergence agitation (ED/EA) has a reported incidence of up to 73.5% after general anesthesia (GA) in children. The implications of ED/EA are broad and include patient complications, increased nursing care intensity, and increased hospital costs. Objective: The objective of this systematic review is to appraise available randomized control trials (RCTs) comparing intravenous dexmedetomidine to placebo in decreasing the incidence of ED/EA among children after GA. Method: We conducted a comprehensive search of the literature using Medline from 1950 through September 2007 and CINHAL from 1982 through September 2007, as well as PubMed and The Cochrane Library. Four RCTs were included in the review and were appraised for methodological quality by each author. Results: Evaluation of the primary study outcomes showed an overall decreased incidence of ED/EA in those groups that received dexmedetomidine versus placebo. Conclusion: Though these RCTs demonstrate statistically significant reduction of ED/EA after GA among children who receive dexmedetomidine, the clinical significance of this pharmacologic intervention is not clear. Further research is necessary to determine cost–benefit of dexmedetomidine to prevent ED/EA in children after GA and the effect of dexmedetomidine on ED/EA compared to other agents.

Keywords: dexmedetomidine; pediatrics; emergence agitation; emergence delirium

The incidence of ED/EA after GA in children is reported to be up to 73.5%. However, the incidence rates reported vary widely because of differences in how ED and/or EA are defined (O’Brien, 2002). The implications of ED/EA may include increased complications such as bleeding or dislodged catheters (Voepel-Lewis, Malviya, & Tait, 2003), disturbances to other recovering patients (Shukry, Clyde, Kalarickal, & Ramadhyani, 2005), continued maladaptive behaviors up to 30 days postoperatively (Dyer, Ashton, & Teasdale, 1995), and the need for increased nursing personnel (Cole, Murray, McAllister, & Hirshberg, 2002). Although not formally addressed in the literature, other important implications of ED/EA include delays in patient transport from the operating suite and increased pharmacy costs. Factors that may increase the risk of ED/EA may include presence of pain, use of poorly soluble inhalation anesthetics (sevoflurane and desflurane), preschool age (Aono, Ueda, Mamiya,
Takimoto, & Manabe, 1997), presence of preoperative anxiety (Dyer et al., 1995; Kain et al., 2004; Moos, 2005; O’Brien, 2002) and use of a variety of medications such as ketamine, metoclopramide, atropine, and droperidol (Nagelhout & Zaglaniczny, 2005). However, the mechanism(s) by which these factors contribute to ED/EA is unknown.

Several interventions for prevention and treatment of ED/EA in children have been investigated with varying rates of success (O’Brien, 2002; Shukry et al., 2005). Because clonidine, an alpha₂ adrenergic agonist, has been shown to decrease the incidence of maladaptive emergence behaviors (Kulka, Bressem, & Tryba, 2001), dexmedetomidine, an alpha₂ agonist with greater selectivity, has been studied to determine its role in preventing ED/EA among children after GA.

**Objective**

The objective of this systematic review is to appraise available randomized control trials comparing intravenous dexmedetomidine to placebo in decreasing the incidence of ED/EA among children after GA. Evaluating the internal and external validity and the methodological quality of the current research is the basis for discussion and practice recommendations.

**Method**

We conducted a comprehensive search of the literature using Medline from 1950 through September 2007 and CINHAL from 1982 through September 2007, as well as PubMed and The Cochrane Library. The keyword search included the following terms: dexmedetomidine, Precedex®, pediatrics, emergence agitation, and emergence delirium. Among the articles retrieved, there were no systematic reviews, evidence-based reviews, or meta-analyses. The literature was further limited to a search for RCT or controlled clinical trials. Bibliographies of each RCT were searched, and relevant citations were added to the final list.

Trials needed to meet the following criteria for inclusion: a double-blind RCT study design, a pediatric sample, use of dexmedetomidine by injection or infusion, and ED/EA as the primary study outcome. Studies that were not RCTs and those that did not examine the study question were excluded (Figure 1). Four RCTs were included in the review and each was appraised for methodological quality by each author. The findings were compared and disagreements were resolved through discussion.

**Results**

A critical examination of each study revealed that there were no statistically significant differences in baseline demographics between the intervention groups and control groups. In each study, age, weight, and gender were not significantly different between groups. There were no differences with regard to duration of surgery or duration of anesthesia between groups except in one study (Shukry et al., 2005) in which the duration of anesthesia and surgery was significantly longer in the intervention group.

Evaluation of the primary study outcomes showed statistically significant decreases in the incidence of ED/EA in those groups that received dexmedetomidine versus placebo except for a low-dose subgroup in a single study by Ibacache, Munoz, Brandes, and Morales (2004). In this study, the effect of dexmedetomidine on the incidence of ED/EA was assessed via two intervention arms: a low-dose arm and a high-dose arm (Table 1). Only one study reported relative risk (Shukry et al., 2005). Relative risk was calculated for all other studies to standardize results for interstudy comparisons (Figure 2).

**Synthesis and Discussion**

There are several strengths of the studies analyzed in this review. All studies in this review clearly stated an RCT design and study question. Effective randomization and blinding reduced selection bias, performance bias, and measurement bias as well as minimized the influence of confounding variables such as age and sex.
<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>M:F(^a) ratio</th>
<th>Mean Age(^b)</th>
<th>Intervention</th>
<th>Dose (IV)</th>
<th>Timing</th>
<th>Physical Status(^c)</th>
<th>Procedure Type/Anesthetic</th>
<th>Primary Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guler, G. et al. (2005)</td>
<td>30</td>
<td>19:11</td>
<td>4.7 years</td>
<td>Dexmedetomidine</td>
<td>.5 mcg/kg</td>
<td>5 min prior to end of surgery</td>
<td>I</td>
<td>Adenotonsillectomy Sevoflurane/nitrous oxide with endotracheal tube (ETT)</td>
<td>Comparison of agitation scores</td>
</tr>
<tr>
<td>Shukry, M. et al. (2005)</td>
<td>23</td>
<td>16:7</td>
<td>4.9 years</td>
<td>Dexmedetomidine</td>
<td>.2 mcg/kg/hr</td>
<td>Continuous infusion</td>
<td>I/II</td>
<td>Elective outpatient procedures Sevoflurane/nitrous oxide with LMA or ETT</td>
<td>Comparison of incidence of emergence delirium at timed intervals</td>
</tr>
</tbody>
</table>

\(^a\) Male:female ratios = no statistically significant difference between groups. \(^b\) No statistically significant difference between groups. \(^c\) American Society of Anesthesiologists Physical Status Classification System.
All RCTs were approved by local ethics committees, and informed consent from parents was obtained. Statistical tests used by each of the studies were appropriate. T-tests were used for intergroup comparisons of continuous data when dexmedetomidine versus placebo was studied (Guler et al., 2005; Isik, Arslan, Tunga, & Kurtipek, 2006; Shukry et al., 2005) and analysis of variance testing (ANOVA) was employed for continuous data when there were three groups compared (Ibacache et al., 2004).

All studies with the exception of Guler et al. (2005) reported \textit{a priori} power calculations for sample size and indicated \( \alpha \) levels at 0.05 and \( \beta \) levels at 0.80. Those that described power calculations stated specific incidence reductions—30\% to 66\%—for planning sample size and were adequately powered for the anticipated effect size.

Figure 2 illustrates the relative risk and confidence intervals of ED/EA in the dexmedetomidine group \textit{versus} the control group for all studies. With the exception of the low-dose intervention group in the Ibacache study, all studies resulted in statistically significant differences between control and intervention groups, which indicates that the effect is likely dose dependent (Ibacache et al., 2004).

Though the raw data from these studies are statistically significant, critical analysis of the studies reveals questions of methodology and implications for further research. The exclusion criteria in each of the four studies were not well-defined. After the completion of anesthesia an independent blinded observer could easily rate a patient as having ED/EA or maladaptive behaviors if the patient had other comorbid conditions that affect emergence from anesthesia (Table 2). All four RCTs excluded patients if they had preoperative anxiety. However, other competing variables such as chronic pain, cognitive delay, and psychological/neurological disorders were not controlled in any of the RCTs (Table 2).

Shukry et al. (2005) were the only authors who discussed subjects enrolled in the study versus those who were included in analysis. This was also the only study that described the race of the subjects shown in baseline demographics. The other studies lacked description of enrolled patients excluded from analysis and did not include race in the demographics of study groups. This may conceal confounders and threaten internal validity.

Although these studies can be reliably reproduced, they may have limited external validity. All studies used general anesthesia, and three studies examined more than one surgery type (Guler et al., 2005; Ibacache et al., 2004; Shukry et al., 2005). However, one study examined general anesthesia for noninvasive testing (Isik et al., 2006). It would be difficult to generalize the results of these four studies to patient populations other than pediatric patients undergoing anesthesia for short duration surgery or noninvasive diagnostic testing.

None of the authors fully disclosed financial interests or external funding sources. In one study (Ibacache et al., 2004), the authors mentioned that they were partially funded by their anesthesia department, but there was no mention of how they obtained the rest of the funding. Recently there has been careful examination and regulation of pharmaceutical spending as well as strict policy on research agendas, therefore the authors should have fully disclosed funding sources.

<table>
<thead>
<tr>
<th>Study</th>
<th>Experimental n/N</th>
<th>Control n/N</th>
<th>RR 95% CI</th>
<th>RR 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isik, 2006</td>
<td>1/21</td>
<td>10/21</td>
<td>0.1 (0.014–0.713)</td>
<td>0.1 (0.014–0.713)</td>
</tr>
<tr>
<td>Guler, 2005</td>
<td>5/30</td>
<td>17/30</td>
<td>0.294 (0.125–0.694)</td>
<td>0.294 (0.125–0.694)</td>
</tr>
<tr>
<td>Shukry, 2005</td>
<td>6/23</td>
<td>14/23</td>
<td>0.42 (0.2–0.918)</td>
<td>0.42 (0.2–0.918)</td>
</tr>
<tr>
<td>Ibacache, 2004</td>
<td>5/30</td>
<td>11/30</td>
<td>0.45 (0.18–1.15)</td>
<td>0.45 (0.18–1.15)</td>
</tr>
<tr>
<td>Ibacache, 2004</td>
<td>3/30</td>
<td>11/30</td>
<td>0.273 (0.084–0.881)</td>
<td>0.273 (0.084–0.881)</td>
</tr>
</tbody>
</table>

Figure 2. Relative risk (95\% CIs) of dexmedetomidine on the incidence of ED/EA among children after GA compared with placebo.

Note. Lines represent confidence intervals and boxes represent relative risk. Box sizes are inversely proportional to relative risk.

\(^a\) 0.15 mcg/kg dexmedetomidine. \(^b\) 0.3 mcg/kg dexmedetomidine.
ED and emergence EA describe a variety of maladaptive behaviors observed during and after recovery from GA (Cole et al., 2002; Guler et al., 2005; Ibacache et al., 2004; Isik et al., 2006; Moos, 2005; O’Brien, 2002; Shukry et al., 2005). Differences between these terms are not well-elucidated in the literature, and often these terms are used interchangeably in clinical practice and research. For example, Guler et al., Isik et al., and Shukry et al. used a similar 5-point scale with the same defining characteristic to describe ED and EA. Clear definitions and appropriate use of these terms in future research will enhance understanding of study goals and aid in comparisons between studies.

Though the reviewed studies demonstrate decreases in ED/EA with the use of dexmedetomidine that appears to be dose dependent, data from Isik et al. (2006) and Shukry et al. (2005) reflect that this difference is not sustained after discontinuation of dexmedetomidine infusion. All studies measured discrete timing intervals at the conclusion of the anesthetic, including time to eye opening, time to removal of airway device, and time to discharge. However, findings were inconsistent. Because the studies were not designed to examine these timing intervals, confounders such as time needed for data collection and observation may have influenced these secondary outcome measures. For these reasons clinical significance is unclear.

Shukry and colleagues (2005) had expansive preoperative preparation for patients in both the intervention and control arm. Preoperative preparation included the use of a child care specialist and age-appropriate teaching methods about the operating room. These interventions may influence the incidence of ED/EA and warrant further clinical investigation.

Established measurement tools for all studies were used for pain and/or ED/EA. However, Guler and colleagues (2005) did not define the time interval of observation and measurement. Because ED can occur up to 30 days postoperatively (Dyer et al., 1995), measurement intervals should be clearly defined for more effective interstudy comparison. Longer periods of evaluation should be considered.

The cost–benefit of using dexmedetomidine must also be analyzed. It is reported that a single patient vial of 100 mcg of dexmedetomidine costs between $40 and $60 (Brummet, 2006; Hospira, 2008; Tobias & Berkenbosch, 2002) versus midazolam, which is reported to be between $1.73 and $1.91/mg (Alderson & Lerman, 1994; Cernaianu et al., 1996). There may or may not be a cost savings compared with other interventions used when personnel, pharmacy, complication, and perioperative costs are evaluated. Further research is required to make these comparisons.

Dexmedetomidine has an overall wide safety profile (Hardman & Limbird, 2001; Kamibayashi & Maze, 2000; Smith & Elliott, 2001) and its use is approved by the FDA for sedation of intubated mechanically ventilated adult patients in an intensive care setting (Chang, Simone, & Schultheis, 2005). However, safety studies have not been performed in the pediatric population (Chang et al., 2005). Because the safety profile and long-term effects of dexmedetomidine use are not known in the pediatric population, practitioners should use this agent with caution.

**Conclusion**

Dexmedetomidine reproducibly reduces the incidence of ED/EA in children after GA. However, there are threats to internal validity and limits to external validity. The clinical significance remains unclear because of poor definitions of ED/EA between studies, absence of cost

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**TABLE 2. Exclusion Criteria for Study Admission for Selected RCTs**

<table>
<thead>
<tr>
<th>Study</th>
<th>Preoperative Anxiety and/or Use of Preop Sedation Medication</th>
<th>Chronic Pain Condition</th>
<th>Chronic Use of Sedation Medication</th>
<th>Cognitive Delay or Neurologic Disorder</th>
<th>Psychiatric Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isik, B., Arslan, M., Tunga, A. D., &amp; Kurtipek, O. (2006)</td>
<td>Yes</td>
<td>Not discussed</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Guler, G. et al. (2005)</td>
<td>Yes</td>
<td>Not discussed</td>
<td>Not discussed</td>
<td>Not discussed</td>
<td>Not discussed</td>
</tr>
<tr>
<td>Shukry, M. et al. (2005)</td>
<td>Yes</td>
<td>Not discussed</td>
<td>Not discussed</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Ibacache, M., Munoz, H., Brandes, V., &amp; Morales, A. (2004)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Not discussed</td>
<td>Not discussed</td>
</tr>
</tbody>
</table>
analysis, short-lived efficacy of the drug, and lack of a well-established pediatric safety profile. Dexmedetomidine is an interesting approach to decrease the incidence of ED/EA in pediatric patients. However, there are other effective pharmacological and nonpharmacological interventions to reduce ED/EA. These include other medications (Kulka et al., 2001), parental presence during induction (Kain et al., 2004), and preoperative teaching for the patient and family in preparation for the operating room (Arai et al., 2007; Shukry et al., 2005). Additional research that addresses these issues as well as comparisons of dexmedetomidine with other available interventions will more clearly reflect the magnitude of clinical significance. Currently it is uncertain which interventions or combination of interventions produce the best results. Therefore, it is not feasible to make strong practice recommendations about the use of dexmedetomidine in the treatment of ED/EA in children after general anesthesia.

References


Acknowledgments. Authors report no financial interests.

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Under Pressure for a Diagnosis: A Case Study Review of Pheochromocytoma Genetics

Tracy D. Andrews, DNPC, MSN, CCRN, ACNP, APRN-BC

Columbia University, New York

Pheochromocytoma is a rare condition that has serious consequences. Although a diagnosis of exclusion, this condition must be considered in patients under the age of 40 with refractory hypertension and a familial history of pheochromocytoma. This article discusses the diagnostic process, including genetic testing, and explores the role of nurse practitioners in evaluating patients who present with symptoms of pheochromocytoma.

Keywords: refractory hypertension; pheochromocytoma; genetics; metanephrines; nurse practitioners

Case Study

Mr. B is a 39-year-old African American male who presented to his local emergency department (ED) with new onset altered mental status. According to his mother, the patient was “unable to talk.” Mr. B has a medical history significant for poorly controlled hypertension (despite antihypertensive medications of multiple different classes), Pickwickian syndrome with concomitant obstructive sleep apnea requiring CPAP (continuous positive airway pressure) at night, diastolic heart dysfunction, gout, depression, ischemic cerebrovascular accident (CVA; 2001), resistant hypokalemia, headaches (presumed tension), night sweats, and labile emotions. His only surgical history is remarkable for left undescended testicle as a child, which will be shown to have great relevance when differentiating possible types of genetic abnormalities. Mr. B resides with his mother and works in a furniture factory.

Prior to presenting to the ED, Mr. B saw his primary care provider (PCP) complaining of right knee pain. The PCP noted Mr. B’s blood pressure was 230/150. He was subsequently given 0.1 mg clonidine orally in the office. Blood pressure was measured 20 minutes later, which was 190/120. A second 0.1-mg dose of clonidine was given, which resulted in a blood pressure of 170/90. The PCP attributed the markedly elevated blood pressure to pain. Mr. B was diagnosed with “gouty arthritis,” prescribed indomethacin 50 mg orally every 6 hours for pain, and was released home.

Mr. B drove home and took a dose of indomethacin 30 minutes after he left the doctor’s office. Approximately 30 minutes after taking the indomethacin, Mr. B’s mother reported she heard a crash in the living room and found Mr. B lying on the floor, disoriented, and having difficulty speaking. She also noted the family dog’s bowl was broken, and the patient was rubbing his head. His mother promptly phoned 911, and the patient was transported to our ED.

Upon arriving at the ED, Mr. B was awake with marked dysarthria and expressive aphasia. Immediate vital signs were BP 160/80 HR 82 RR 28. He was admitted to the general medical floor for evaluation of altered mental status and to rule out CVA. Initial laboratory values showed hypokalemia with a potassium of 2.7 and a creatinine of 2.2. Other labs were within normal limits, including toxicology screenings.

Mr. B returned to his baseline mental status within 10 hours, ate dinner, and was conversational with family. Later that evening, Mr. B visited with his ex-girlfriend. His mother left the room while the patient and his ex-girlfriend spoke. Upon her return, approximately 2 hours later, the mother relayed to staff that the patient complained of a
severe headache and was disoriented to place, time, and situation. The patient became combative, and four-point restraints were required. Mr. B was transferred to the coronary care unit (CCU) for evaluation of possible myocardial infarction (MI) and/or evolving CVA.

Upon admittance to the CCU, Mr. B continued to be combative, which required high doses of lorazepam, haloperidol, and even initiation of a midazolam drip. During his extreme combative phase, Mr. B developed wheezing and stridorous respirations, a sinus tachycardia with heart rate of 120–140, and blood pressure of 200/140. The decision was made to electively intubate the patient for airway protection and facilitate the computed tomography (CT) of his head to rule out CVA or other neurological cause of his acute mental status changes. Additional labs and diagnostics were obtained showing continued hypokalemia with potassium 2.3 and creatinine now 3.4. Chest radiography, echocardiogram, and EEG were within normal limits.

Mr. B received multiple potassium replacements with resistant hypokalemia. Due to his rising creatinine, multiple fluid boluses were given as well as initiation of maintenance fluid of normal saline (NS) at 100 mL/hr. Urinary output was adequate with hourly output totals of 50–120 mL/hr. An emergent CT of the head without contrast was obtained, which showed no infarcts, edema, or bleed. A lumbar puncture was performed. Cerebrospinal fluid, blood, sputum, and urine cultures were sent. Culture results were negative except for a light growth of *staphylococcus aureus* (beta lactamase positive) in sputum. Mr. B required high doses of benzodiazepines and ventilatory support for 4 days.

On CCU day 4, a critical care consult was obtained. Upon review of his chart prior to his consult, Mr. B had received extraordinarily high doses of benzodiazepines, with the highest being a midazolam drip at 35 mg/hr. We made the decision to wean the patient’s midazolam drip to ascertain neurological function. Mr. B awoke easily and was cooperative and appropriate. Ventilatory weaning parameters were obtained and subsequent extubation ensued.

Upon extubation, Mr. B’s neurological status revealed that he was alert and oriented to person, place, and time. He was disoriented to situation but was easily reoriented. He requested a hamburger and verbalized extreme hunger. He had no signs of agitation or combativeness. His vital signs were blood pressure 160/80 with mild tachycardia and heart rate 125. Approximately 10–20 minutes after extubation, Mr. B was noted to have marked stridorous respirations and expiratory wheezes. He then became disoriented and lethargic. Mr. B’s vital signs were: HR: 140, BP: 220/110, R: 38. He was reintubated, sedated, and placed on a nicardipine drip for blood pressure control (Neutel et al., 1994).

Given the patient’s malignant hypertension, rising creatinine, and resistant hypokalemia, the decision was made to evaluate the patient for hyperaldosterone state, pheochromocytoma, and causal factors for patient’s rising creatinine such as prerenal state and acute tubular necrosis.

Chemistries were ordered to ascertain the patient’s overall nutritional status to assist with planning total enteral nutrition (TEN) requirements. Also, in light of the patient’s resistant hypokalemia, magnesium level was ordered to determine presence of hypomagnesemia. Hypomagnesemia has been documented to be a major causal factor of resistant hypokalemia. Also, hypomagnesemia is seen in patients with primary aldosteronism because of dysfunction of the ascending limb of the loop of Henle, where magnesium is filtered and reabsorbed. A 24-hour urine for vanillyl mandelic acid (VMA) and catecholamines was obtained (values depicted in Table 1).

Based on Mr. B’s presentation and laboratory values, the differential diatheses included ACTH-secreting tumor, malignant hypertension, sympathomimetic medication reaction, ganglioneuroma, chemodectoma, pheochromocytoma, and clonidine withdrawal.

Mr. B underwent an adrenal magnetic resonance imaging (MRI), which revealed a pheochromocytoma tumor measuring 3.5 cm on the right adrenal gland. Mr. B required 3 more days of ventilatory support. Therefore, a duodenal feeding tube was placed via fluoroscopy guidance, and low-volume, high-protein total enteral nutrition (TEN) was initiated for nutritional support. Due to the patient’s hypernatremia that developed over the course of the days without enteral nutrition, NS infusion was discontinued; subsequently, dextrose 5% water with 40 mEq KCL per liter was initiated at 100 mL/hr. Mr. B was slowly weaned from sedation and successfully extubated on day 10.

### TABLE 1. Common Pheochromocytoma Laboratory Tests with Normal Values

<table>
<thead>
<tr>
<th>Laboratory Test</th>
<th>Value</th>
<th>Normal Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norepinephrine</td>
<td>212</td>
<td>15–100</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>54</td>
<td>2–24</td>
</tr>
<tr>
<td>Dopamine</td>
<td>509</td>
<td>52–480</td>
</tr>
<tr>
<td>Total catecholamines</td>
<td>266</td>
<td>26–121</td>
</tr>
<tr>
<td>Metanephrines</td>
<td>1590</td>
<td>4–540</td>
</tr>
<tr>
<td>Total metanephrine</td>
<td>2496</td>
<td>90–690</td>
</tr>
<tr>
<td>VMA</td>
<td>14.3</td>
<td>&lt;6/24 hours</td>
</tr>
</tbody>
</table>

Mr. B was maintained on β-blockers, and clonidine was reinstituted at progressively escalating doses to prevent clonidine withdrawal. Blood pressure was maintained with mean arterial pressures (MAP) of 80–90 to ensure adequate renal perfusion. Phenoxbenzamine was initiated. Mr. B was successfully transferred to the telemetry floor. Mr. B was advised to make considerable lifestyle modifications, including an exercise program for weight reduction and cardiac health, an 1,800-calorie weight reduction diet, and sodium restriction. He was discharged home where he was to follow up regarding surgery for removal of the pheochromocytoma. Mr. B subsequently underwent surgical removal of the unilateral pheochromocytoma; however, he still requires a complex antihypertensive regimen.

Clinical Findings of Pheochromocytomas

A pheochromocytoma can be defined as a catecholamine-secreting tumor of the adrenal gland, which usually arises from chromaffin cells (Eisenhofer et al., 2001; Sweeney, 2005). However, 9%–23% of pheochromocytomas develop from extra-adrenal chromaffin tissue and are called paragangliomas (Petersenn, Unger, Walz, & Mann, 2006). Epidemiologically, pheochromocytomas have peak incidence between the ages of 30–60 years of age, with equal presentation in both male and female genders. Pheochromocytoma is often a diagnosis of exclusion for resistant hypertension but must be investigated as a differential diagnosis in all malignant hypertension cases. Primary presentation of a patient with pheochromocytoma includes headache, diaphoresis (specifically profound night sweats), and palpitations. Associated symptoms include anxiety, tremor, pallor, chest pain, epigastric pain, painless hematuria, and flushing (rare). Frequency of symptoms can range from daily to once every few months with usual durations of 1 hour or less (Bravo et al., 2003; Unger et al., 2006).

Patients with pheochromocytomas will often present with resistant hypertension, malignant or intraoperative hypertension, and even hypotensive episodes (Gimenez-Roqueplo et al., 2003). As with many other diagnoses, clinicians have been able to create diagnostic clues for other practitioners to use in pheochromocytoma diagnosis. Table 2 describes the six most common presenting signs/symptoms of pheochromocytomas. This is known as the 6 H’s of pheochromocytomas.

Also, there is a similar “Rule of 10” probability concept with the presence of a pheochromocytoma. This concept includes the six following probability characteristics of a pheochromocytoma with 10% probability that all or some are included: familial, malignant, multiple or bilateral, extra-adrenal, childhood onset, and recurrence after surgery (Tischler, 2006).

Because of the extensive workup necessary for proper pheochromocytoma diagnosis, all hypertensive patients should not be screened. There are five categories of patients who should be screened for pheochromocytoma (Table 3). Laboratory and diagnostic tests performed for pheochromocytoma often require special preparation prior to test completion. Laboratory studies for pheochromocytoma diagnosis include plasma-free metanephrine measurement, 24-hour urine metanephrine measurement, urine VMA, and plasma catecholamine (norepinephrine, epinephrine) measurement. Diagnostic tests include adrenal CT or adrenal MRI and metaiodobenzyl-guanidine (MIBG) scan. MIBG scans are especially useful for identifying tumors in unusual areas (Tischler, 2006).

As mentioned in the “Rule of 10,” pheochromocytomas often have a familial basis. Significant genetic

<table>
<thead>
<tr>
<th>TABLE 2. 6 H’s of Pheochromocytoma</th>
<th>Corresponding Percentage of Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>100</td>
</tr>
<tr>
<td>Headache</td>
<td>90</td>
</tr>
<tr>
<td>Hyperidrosis</td>
<td>69</td>
</tr>
<tr>
<td>Hypermetabolism</td>
<td>73</td>
</tr>
<tr>
<td>Heat consciousness/palpitations</td>
<td>73</td>
</tr>
<tr>
<td>Hyperglycemia</td>
<td>55</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>TABLE 3. Patient Populations That Should Be Evaluated for Pheochromocytoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hypertension requiring more than four blood pressure medications</td>
</tr>
<tr>
<td>2. Onset of hypertension before the age of 35</td>
</tr>
<tr>
<td>3. Onset of hypertension after the age of 60</td>
</tr>
<tr>
<td>4. Signs or symptoms of pheochromocytoma</td>
</tr>
<tr>
<td>5. Patients with hypertension refractory to conventional treatment</td>
</tr>
</tbody>
</table>

exploration has been performed in conjunction with pheochromocytoma origin. Approximately 10%–20% of pheochromocytomas can be related to a familial or genetic predisposition. Germline mutations in the RET, VHL, NF1, SDHB, SDHC, and SDHD genes have been linked to pheochromocytomas (Kohane, Ingelfinger, Nimkin, & Wu, 2005; Perren & Komminoth, 2006).

RET

RET proto-oncogene is located on the long arm of chromosome 10 at position 11.2. The RET gene’s functional purpose is to provide instructions for producing a protein involved in signaling within cells. RET genes are essential for normal development of several kinds of nerve cells, specifically intestine, autonomic, and cardiac. They are also involved in normal kidney development and spermatogenesis. Germline mutation in the RET gene is usually seen by the changing of single-protein building blocks rather than large deletions or mutations. There is a 75% penetrance rate with RET mutation. Presentation can be variable. Often patients who have RET mutations may be completely asymptomatic for several decades. Because of the high penetrance rate, there is usually a positive family history (Jessop et al., 1987; Mannelli et al., 2007).

Von Hippel-Lindau (VHL)

VHL tumor suppressor gene is located on the short arm of chromosome 3 between positions 25 and 26. The VHL gene prevents cells from growing and dividing too rapidly. Germline mutations in VHL are responsible for multiple tumor types, but the mutation in this gene is variable. Some mutations involve only a few DNA nucleotide changes, whereas others involve large deletions of gene portions. Mutations of the VHL gene are responsible for many malignancies and polycythemia vera (Peeling, Smith, & Bossuyt, 2006). Presentation for VHL mutations usually includes hypertensive crises, clear cell renal carcinoma, cerebellar/spinal hemangioblastoma, retinal angioma, cysts, and bilateral pheochromocytomas. Pheochromocytomas develop in approximately 20% of patients with VHL mutation, with a mean age of onset between 23–29. Although some VHL mutation-derived pheochromocytomas have also developed much later in life (Gimenez-Roqueplo et al., 2003).

Succinate Dehydrogenase (SDHB)

SDHB is a protein complex with several subunits. SDHB is located on chromosome 1 at position 35–36. SDHB is connected to the undersides of SDHC and SDHD subunits on the inner membrane of the mitochondria. The function of SDHB is to catalyze the oxidation of succinate. Germline mutations are noted in exons 1 through 7 but not 8. There is a high malignancy rate associated with SDHB mutations, 33%–83%. There is a 77% penetrance rate with clinical manifestation by age 50. The average onset of disease is 36 years of age (Gimenez-Roqueplo et al., 2003).

Succinate Dehydrogenase (SDHC)

SDHC is another succinate dehydrogenase subunit located on chromosome 1 at position 21. SDHC is also located on the inner membrane of the mitochondria and is partitioned in six exons. SDHC and SDHD form complex II. Its function is to catalyze the oxidation of succinate. Complex II mutations of SDHC have been associated with increased oxidative stress with a concomitant hypoxia within the cell. This increased stress has been highly associated with increased apoptosis and tumorigenesis (Gimenez-Roqueplo et al., 2003; Muller, Troidi, & Niemann, 2005).

Succinate Dehydrogenase (SDHD)

SDHD is one of the four succinate dehydrogenase subunits located on the inner membrane of the mitochondria. SDHD sits alongside SDHC and is located on chromosome 1 at position 23. Previous names for SDHD were PGL and PGL1. SDHD functions as an enzyme in the citric acid cycle and electron transfer chain. Mutations are associated with hypoxic responses at a cellular level, which like SDHC increases tumorigenesis. SDHD mutations are more common in people who live at high altitudes. Presentation for any of the SDH mutations includes sweating, palpitations, headaches,
and pallor (Gimenez-Roqueplo et al., 2003; Neumayer et al., 2007). Pheochromocytoma management should include oral phenoxybenzamine as well as β-blocker agents (Karagiannis, Mikhailidis, Athyros, & Harsoulis, 2007; Plouin & Gimenez-Roqueplo, 2006b). These oral agents should be instituted at least 2 weeks preoperatively. Surgical management includes either laparoscopic adrenalectomy for patients with single or small adrenal tumors who have controlled hypertension or open adrenalectomy for patients with adrenal tumors greater than 7 cm in size and/or concomitant uncontrolled hypertension (Karagiannis et al., 2007; Tischler, 2006).

Case Study Revisited

Upon correct diagnosis of Mr. B’s pheochromocytoma, proper medical and surgical interventions were executed. Completion of the patient’s genetic pedigree was performed retrospectively and was not a part of the management plan (Figure 1). Upon review of Mr. B’s pedigree, there is a striking propensity for hypertension and cancer in his family. Given his presentation and symptomatology, there is a high suspicion for either a VHL or SDH mutation in Mr. B. Therefore, performance of DNA sequencing might have provided significant insight into the possibility of either mutation.

Because VHL mutation is most often associated with bilateral pheochromocytomas, having the DNA sequencing results might have served as a guide to the need for closer follow-up. Because of the high propensity of retinal angiomatas in VHL mutations, an ophthalmology consult would have been advisable (Eisenhofer et al., 2001). In the event Mr. B had an SDH mutation, there would be a higher like-

![Figure 1. Genetic pedigree for J.B.](image)

**Note.** HTN = hypertension; ETOH = ethanol alcohol; ITP = idiopathic thrombocytopenic purpura; CAD = coronary artery disease; DM = diabetes mellitus; PVD = peripheral vascular disease; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; CVA = cerebrovascular accident; TIA = transient ischemic attack; OSA = obstructive sleep apnea; HA = headache; HX = history.
lihood of him developing other types of cancer in the future (Gimenez-Roqueplo et al., 2003). Having the information afforded by genetic testing would facilitate early screening and closer monitoring for malignancy manifestations.

Conclusions

Because of presumed rarity and unusual nature of pheochromocytomas, appropriate diagnosis is often overlooked. Causal factors for this condition being overlooked or misdiagnosed are variable but often include insufficient investigation into the patient’s history and presenting symptoms, lack of clinical acumen, and disbelief that the diagnosis is possible. Upon discovery that pheochromocytoma is present, patients should strongly be encouraged to seek genetic counseling. Genetic counseling can provide patients with the information needed to make informed decisions regarding genetic testing, which may be beneficial for the patient as well as family. Meticulous blood pressure management and eventual surgical intervention are key components of a resultant positive outcome for patients and families. Because of our holistic, evidence-based approach to diagnosis and well-honored patient interview skills, advanced practice nurses can play a pivotal, key role in the exploration, diagnosis, and effective management of this type of complex situation.

References


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Mitral valve prolapse (MVP) is the most common valvular heart disease frequently associated with a constellation of symptoms unrelated to structural valvular changes. Patients' self-reports reflect a variety of frightening symptoms, including chest pain, shortness of breath, palpitations, migraine headaches, lightheadedness, fatigue, dizziness on standing, mood swings, and anxiety or panic attacks. Individuals with these symptoms repeatedly seek help in emergency rooms, urgent care centers, and primary care offices, contributing to the economic burden of health care. Treatment measures are directed toward symptom relief. Although traditional medications such as beta-adrenergic blockers, calcium channel blockers, and anxiolytics are widely used to treat MVP symptoms, these medications are reportedly ineffective for many people. An appreciable number use one or more alternative therapies to control symptoms—most notable among these are magnesium supplements, which are known to influence cardiac function. This article’s purpose is to review the literature on what is known about MVP syndrome and magnesium supplementation.

**Keywords:** mitral valve prolapse; magnesium supplementation; syndrome; nondrug interventions

Mitral valve prolapse (MVP) is the most common valvular heart disease (Boudoulas & Wooley, 2000). Some patients have structural changes that require mitral valve replacement. Others, diagnosed with MVP syndrome (MVPS), have a constellation of symptoms unrelated to these structural changes and rarely require valve replacement. Both males and females of all ages with MVPS report a variety of frightening symptoms, including chest pain, shortness of breath, palpitations, migraine headaches, lightheadedness, fatigue, dizziness on standing, mood swings, and anxiety or panic attacks (Scordo, 2001, 2005; Utz & Ramos, 1993; Utz, Whitmire, & Grass, 1993). These symptoms often cause fear and negatively affect their quality of life. “I thought I was going to die. I’d never see my children again, and the medications weren’t working.” Individuals with these symptoms repeatedly seek help in emergency rooms, urgent care centers, and primary care offices, contributing to the economic burden of health care (Scordo, 1990, 2005). Treatment measures are directed toward relieving symptoms. Although traditional medications such as beta-adrenergic blockers, calcium channel blockers, and anxiolytics are widely used to treat MVPS symptoms, these medications are reportedly ineffective for many people (Scordo, 2007). An appreciable number use one or more alternative therapies to control symptoms—most notable among these therapies are magnesium supplements, known to influence cardiac function (Scordo, 2005). The purpose of this article is to review the literature on what is known about MVPS and magnesium supplementation.

**Mitral Valve Prolapse**

Anatomic MVP is a well-recognized clinical entity with a reported prevalence of 2% to 22% (Benjamin, 2001; Boudoulas, Kolibash, & Wooley, 2000; Devereux et al., 2001; Freed et al., 1999; Gaffney & Blomqvist, 1988;
Mitral Valve Prolapse Syndrome

When anatomic MVP is associated with a constellation of symptoms not related to structural changes, then the diagnosis becomes MVPS (Boudoulas & Wooley, 2000; Boudoulas et al., 2000). Symptoms are believed to be the result of various forms of neuroendocrine or autonomic dysfunction or of anxiety disorders. Resultant metabolic changes include parasympathetic abnormality, increased catecholamine level, catecholamine regulation abnormality, excessive response to adrenergic stimulation, decreased intravascular volume, renin-aldosterone regulation abnormality, and magnesium deficiency (Boudoulas et al., 2000; Durlach, 1994; Durlach, Pages, Bac, Bara, & Guiet-Bara, 2004; Gaffney & Blomqvist, 1988; Kitlinski et al., 2004). Although the long-term history of patients with MVPS has not been well-defined, natural history studies report that individuals with MVPS have a relatively benign prognosis and rarely require valve replacement (Boudoulas & Wooley, 2000; Boudoulas et al., 2000).

The distinction between MVP and MVPS was introduced in the early 1980s, but many authors continue to use the term symptomatic MVP when describing patients with MVPS. Research on patients with MVPS is often termed “symptomatic MVP” and not MVPS. There has been movement by cardiologists in the last 10 years to use the term MVPS, but the mixed use of these terms in the research literature remains. Most research to date deals with the physiology and treatment of anatomic MVP; however, research on the effect of MVPS on the individual’s role status, health concerns, and use of health care services only recently has been defined (Scordo, 2005).

MVPS Symptoms

Common MVPS symptoms include fatigue, palpitations, tachycardia, skipped beats, extra beats, chest pains, mood...
Mitral Valve Prolapse Syndrome and Magnesium Supplementation

Mitral Valve Prolapse Syndrome and Magnesium Supplementation

in this sample was higher than for patients with chronic illness (M = 84.2, SD = 15.6) or mitral valve disease (M = 77.4, SD = 20.9). Higher overall uncertainty scores correlated with greater number of MVPS symptoms (r = .43, p < .001). These uncertainty responses were believed to be related to the unpredictability of symptoms occurrence in MVPS. Participants with the highest MUIS score (92.2) often visited the emergency department (Scordo, 2005). These findings support anecdotal and clinical evidence that MVPS patients have many fearful reactions to their symptoms (Scordo, 1994, 2007b). In fact, the impact of MVPS symptoms on daily life can be dramatic (Utz, Hammer, Whitmire, & Grass, 1990). In taped interviews, 20 subjects with MVPS judged their state of health by their ability to continue employment, to perform family/household duties, and to participate in exercise and leisure activities (Utz et al., 1990). Some subjects feared activities would provoke a heart attack and avoided them. Participants in MVP support groups located throughout the United States echoed these concerns (Scordo, 2001). The majority of participants (73%, n = 274) who were able to locate and attend a support group did so to lessen their fears about MVPS. They believed if they could obtain information about MVPS and about how to control their symptoms, they would be less fearful.

Treatment measures are directed toward symptom relief. Many MVPS patients report they are frequently prescribed medication and not given information on other interventions to control symptoms (Scordo, 2005). This may be partly related to the time required for explanations about MVPS as compared to writing a prescription for a medication. Frequently used medications to treat associated symptoms include beta-adrenergic blockers along with calcium channel blockers and anxiolytics (Boudoulas & Wooley, 2000; McLaren et al., 1976; Scordo, 2005). Scordo (2005) found that 337 (40%) of 837 patients with MVPS were taking one or more prescribed medications for MVPS symptoms: 281 (34%) were taking a beta blocker, 175 (21%) were taking an anxiolytic, 12 (1%) were taking a calcium channel blocker, and 15 (2%) were taking digoxin. Beta-adrenergic blocking agents block the action of endogenous catecholamines (epinephrine [adrenaline] and norepinephrine [noradrenaline] in particular) on β-adrenergic receptors, which are part of the sympathetic nervous system and thus are theoretically designed to suppress symptoms related to increased catecholamines such as chest pain and palpitations. Calcium channel blockers, such as verapamil, diltiazem, and digitalis, because of their negative chronotropic effects are frequently used to treat palpitations, while anxiolytics are used to treat the associated anxiety. However, there was no relationship between reported symptoms and medication use (Scordo, 2007b). There is limited efficacy data to justify these medications. Oral digoxin was noted to reduce the incidence and severity of chest pain in 23 patients with MVP (Saltissi, Crowther, Byrne, Clarke, Jenkins, et al., 1983). Oral propranolol was found to be beneficial in 6 of 16 patients treated for supraventricular arrhythmias, with improvement in chest pain of 2 patients (Winkle et al., 1977). Ethmozine was found to be effective in controlling symptomatic complex ventricular arrhythmias in 17 patients (Pratt et al., 1986). No large studies or clinical trials of efficacy were found.

Anecdotal reports, clinical experience, and some recent preliminary data suggest that for many people with MVPS, symptoms can be controlled using nondrug measures (Scordo, 1990, 1994, 2000, 2005, 2007b; Utz et al., 1993). To determine commonly used treatments, the MVPS Standard Form was completed by the 837 MVPS patients in the Scordo study (Scordo, 2005). This form includes measures of current and past medications (prescribed and over the counter); self-treatment measures; and use of alternative therapies. Self-reported measures that decreased symptoms included adequate rest; avoiding stress, caffeine, and other stimulants; regular exercise; and increased water intake (Scordo, 2005). Participants who used alternative therapies (n = 527, 63%) reported that conventional medicine did not help control their symptoms and believed that alternatives were more congruent with their beliefs, swings, light-headedness, migraine headaches, shortness of breath, dizziness with postural changes, and anxiety or panic attacks (Boudoulas & Wooley, 2000; Scordo, 2000, 2005, 2007a; Utz et al., 1993). In a study of 837 patients with MVPS, 50% of the participants reported experiencing at least 10 symptoms since being diagnosed with MVPS, with palpitations, anxiety, skipped beats, fatigue, and light-headedness reported most frequently (Scordo, 2005). In the Framingham Heart Study, 12% of MVPS subjects had complaints of chest pain, and nearly 50% had dysrhythmias (Savage et al., 1983). Symptoms may vary in frequency and intensity during emotional, physical, or physiological stress (Boudoulas & Wooley, 2000; Scordo, 1991, 2005, 2007a).

MVPS symptoms are commonly associated with fears and concerns that lead to multiple emergency department visits and/or unscheduled outpatient office visits (Scordo, 1995, 2005). To determine the health concerns of individuals with MVPS, 837 subjects throughout the United States and Canada (731 [87%] females and 106 [13%] males) responded to the Mishel Uncertainty Illness Scale (MUIS). The overall uncertainty score (M = 86.4) in this sample was higher than for patients with chronic illness (M = 84.2, SD = 15.6) or mitral valve disease (M = 77.4, SD = 20.9). Higher overall uncertainty scores correlated with greater number of MVPS symptoms (r = .43, p < .001). These uncertainty responses were believed to be related to the unpredictability of symptoms occurrence in MVPS. Participants with the highest MUIS score (92.2) often visited the emergency department (Scordo, 2005). These findings support anecdotal and clinical evidence that MVPS patients have many fearful reactions to their symptoms (Scordo, 1994, 2007b). In fact, the impact of MVPS symptoms on daily life can be dramatic (Utz, Hammer, Whitmire, & Grass, 1990). In taped interviews, 20 subjects with MVPS judged their state of health by their ability to continue employment, to perform family/household duties, and to participate in exercise and leisure activities (Utz et al., 1990). Some subjects feared activities would provoke a heart attack and avoided them. Participants in MVP support groups located throughout the United States echoed these concerns (Scordo, 2001). The majority of participants (73%, n = 274) who were able to locate and attend a support group did so to lessen their fears about MVPS. They believed if they could obtain information about MVPS and about how to control their symptoms, they would be less fearful.

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values, and philosophy of health and life. Also, they reported conventional medicine did not help control symptoms. Common practices were yoga and meditation along with vitamin and mineral supplements—most commonly magnesium supplements with doses ranging from 200 to 800 mg/day. Magnesium supplements were associated with a reduction in chest pains, palpitations, and anxiousness. Additionally, analysis of the dietary surveys collected from this sample revealed a significant inverse correlation between low magnesium intake and chest pain.

**Magnesium and MVPS Symptoms**

Magnesium (Mg) is the second-most abundant intracellular cation in the body (Elin, 1994; Maier, 2003). It is a cofactor in more than 300 enzymatic reactions, such as adenosine triphosphate (ATP) metabolism, activation of creatine kinase, adenylate cyclase, and sodium potassium-ATPase (Fox, Ramsoomair, & Carter, 2001). Magnesium is also considered the physiology calcium antagonist; at the cellular level, it has been proposed to act as a chronic regulator of cell functions. It is well-known that Mg plays a pivotal role in the control of cardiac excitability, neuromuscular transmission, vasomotor tone, and blood pressure (Ueshima, 2005). The majority of magnesium stores are in bone (60%–65%), with the remainder in muscle (27%), soft tissues (19%), erythrocytes (0.5%), and serum (0.3%). Normal total serum magnesium concentration is 0.75–0.96 mmol/L (1.8–2.3 mg/dL) (Lowenstein & Stanton, 1986). Given that serum contains only 0.3% of the total body Mg content, serum magnesium levels correlate poorly with total body stores, and Mg in the serum is a very poor indicator of total body magnesium content. Many patients with normal serum magnesium levels could be intracellularly deficient (Lowenstein & Stanton, 1986). Additionally, signs and symptoms ascribed to Mg deficiency may be absent even with severe hypomagnesia (Noronha & Maruschak, 2002).

Magnesium’s importance as an essential nutrient was first recognized in the 1930s when Kruse et al. reported on the multiple effects of a lack of magnesium on the development, reproduction, humoral balance, and neuromuscular apparatus in rats and the reversibility of these defects by oral magnesium loading. These physiology data constituted the background for initial studies that established the importance of abnormalities in magnesium metabolism (Durlach et al., 2004). Mg deficiency is considered to contribute to many diseases, and the role for Mg as a therapeutic agent continues to be tested in numerous clinical trials. Abnormalities in intracellular magnesium homeostasis have been hypothesized to play an important role in mood disorders, migraine headaches, insulin resistance, type 2 diabetes mellitus, immune system function, and in the pathogenesis of cardiovascular diseases including atherosclerosis, hypertension, ischemic heart disease, sudden cardiac death, and cardiac arrhythmia (Barbagallo et al., 2003; Eby & Eby, 2006; Evans & Taylor, 2006; Laires, Monteiro, & Bicho, 2004; Mazur et al., 2007; Pokan et al., 2006; Tam, Gomez, Gonzalez-Gross, & Marcos, 2003; Ueshima, 2005). Intravenous magnesium has been associated with a significant reduction in the incidence of atrial fibrillation after coronary artery bypass surgery (Alghamdi, Al-Radi, & Latter, 2005), has been shown to provide additional benefit in moderate to severe acute asthma in children treated with bronchodilators and steroids (Cheuk, Chau, & Lee, 2005), and is recommended as the first-line treatment for torsades des pointes with a prolonged QT interval (Olgin & Zipes, 2005). Hypomagnesemia is one of the most common electrolyte disturbances in hospitalized patients, especially in the critically ill (Cheuk et al., 2005). Deficits in total serum magnesium on admission to the hospital have been associated with increased mortality (Noronha & Maruschak, 2002).

Primary Mg deficit can be due to Mg deficiency or Mg depletion (Bobkowski, Nowak, & Durlach, 2005). Magnesium deficiency is due to insufficient dietary Mg intake, a common finding in developed countries (Ford & Mokdad, 2003). Western-style diets, however, provide sufficient magnesium to avoid overt magnesium deficiency in most healthy adults (Vormann, 2003). Magnesium depletion is due to deregulation of factors controlling Mg status, such as intestinal Mg hypoabsorption, increased urinary excretion, reduced Mg bone uptake and mobilization, insulin resistance, stress, excessive alcohol intake (Rivlin, 1994, p. 416–423), coffee and phosphate excess, and corticosteroid or catecholamine excess (Durlach et al., 2004).

Magnesium depletion, possibly due to autonomic dysfunction, may play a role in MVPS symptomatology (Bobkowski et al., 2001; Coghlan & Natello, 1992). Increased sympathetic activity stimulates the renin-angiotensin-aldosterone system with subsequent urine magnesium loss. Cardiac muscle, similar to skeletal striated muscle, may respond to magnesium deficit with “signs of tetany” reflected by the left ventricular dyssynergy and propensity for prolapse of the mitral valve leaflets (Durlach et al., 2004). Magnesium deficiency may also lead to alteration of collagen synthesis and subsequent degeneration of mitral valve leaflets. Mg deficiency in MVPS may produce a variety of cardiac, neurologic, psychosomatic, and neuromuscular symptoms. Significantly lower serum
Mitral Valve Prolapse Syndrome and Magnesium Supplementation

Though magnesium deficiency in MVPS has previously been suspected as a cause of associated symptoms, there is limited research on treatment with oral Mg. Studies of the effects of Mg supplementation on MVPS symptoms are limited by imprecise echocardiographic diagnostic criteria of MVP (Lichodziejska et al., 1997), small sample sizes, and inadequate methods for monitoring changes in symptoms. Dosages and formulations varied widely. Also, the majority of these studies were performed prior to the development of newer formulations of magnesium supplements. Despite these limitations, there is physiological theory and clinical evidence to support a more rigorous test of the use of Mg supplements to decrease MVPS symptoms. In addition, prior studies failed to establish an effective dose needed to decrease MVPS symptoms.

The therapeutic efficacy of magnesium lactate was assessed in an early (1985) study of 35 patients (4 males and 31 females) diagnosed with MVP by clinical and echocardiographic criteria and having one or more MVPS symptoms (Simoes Fernandes et al., 1985). Serum hypomagnesemia was detected in 13 (37%) of patients. Twenty-four patients took Mg lactate (360 mg of elemental Mg) for 16 weeks. In the remaining 11 patients, the trial was divided into two periods of 8 weeks each. During the first period, a placebo was administered; during the second half the patients took 3 g/day of Mg lactate. Based on clinical recordings by the clinician, patients who took the magnesium supplements noted improvement in symptoms—particularly palpitations, chest pains, and anxiety. Those in the placebo group did not experience any improvement in symptoms. The Mg lactate was well-tolerated, with only two cases of epigastric discomfort that was relieved with the administration of antacids. Mean serum levels of magnesium increased in patients taking Mg. Despite the small sample and the lack of a standardized data collection instrument to measure symptom frequency and severity, this study was one of the first to provide findings that support the use of magnesium supplements for MVPS symptom control.

To assess the frequency of low serum magnesium and to analyze the effects of oral magnesium therapy, 94 patients diagnosed with mitral valve prolapse by echocardiography were studied. In that sample (87 female, 5 males, age 32–56 years), 59 (63%) patients had low serum Mg and 35 (37%) had normal levels (Coghlan & Natello, 1992). The two groups did not differ in MVPS symptoms. Magnesium treatment with either Mg oxide (250–1200 mg)
or Mg chloride (128–256 mg) was randomly added to existing medical treatment, that is, beta and calcium channel blockers, to a subset of 41 (69%) patients. Four participants discontinued therapy because of diarrhea with Mg oxide therapy at the 1200 mg dose. Treatment lasted 4 months and, according to clinical records, resulted in marked improvement of muscle cramps and migraines. Although limited by the lack of a standardized instrument to measure MVPS symptoms, this study demonstrated the benefit of Mg supplements when used in addition to traditional medications. Differences in outcomes between the two types of Mg supplementation were not reported. Also, the effects of two dosage levels on the frequency and intensity of MVPS symptoms were not reported.

The effects of magnesium supplementation were assessed in a double-blind, placebo-controlled, crossover study with 141 MVPS subjects (124 women and 17 men), aged 16 to 57 years with heavily symptomatic MVP who were free of other diseases and had low serum magnesium (< 0.7 mmol/L) measured on 3 consecutive days (Lichodziejewska et al., 1997). Heavily symptomatic MVP was defined as having at least 7 of 13 common MVPS symptoms. Diagnosis was based on 2D echocardiograms. Pre- and postdata were collected on MVPS symptoms, anxiety (Spielberger’s “TPI” psychological questionnaire), and urinary excretion of adrenaline and noradrenaline. Of the 141 heavily symptomatic patients, 84 (60%) had decreased serum magnesium levels. These 84 subjects were then randomized to receive either placebo or magnesium supplementation with magnesium carbonate (MgCO₃) 0.6 g/capsule (170 mg of elemental Mg) given as follows: first week, 510 mg of elemental Mg; second to fifth week, 340 mg of elemental Mg. Only half of the subjects (70 of 141) completed the protocol (64 women and 6 men, aged 16 to 47). “Poor cooperation” is the only explanation given by the authors for study dropouts. No mention is made of adverse effects. As compared to placebo, within 5 weeks of treatment, subjects treated with magnesium noted a significant reduction in weakness, chest pain, dyspnea, palpitations, and anxiety. It is unclear how symptom frequency was measured because there is no mention of instruments that measure symptom frequency or intensity. Mean daily excretion of noradrenaline and adrenaline significantly diminished in the magnesium group. The authors suggested that the results support a causal relation of symptoms of MVP and magnesium deficit. They hypothesized that the positive effects of magnesium may be related to the decreased sympathetic activity as reflected by the decrease in urine secretion of catecholamines.

Further support for the positive effects of magnesium supplementation was demonstrated in a study in Russia (English abstract only) (Martynov et al., 2000). Subjects (n = 84) with idiopathic MVP were randomized to receive a daily dose of 3,000 mgm magnesium orotate or placebo for 6 months. Pre- and postdata were collected from clinical records (symptoms), echocardiography, 24-hour electrocardiographs, spectral analysis of cardiac rhythm variability, quality of life (Visual Analog Scale and Disability Scale), and magnesium hair analysis. The authors reported that magnesium orotate treatment resulted in complete or partial reduction of symptoms in more than half of subjects. Which symptoms were reduced was not detailed in the study.

Summary

MVP has been described as the most common cardiac valvular abnormality in industrialized countries. Frequent symptoms include fatigue, palpitations, tachycardia, skipped beats, extra beats, chest pains, mood swings, light-headedness, migraine headaches, shortness of breath, dizziness with postural changes, and anxiety or panic attacks. Research has demonstrated that these symptoms are commonly associated with fears and concerns that often cause multiple emergency department visits. Treatment measures are directed toward symptom control. Commonly prescribed medications, beta blockers and anxiolytics, are ineffective for controlling symptoms. Thus, many individuals turn to alternative therapies for symptom management. It thus seems logical to address the safety and efficacy of magnesium as an intervention. Although there are studies that support the use of magnesium supplementation in MVPS, they fail to establish an effective dose of Mg. In addition, they are limited by small samples, imprecise echocardiographic diagnostic criteria of MVP, and inadequate methods for monitoring changes in symptoms. Thus, further research is needed to address these issues.

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CASE STUDY

Cultural Competence:
Scholarly Nature of
Clinical Practice of Nursing

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This case study discusses combining Western and traditional medicine for a Native American woman who was treated for unruptured cerebral aneurysms and lung cancer. As her primary care provider, I managed and coordinated referral decisions, provided primary care, education, advocacy, and shared in decision making with the patient and her family.

Keywords: cultural competence; Native American traditional medicine; clinical practice of advanced nursing; culturally competent care; cultural awareness; Yuwipi ceremony

Linda, a 65-year-old Native American woman, was diagnosed with multiple unruptured cerebral aneurysms and a transient ischemic attack (TIA) 3 months prior to my first visit with her. At that time, she reported complaints of visual disturbance, right-sided weakness, dull headache, confusion, and vertigo. In the emergency room (ER), a computed tomography (CT) scan and CT angiography of the brain confirmed multiple unruptured cerebral aneurysms. She was evaluated by a neurosurgeon and magnetic resonance angiography (MRA) of the brain was performed. The neurosurgeon recommended no treatment of the aneurysms and a repeat MRA of the brain in 1 year.

Linda’s past medical history included mild cerebral vascular accident with no sequelae 2 years ago, hypertension, rheumatoid arthritis (RA), osteoporosis, hyperlipidemia, chronic obstructive pulmonary disease, coronary artery disease (CAD), gastroesophageal reflux disease, and tobacco use (50 pack-years). Her family history was significant for abdominal aortic aneurysm rupture, type 2 diabetes mellitus, coronary artery disease, transient ischemic attack, hyperlipidemia, rheumatoid arthritis, and unspecified anticoagulation disorder.

During the time of diagnosis and throughout her illnesses Linda was a tribal council leader. She was very active within the tribal community, enjoyed spending time with family, and attended pow-wows every weekend during the summer. She occasionally used tobacco as per traditional ceremonies. She was married and lived with her husband and step-grandson.

At her first visit with me I obtained a complete history and physical exam. Linda and her family requested a second opinion from another neurosurgeon as the sudden death of her brother from a ruptured abdominal aortic aneurysm 3 years earlier was still fresh in their minds. I referred the patient to another neurosurgeon.

Five weeks later, Linda and her family members saw the second neurosurgeon. Linda reported that a “coiling procedure” was not an option because of the size of the aneurysms. I reviewed the neurosurgeon’s report, which confirmed three intracranial aneurysms. The largest aneurysm measured approximately 7 mm × 4.5 mm at the left middle cerebral artery (MCA) bifurcation. A smaller aneurysm was found at the base of the right posterior communicating artery (PCA). It measured 3.2 mm × 4 mm. A 1–2mm aneurysm was also found at the origin of the right A1 segment. Also present was a dilation of the left MCA. It was difficult to distinguish if this was fusiform or saccular in nature.

The neurosurgeon reported that the aneurysms on the right side of the brain were too small for any surgical procedure and that observation and control of risk factors...
Cultural Competence

Native American Traditional Healing: Historical Background

Native medicine is believed to be as old as 40,000 years. However, there was no documentation of this until Europeans arrived 500 years ago (Center for Health and Healing, 2003). Native medicine is embodied in a lifestyle that honors all creation and cannot be reduced to an academic body of knowledge and technique. Native American elders decline to discuss their knowledge for fear of excommunication and exploitation of their sacred knowledge. Therefore, the writings of Native medicine describe the outward appearance but do not capture its richness (Center for Health and Healing, 2003). Diseases, in Native American minds, are seen in the context of disruption in the body, mind, spirit, emotions, social group, and lifestyle in contrast to physical pathology.

Historically, sophisticated Native American interventions have been lost in whole or in part as a result of many tribes dying out, a decreased number of Native Americans, and pride that discouraged sharing of knowledge with non-Native Americans. Through the years, more and more Native Americans adapted to European ways and beliefs, especially Christianity. Fewer Native Americans took interest in keeping their tradition alive (Center for Health and Healing, 2003). However, there is evidence that Native Americans and nonnatives now are becoming more interested in traditional Native American healing practices (Mehl-Madrona, 1999). Yet, many Native American elders still do not trust nonnative cultures to honor the integrity of their teachings.

Treatment Approach

Traditional healing is holistic; it does not focus on symptoms or diseases but rather on the total individual and how that individual fits into the web of life (AIDS Infonet, 2006). This type of healing concentrates on returning the individual to a state of harmony. Traditional healers have their own perspective on the healing process based on their own set of skills and life experiences. A native healer who has too many failures loses the reputation of a powerful healer (Center of Health and Healing, 2003). Thus, many healers select their cases carefully.

Individuals seek healers based on success in similar situations. The healing process is an exchange and requires a fee. Native healers do not set prices for their services and believe that harmony is most effective when the patient is deeply engaged in the process.

The patient makes an offer to the healer and waits to hear back. If the patient does not hear back, the offer is not accepted. The patient can make another offer or find a different healer. When an offer is accepted, the healer first gives the patient a behavioral prescription to strengthen her/his commitment, such as performing a selfless act, making amends with an estranged family member, or climbing a sacred mountain (Center of Health and Healing, 2003).

Usually, the healer chooses the simplest intervention judged to be effective based on the specific situation. There are no written guidelines to healing. Some common techniques include herbalism, animal spirits, lifestyle modification, prayer, sweat, smoking, vision quest ceremonies, various massages, and self-inquiry. The healer’s inten-

were indicated. According to the neurosurgeon, the risk of rupture for the larger aneurysm was 0.7% within a year. He also reported the actual size of this cerebral aneurysm was still in question due to the presence of a “daughter sac.” Coiling method was not indicated because of the daughter sac and the risk of rupture during the procedure. The treatment options for this aneurysm were surgical clipping or observation. He also discussed the risk of rupture. According to the neurosurgeon, 15%–20% of patients die before arriving at the hospital, and another 15%–20% die at the hospital. Forty-five percent of the patients expire when aneurysms rupture, another one-third recover with minimal deficits, and the others may have major deficits requiring nursing home placement or home care services. The risk of disability resulting from surgery was estimated at 10%–15%. In this right-hand-dominant patient with a left-sided aneurysm, surgery might affect speech and memory, right-sided weakness or paralysis, and/or sensory impairment. The neurosurgeon recommended observation with no surgery at that time as the risk of rupture of the small aneurysms within 1 year was low. He also recommended a repeat CT angiogram in 1 year.

After seeing the second neurosurgeon, Linda decided to seek Native American traditional healing from a medicine man. Linda reported she was afraid the aneurysms may rupture and did not want to wait a year for a repeat CT angiogram. She had heard that the medicine man had helped another Native American who also had cerebral aneurysms. Linda hoped the traditional medicine would do the same for her.

Upon returning from seeing the medicine man, Linda came to the clinic with her husband and daughter for follow-up. At first, she was reluctant to share her traditional medicine experience with me. She did report she was given an unknown herb to take three times a day. Linda’s family members also reported a “Yuwipi Ceremony” was held for Linda.

Historical Background

Native American Traditional Healing: Historical Background

Native medicine is believed to be as old as 40,000 years. However, there was no documentation of this until Europeans arrived 500 years ago (Center for Health and Healing, 2003). Native medicine is embodied in a lifestyle that honors all creation and cannot be reduced to an academic body of knowledge and technique. Native American elders decline to discuss their knowledge for fear of excommunication and exploitation of their sacred knowledge. Therefore, the writings of Native medicine
tion is not to cure a disease but to transform the patient through the experience of the disease. The techniques are only steps toward becoming whole, balanced, and connected. Native Americans are taught that “powers” come in the form of natural forces and elements of nature. Every part of the earth is a physical and spiritual source of power and energy that directly affects humans because humans are an integral part of the great family in creation (Lake-Thom, 1997).

**Yuwipi Ceremony**

According to Linda, her husband, and daughter, *Yuwipi* means “Dakota spirit calling.” Linda learned of a particular medicine man at a pow-wow she attended. She was introduced to a Native American who was seeing this medicine man. Linda stated this other individual’s aneurysms decreased in size before undergoing surgery, and the Western doctors were amazed by this change. Linda’s family was told this individual was given the same traditional herbs as Linda, and she also participated in a Yuwipi ceremony.

Linda related the details of her traditional treatment to me. The medicine man instructed Linda to make 104 tobacco ties in four different colors, red, white, yellow, black, and to bring a bag of tobacco with her to the ceremony for offering. She was also instructed to reflect and pray before the ceremony. Linda had to make the tobacco ties herself, with no help from family members, to make a successful Yuwipi. Linda was also honored in a “sweat” before the Yuwipi ceremony. She was unable to attend the sweat due to her poor health.

On the night of the Yuwipi ceremony, Linda, her family, and friends entered a dark room. On the floor was a star quilt spread out with choke cherry tree branches on the four corners. Tobacco is a symbol of man communicating with spirits. The medicine man attached the 104 tobacco ties around the four choke cherry tree branches, making a circle when they were attached.

All participants were instructed to remove all jewelry, watches, hair pins, shoes, and belts and sat around the edges of the star quilt on the floor. The medicine man then was wrapped up in the star quilt and his hands and legs tied by his assistant. Four rattles were placed in front of Linda. The medicine man’s assistant started playing the drums. All participants were instructed to pray. During the ceremony, Linda’s daughter reported opening her eyes and seeing a lot of flickering lights that she believed were spirits. She moved her legs thinking the spirits were going to step on her. Linda and her daughter also reported feeling a tapping sensation on their knees and feet. They all felt a forceful “swish” that they believe represented an eagle flying. Eagles are believed to deliver prayer and messages to the spirits, a form of communication between man and spirits. Chanting and drumming continued. Linda recalled hearing an “old woman” singing in Native tongues. They all reported feeling spirits in the room.

At the end of the ceremony, the light in the room was turned on and the medicine man was found to be untied and unwrapped. The star quilt he was wrapped in was folded with the ties on top. The 104 tobacco ties, which had been wrapped around the choke cherry tree branches, were in front of Linda rolled into a ball. Linda and her family members reported being amazed and were unsure of how this all occurred. They also reported the four rattles were now dangling from the choke cherry branches. Some believed the ceremony lasted 1 1/2 hours, though others thought it was 40 minutes.

Linda was instructed by the medicine man to burn the tobacco ties in 4 days. One relative was instructed to sweat at the half moons four times to find his spiritual answer. This family member had a question he had been struggling with for some time that only he knew about. Four is a very important number in the Native American tradition. There are four directions, four skin colors, four elements of life (bravery, humanity, wisdom/truth, love/respect), and four elements of nature (wind, rain, fire, sun), four seasons, and the four medicines used in ceremonies (tobacco, sage, cedar, sweet grass). Some traditional ceremonies last 4 days and 4 nights.

**Sweat Lodge Ceremonies**

Sweat lodge ceremonies are ancient purification and healing ceremonies. They are held in low domes of bent interwoven willow branches. Stones representing grandfathers are heated at the sacred fire outside of the lodge and brought into the center of the lodge where medicine water is poured over them to create a healing steam. The healing steam is believed to purify physically, mentally, emotionally, and spiritually.

Linda continued the traditional herbs as prescribed by her medicine man. She was instructed to use the herbs for a year and to see him again after her CT angiogram. Unruptured cerebral aneurysms are asymptomatic, therefore Linda did not know if the herbs were decreasing the size of the aneurysms. She did report feeling better and was optimistic knowing that the herbs had helped another person. She reported no side effects.

Nineteen weeks after her first visit, Linda presented to the clinic with shortness of breath on exertion and a cough productive for green phlegm. She had been
tobacco-free since her first visit with me. Her physical examination was significant for diminished breath sounds on the right. Chest x-ray revealed a new right pleural effusion with possible associated compressive atelectasis of the right lower lung. I ordered a CT scan of the chest. The results revealed possible bronchogenic carcinoma in the right lung apex with associated pleural fluid and possible mediastinal adenopathy. Sputum cultures were positive for pseudomonas aeruginosa. Linda was prescribed ciprofloxacin and was instructed to discontinue methotrexate. I notified her rheumatologist and referred her to a pulmonologist.

Fluid analysis from thoracentesis done by the pulmonologist revealed 1400 cc of bloody fluid positive for bronchogenic adenocarcinoma. She was admitted to a tertiary hospital for further work-up by an oncologist. Linda's husband notified the medicine man. The medicine man prescribed two different herbs for Linda’s new diagnosis.

Over the next 6 months, Linda started chemotherapy for stage 3 bronchogenic adenocarcinoma. During that time, she was under my care as the primary care provider and the care of the oncologist, pulmonologist, rheumatologist, and the medicine man. When Linda's rheumatoid arthritis flared, she was treated with prednisone.

Linda developed pneumonia while undergoing chemotherapy and was hospitalized for 3 weeks. She lost 20 pounds. Family members contacted the medicine man, and Linda was given another herb to help stimulate her appetite. Linda eventually recovered from pneumonia and gained back her weight. After a series of chemotherapy, Linda improved and returned to full-time work.

Although the stresses of work continued, Linda was dedicated and determined to improve quality matters and economic development for her tribal community. She did not allow her illness to interfere with her responsibilities as a tribal council leader. Linda continued to follow up with me and her oncologist. She continued consuming the herbs her medicine man prescribed and attended Yuwipi ceremonies.

Five months later, Linda awoke one morning with severe headache, nausea, and vomiting. Family members rushed her to the tertiary care hospital where she was diagnosed with metastatic brain cancer. Family members contacted the medicine man. In her hospital room above her bed the family placed tobacco ties symbolizing an offering to the spirits, a white eagle feather that symbolized taking messages and prayers to the spirits, and sweet grass, which is one of nature’s elements and a powerful medicine. She underwent 10 days of radiation to the brain and was discharged home with home care services.

On the fifth day home, I was contacted by family members who were concerned about her condition and wanted advice. When I arrived at the family home, I assessed Linda and discussed my findings with family members in a private room. Within the hour, more family members arrived.

That evening family members held a sweat for Linda. During the sweat, family members took a chinupa, or ceremonial pipe, and packed it with tobacco that had been blessed by the spirits. The chinupa was plugged to prevent spillage and maintain the spiritual blessings. After the sweat, family members returned to Linda’s home, gathered around Linda, and held a prayer service. This prayer service called spirits to help Linda with her journey home. Within a few hours, Linda expired. Her family believes she entered the spirit world.

Native Americans believe in 4 days of mourning. This allows spirits to come from the west, north, east, and the last day, the south. On the fourth day, a private prayer service was held at the cemetery with family members. At that time, the chinupa, with its blessed tobacco, was shared by family members. This tobacco offering was a communication among the spirits and family members to help Linda on her journey.

Health care workers must be receptive to medicines and treatments from other cultures. Some herbal medicines can interfere with multiple drug therapy, especially in the elderly. This case study demonstrates combining Western and Native American medicines and traditional ceremonies to provide holistic care for a patient with multiple complex diagnoses. Linda and her family benefited from this multicultural experience that incorporated their individual needs and brought wholeness, balance, and connection. They were able to communicate with their spirits and experience their spirituality as a sacred circle of kinship that promotes unity and wholeness. As a health care provider, I too benefited and learned from Linda and her family.

References


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CASE STUDY

Testicular Cancer: Implications for Primary Care Providers

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The Cancer Institute of New Jersey, New Brunswick

Germ cell tumors are the most common solid tumor in men between 15 and 34 years of age. Survival from germ cell tumor is high, with a 5-year survival rate of 90% (Schmoll et al., 2004). Because this cancer affects young men, they have many years to manifest the long-term side effects of treatment. Second primary cancers are a leading cause of death among testicular cancer survivors (Zagars, Ballo, Lee, & Strom, 2004). This case study reviews the clinical course of a 27-year-old male with a newly diagnosed nonseminoma germ cell tumor. Diagnostic and treatment-related issues for both patient and health care provider are addressed. Guidelines for the surveillance of nonseminoma patients after treatment and the implications of long-term follow-up are reviewed.

Case Study

Mr. V is a 27-year-old male who presented to the emergency department (ED) with back pain. Upon further questioning by the ED clinician, Mr. V described a painless swollen testis. Physical examination revealed abnormal left testicular findings. An intratesticular mass measuring 2 cm × 3 cm was visualized on ultrasound. Further workup included a computed tomography (CT) scan of the chest, abdomen, and pelvis, which revealed a 14-cm left-sided retroperitoneal mass and multiple lung nodules. Serum tumor marker results included an AFP of 461 ng/ml (0–15 ng/ml), an LDH of 990 U/L (105–230 U/L), and a β-HCG of <1.0 IU/L (0–3 IU/L), indicative of a nonseminoma germ cell tumor. A bone scan and an MRI of the brain were both negative for evidence of disease.

Mr. V underwent a left orchiectomy with pathology revealing malignant mixed germ cell tumor, 70% immature teratoma, and 30% seminoma. A fine needle aspirate of the retroperitoneal mass confirmed a malignant germ cell tumor. Mr. V was staged as intermediate risk, stage IIIB disease, which according to the International Germ Cell Cancer Collaborative Group (IGCCCG), has a 79% 5-year survival rate if treated with a cisplatin regimen (International Germ Cell Cancer Collaborative Group, 1997) (see Table 1).

Mr. V denied previous medical or surgical history. He does not take any medications, had smoked one pack of cigarettes per day for 8 years, and drank approximately two to three beers per week. He worked in finance and

<table>
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<tr>
<th>TABLE 1. International Germ Cell Cancer Collaborative Group Prognostic Classification of NSGCT</th>
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<tr>
<td>Risk</td>
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<tr>
<td>Good risk</td>
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<tr>
<td>Intermediate risk</td>
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<td></td>
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<td>Poor risk</td>
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lived with his parents. His family history includes a mother alive and well at age 52 and a father with a history of hypertension and myocardial infarction at age 50. Mr. V is an only child and he has no known history of cancer in the family.

Mr. V received four cycles of bleomycin, etoposide, and platinum (BEP), the indicated regimen for stage IIIB nonseminomatous germ cell tumor (NSGCT). Prior to initiation of the regimen, Mr. V learned of his potential for impaired fertility as a result of the chemotherapy. He was encouraged to consider banking his sperm. He was given contact information for a local sperm bank and advised to schedule an appointment prior to initiation of the chemotherapy. Mr. V did opt for sperm cryopreservation. He tolerated chemotherapy treatments fairly well with fatigue and the development of neutropenia the most notable side effects. Neutropenia was treated with filgrastim injections, a human granulocyte colony-stimulating factor that accelerates recovery of the neutrophil count (Amgen, 2007).

After Mr. V completed the four cycles of BEP, a re-evaluation CT scan of the chest, abdomen, and pelvis revealed complete resolution of the pulmonary nodules and a significant reduction in the left retroperitoneal mass, with the residual mass having a necrotic appearance and a measurement of 9 cm. All of his serum tumor markers normalized.

Background

Germ cell tumors (GCTs) comprise 95% of malignant tumors arising in the testes. The estimated number of new cases of testicular cancer in the United States in 2007 is 7,920, and the estimated number of deaths is 380 (National Cancer Institute, 2007). Although GCTs are uncommon tumors comprising 2% of all malignancies, they constitute the most common solid tumor in men between the ages of 15 and 34. Over the last half century the incidence of testicular cancer has increased two to fourfold in industrialized countries (Hemminki & Chen, 2006), and although improvements in diagnosis can explain some of the increase in incidence, it is believed that other factors such as the environment or lifestyle exposures may play a role (Xu, Pearce, & Parker, 2007).

Germ cell tumors are divided into seminoma and nonseminoma types. Nonseminoma is the more aggressive tumor and includes embryonal carcinomas, teratomas, yolk sac carcinomas, choriocarcinomas, and combinations of all of these types. In nonseminomatous germ cell tumors, the serum concentrations of alpha-fetoprotein (AFP) and β-human chorionic gonadotropin (β-HCG) are elevated in over 80% of men. Lactate dehydrogenase (LDH) is less specific but has independent prognostic value in patients with advanced germ cell tumors and is elevated in 60% of NSGCTs (Khan & Protheroe, 2007).

Testicular cancer is highly treatable and curable. More than 90% of patients diagnosed with GCTs are cured, including 70%–80% of patients with advanced tumors treated with chemotherapy (National Comprehensive Cancer Network, 2007). As a result of treatments leading to dramatic improvements in long-term survival, the late toxicities from treatment have become a significant issue that requires not only long-term surveillance but continued assessment for potential complications related to previous therapy (see Table 2).

Residual Disease After Chemotherapy

Approximately one-third of patients with stage II–IV nonseminoma have residual masses after treatment. Some consist of necrotic or fibrotic tissue, and others can be an undifferentiated malignancy (5%–10%) or differentiated teratoma (50%–60%) (Donohue, Leviovitch, Foster, Baniel, & Tognoni, 1998; Gelderman, Scraffordt Koops, Sleijfer, Oosterhuis, & Oldhoff, 1989). A differentiated teratoma may undergo a late malignant change, indicating that in general these masses should be resected, and the resection of a mature teratoma can result in a prolonged survival with little chance of recurrence (Cameron, Loehrer, & Thomas, 2007; Gerl et al., 1997; Shahidi et al., 2002).

<table>
<thead>
<tr>
<th>Year</th>
<th>Clinic Visit, AFP, β-HCG, LDH, CXR</th>
<th>CT A/P</th>
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<tbody>
<tr>
<td>1</td>
<td>Every 2–3 months</td>
<td>Every 6 months</td>
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<tr>
<td>2</td>
<td>Every 2–3 months</td>
<td>Every 6–12 months</td>
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<td>3</td>
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<td>5</td>
<td>Every 6 months</td>
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<tr>
<td>6</td>
<td>Every 12 months</td>
<td>Every 12–24 months</td>
</tr>
</tbody>
</table>

Risk Factors

Risk factors for germ cell tumors include male gender, age 15 to 34, prior history of germ cell tumors, a positive family history of a GCT, cryptorchidism, infertility, and Klinefelter’s syndrome (Cameron, 2007). The rising incidence of GCTs suggests an environmental role, which is supported by the declining sperm counts and increasing incidence of cryptorchidism. High estrogen concentrations have been explored as a possible cause. One study assessed the sons of women who received the synthetic estrogen diethylstilboestrol and found an increased incidence of testicular abnormalities (Horwich, Shipley, & Huddart, 2006). In addition, recent studies have shown decreasing semen quality to be associated with endocrine altering compounds (Hauser, Chen, Pothier, Ryan, & Altshul, 2003; Jensen, Toppari, Keiding, & Skakkebaek, 1995). Hardell et al. (2004) looked at the concentration of polychlorinated biphenyls (PCBs) in both testicular cancer patients, their biological mother, and case controls, and found that the mothers of the testicular cancer patients had significantly increased concentrations of a number of PCB congeners (Hardell et al.). However, there is no clear consensus from the studies that estrogen exposure causes testicular cancer.

Survivorship Issues

Given the high cure rates of testicular cancer and its tendency to occur in young adults, patients are living free of disease for a long time. Awareness of cancer survival has increased greatly over the past decade. Concerns for survivors include the late effects of chemotherapy, late relapse of the disease, the development of a second cancer, and the effects of disease and treatment on fertility (Vaughn, Gignac, & Meadows, 2002).

Secondary Malignancies

A study by Richiardi et al. (2007) investigating the risk of second malignancies among 29,511 survivors of germ cell testicular tumors found that nonseminoma patients had a statistically significant standardized incidence ratio of 2.0 or more for myeloid leukemia, soft tissue sarcoma, pancreatic cancer, stomach cancer, bone cancer, neoplasm of the skin, renal cancer, and thyroid cancer (Richiardi et al.). Chemotherapy is thought to be the major culprit of therapy-related leukemia, although that risk is higher with combination chemotherapy and radiation (Kollmannsberger et al., 1999). Etoposide, a DNA topoisomerase II inhibitor and one of the chemotherapeutic agents used as part of the BEP regimen, does carry a significant risk for leukemia, especially with high doses >2 g/m2. A study by Travis et al. (2005) looked at second cancers among 40,576 testicular cancer patients in Europe and North America diagnosed between 1943 and 2001 reported to population-based cancer registries. The findings revealed that young patients might experience high levels of risk as they reach older ages. At 10 years, patients had a statistically significant elevated risk for developing solid tumors, with a relative risk of 1.9, and the risk remained significantly elevated for 35 years. Patients diagnosed with nonseminomatous tumors at age 35 had a cumulative risk of solid cancers 40 years later of 31%, compared to 23% for the general population (Travis et al.).

Pulmonary Toxicity

Chronic lung damage is a rare but serious side effect of bleomycin that can lead to pulmonary fibrosis and death. The risk of fatal bleomycin toxicity is 1%–2% with an additional 2%–3% of patients experiencing nonlethal pulmonary fibrosis (Ginsberg & Comis, 1982). Pulmonary function tests are monitored before initiating bleomycin and during treatment. The diffusion capacity of carbon monoxide (DLCO) is used as a marker of pulmonary damage. Bleomycin is typically held if the DLCO falls to 40%–60% of its pretreatment value (Comis, 1990).

Vascular Toxicity

Vascular toxicities associated with bleomycin include Raynaud’s phenomenon. Raynaud’s phenomenon is characterized by transient episodes of vasoconstriction of the digital arteries. Clinically, these episodes exhibit as pallor followed by cyanosis, then redness and pain. Cold temperature is a typical instigating factor. In a large retrospective study, 37% of patients treated with vinblastine and bleomycin with or without cisplatin developed Raynaud’s phenomenon, and the clinical manifestations were evident at a median of 10 months, with a range of 2–28 months (Vogelzang, Bosl, Johnson, & Kennedy, 1981).

Cardiovascular toxicities have been associated with the BEP chemotherapy regimen for testicular cancer. Acute myocardial infarction has been reported both during and shortly after chemotherapy for germ cell tumors (Doll et al., 1986; Rodriguez, Collazos, Gallardo, & Hernando, 1995). All of the patients who had a myocardial infarction were young and had no known cardiovascular disease, and therefore the cardiac event was attributed to the chemotherapy, although the mechanism is unclear. Cisplatin
Testicular Cancer

Neurotoxicity

Peripheral neuropathy is a common form of neurotoxicity associated with cisplatin. The incidence of neuronal damage is reported to be as high as 76%, although a significant number of these patients have subclinical damage and some have resolution of sensory changes over time. It is estimated that symptoms persist for 20%-40% of patients (Hansen, Helweg-Larsen, & Trojaborg, 1989; Roth, Greist, Kubilis, Williams, & Einhorn, 1988). The dorsal root ganglia appear to be the site of neural damage, and therefore clinical manifestations are sensory in nature. Peripheral parasthesias and dyesthesias are common (Thompson, Davis, Kornfeld, Hilgers, & Standefer, 1984).

Otoxicity is another potential side effect of cisplatin, with an incidence of 20%-40%. Risk factors for ototoxicity appear to be related to cumulative dose of cisplatin, age, renal insufficiency, and pre-existing hearing impairments (Bokemeyer et al., 1998).

Infertility

Several studies have documented an increased risk for testicular cancer in patients presenting with infertility. Two studies have shown that before orchiectomy, spermatogenesis is already impaired in men with testicular cancer (Lass et al., 1998; Petersen, Skakkebaek, Vistisen, Rorth, & Giwercman, 1999). A Danish population study that included 32,442 men who underwent semen analysis from 1963 to 1995 found that men with abnormal semen characteristics were 1.6 times more likely to develop testicular cancer (Jacobsen et al., 2000). Carroll et al. (1987) found that of 15 patients that presented with germ cell tumors, 10 (66%) had evidence of abnormal spermatogenesis including poor motility, low sperm concentration, or low semen volume.

The infertility associated with testicular cancer may be related to a disruption in testicular architecture and functioning of the testis. This local effect of germ cell tumors is supported by a review of radical orchiectomy specimens in 28 patients that revealed impaired spermatogenesis most apparent within 3 mm of the tumor margin (Ho et al., 1992).

The current chemotherapy regimens target rapidly dividing cells, therefore they disrupt spermatogenesis. Almost all patients receiving combination chemotherapy will have no measurable sperm in the semen (azoospermia) during treatment. An evaluation of men treated for NSGCT demonstrated elevated luteinizing hormone (LH) levels in 59% of men who received chemotherapy and decreased sperm counts and semen volume compared to men after orchiectomy alone (Hansen, Berthelsen, & von der Maase, 1990).

Recovery of spermatogenesis may occur between 12–36 months after treatment with approximately 50% of patients achieving normal sperm counts (Boyer & Raghavan, 1992). Even after 2–5 years, many of these men continued to have low sperm counts, with approximately 25% having persistent azoospermia. Cisplatin has been shown to impair spermatogenesis, although with doses < 400 mg/m2, it is less likely (Aass, Fossa, Theodorsen, & Norman, 1991).

Men who have testicular cancer have many options available to preserve fertility. These options include sperm cryopreservation, advances in assisted reproductive techniques (ART), and testicular sperm extraction (TESE). Due to the decreased fertilization rates with in vitro fertilization or intracytoplasmic sperm injection after chemotherapy, sperm cryopreservation should be recommended before chemotherapy (Lambert & Fisch, 2007). Today,
with in vitro fertilization and sperm micromanipulation, even poor quality sperm can result in a pregnancy (Turek, Lowther, & Carroll, 1998).

**Psychosocial**

Because testicular cancer affects young men between the ages of 15 and 34, they are in a phase of life where they are often starting careers, committing to a partner, and starting a family. Quality of life has been studied in these patients, and findings demonstrate that fewer than 10% of testicular cancer survivors are affected by long-term psychosocial consequences. In one study, health-related quality of life in long-term testicular cancer patients was reported to be as good as or even better than men in the general population (Fleer, Hoekstra, Sleijfer, & Hoekstra-Weebers, 2004). Most of these studies have assessed the testicular cancer population at large.

A study by Tuinman, Hoekstra, Fleer, Sleijfer, and Hoekstra-Weebers (2006) explored self-esteem, social support, and mental health in three groups of testicular patients, singles (no partner), those with the same partner as at time of diagnosis, and those with a partner they met after completion of treatment. The study found that survivors with the same partner as at time of diagnosis had the highest level of functioning and reported the highest level of self-esteem and best mental health (Tuinman et al., 2006). Health care providers should assess the mental health needs of the testicular cancer patient, with an understanding that the single patient may be at increased risk of lowered mental health.

**Health Maintenance**

Given the increased risk of second cancers and treatment-related morbidities in the testicular cancer population, primary care providers need to promote disease prevention and cancer screening methods. Health care providers evaluating long-term survivors need to perform comprehensive history and physical exams with each annual visit. The examination should include a skin screening to assess for pigmented lesions, a lymph node exam, and a contralateral testicular examination. Because of increased cardiovascular morbidity from chemotherapy, germ cell tumor patients should have their weight and blood pressure monitored with each clinic visit, and according to the National Cholesterol Education Program guidelines, a lipid profile at least once every 5 years. These patients should be strongly encouraged to stop smoking or to participate in smoking cessation programs (Henrich, Fegg, Meiler, Jost, & Gerl, 2006). Additional screening related to the late effects of cisplatin should include an audiogram if the patient has tinnitus and/or hearing loss and a neurologic evaluation related to potential peripheral neuropathy from chemotherapy. Measures recommended to reduce the frequency and severity of Raynaud’s phenomenon include avoiding sudden cold exposure, sympathomimetic drugs and cigarette smoking, and minimizing emotional stress. If nonpharmacologic measures are not successful, calcium channel blockers have been used with some success.

**Conclusion**

Mr. V’s retroperitoneal mass was resected, and the pathology revealed mature teratoma and necrosis without viable tumor. Mr. V recovered well from surgery and now is undergoing continued surveillance according to the National Comprehensive Cancer Network guidelines for NSGCT. His primary care provider will need to be vigilant with routine health maintenance, including colonoscopy, PSA blood test, testicular self-exams, and digital rectal exams (Vauhn et al., 2002). Mr. V will require continued surveillance to monitor for long-term toxicities of chemotherapy, recurrence of his disease, and a second primary. The hope is that with continued clinical trials designed to decrease morbidity, a reduction in secondary cancers and treatment-related toxicities will result, but this will not be known without long-term follow-up.

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Web-Based Education in Graduate Nursing Programs

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Distance education is increasingly prevalent in nursing programs, with a recent emphasis on graduate programs. This article reviews the strengths of alternative teaching modalities, including reaching those students who might not otherwise be able to further their studies. Innovative teaching strategies using the technology strengthen a student's ability to acquire information and utilize evidence-based practice, similar to what will be faced in the nurse practitioner (NP) role. We will also examine faculty perspectives to see how to best proceed with distance education.

**Keywords**: distance; Web; education; nursing; faculty; graduate

**Web-Based Nursing Education**

Distance learning technology and Internet-based education have become prevalent in many academic institutions, and they have become increasingly common in schools of nursing. It wasn't long ago that nursing educators began to realize that alternative teaching modalities existed to reach and capture students, and that the transition away from face-to-face (F2F) classrooms to online settings was effective and valuable. “This evolving technologic tool set is increasing and expanding the opportunities that are available to the learner, thus creating rich learning environments for teaching both mechanical and qualitative skills” (Billings, Connors, & Skiba, 2001). The challenge of nursing education today is to prepare students who are aware and equipped to meet the needs of diverse populations with complex health issues in a society where access to practitioners and clinicians is many times limited by geography and economics. Not only have the Internet and advent of telemedicine been advantageous to rural health care, the technology is also efficiently utilized as a powerful learning device to educate graduate nursing students into critically thinking, problem-solving, independent practitioners with skills readily applicable to practice.

This article will discuss the strengths of Web-based nursing courses, especially as they pertain to graduate and advanced practice education. Distance delivery mode, although different than a traditional F2F classroom, has wonderful advantages and can be an excellent tool. Numerous studies demonstrate that online nursing courses have successful outcomes, mostly in the RN-to-BSN programs (Armstrong, Gessner, & Cooper, 2000; Cannon & Boswell, 2001; Leasure, Davis, & Thievon, 2000). Much of what has been learned can also be applied in the development of online graduate nursing courses. Advanced practice nurses can benefit significantly from this innovative learning opportunity.

**Strengths**

In traditional F2F courses, certain methodologies work well in the transfer of knowledge, and some methods are less successful. Online courses are no different. Many Web-based nursing courses have previously only been offered to RN-to-BSN students. Fortunately, graduate courses are starting to move forward with this technology. Advanced practice nursing students need specialized preparation to succeed in their new roles. Several studies have evaluated online
delivery in advanced practice nursing (APN) education and have found many benefits to this innovative approach.

**Balance of Returning to School**

Graduate nursing students are typically women who balance a career, children, and family while obtaining an education (Halter, Kleiner, & Hess, 2006; Ostrow & DiMaria-Gahlili, 2005). One attractive option in online education is to study asynchronously, eliminating transit and parking time. This alone is one substantial reason why graduate education is increasingly accessible and why more universities are transitioning to this modality.

**Success With Case Studies**

Huckstadt and Hayes (2005) examined the effectiveness of interactive online learning modules for APNs. Their findings support case-based online learning as a successful method in the education of APNs. The findings also support an overwhelming desire among APNs to have more online courses available to them. Case studies set powerful learning challenges that encourage learners to acquire information and sharpen analysis, synthesis, application, and evaluation skills (Huckstadt & Hayes, 2005). Furthermore, case studies grant the ability to use evidence-based practice as it applies in clinical situations. Far too often, novice nurse practitioners (NPs) cannot recite the best practice or latest literature on what the appropriate treatment should be and therefore end up without support for what they believe is in the best interest of the patient. These skills are mandatory while working with specialists and demonstrating that NP care is not substandard. Until NPs can translate evidence into practice, we remain at a disadvantage with our patients and our profession. Working through case studies can be done competently in an online fashion as the modality translates well into real-life application. Anderson and Mercer (2004) evaluated NP delivery between traditional F2F classes and online delivery in a Texas university through a descriptive study and found that there are no differences in application between the groups. The researchers also evaluated whether teaching online with the Internet as an educational tool made a difference in their practice and found that it was utilized very well. It may follow that learning how to navigate the online environment teaches useful skills in data collection as it pertains to clinical application.

**Supportive Environment**

An interesting phenomenological study was recently conducted that looked at online nursing doctoral students. Halter et al. (2006) found that most doctoral students initially had doubts and concerns about online learning but were pleasantly surprised by the educational challenge and consistently identified their own role in learning as one of any doctoral student, not just the traditional land-based student. Furthermore, these online doctoral students expressed satisfaction with their faculty and fellow student relationships and were not distracted by the distance and computer modality. These researchers summarize that “while online doctoral education in nursing may be viewed with skepticism, there is little research to support or refute possible concerns” (Halter et al., 2006, p. 103).

**Faculty Perspective**

Faculty members have been studied on their analysis of the strengths and applicability of online learning. One nationwide study (Atack & Rankin, 2002) found what most online instructors discover—that there is much preparation and planning involved before the class is actually offered, but that most prefer online teaching and feel it could be as effective as traditional teaching.

Nursing faculty have also found that they need to gain competence in newly acquired technological skills (Delgado, 2004; Parker, Riza, Tierney, & Barrett, 2005); however, they recognize that the opportunity for increased teaching satisfaction exists with new teaching technologies, and excellent opportunities for creative class experiences and assignments exist. Recommendations are being developed to support faculty in their transition, and many studies are advising necessary organizational and preoperational time for course development as a tool for success (Barker, 2003; Christianson, Tiene, & Luft, 2002; Parker et al., 2005).

Most faculty studied believed that though the educational delivery and teaching methodology is different, it was an overall positive experience with an overall increased awareness of course design and outcomes. Jairath and Stair (2004) conclude that when “the infrastructure for Web-based courses and programs effectively address technological, legal, administrative, and curricular components, Web-based education can accelerate student learning, facilitate progression through educational programs, and contribute to increased satisfaction within the educational experience.

**Challenges**

It is evident that teaching online is vastly different from teaching in a face-to-face classroom. What many faculty fail to recognize in their initial attempts to convert
a course to an online offering is that assignments need to be redesigned as the student learns differently in this distinctly different environment. A faculty member cannot just take the lectures and post them on the Web for students to read. In a traditional classroom, students may passively listen to the lecture and watch a slide presentation, but online students will ignore the slide show, even if it is only 5–10 slides in length. Voice-over slide shows have better success, and those with some video attached have greater appeal. However, the most successful learning tool is to create an assignment where the student becomes an active participant rather than a passive learner.

Discussion Board Assignments

Discussion boards offer an excellent ability to stimulate conversation between students and with the instructor. As compared to discussions in an F2F classroom, where students often speak quickly without much thought, online discussions offer the ability to create well thought out responses, promoting a rich dialog between peers who have had time to create their answers to the question and then to each other. What is important for faculty members to recognize is how to initially post questions that draw from the student’s perception while encouraging critical thinking. If the question posed is a simple yes or no, or one that has the same answer, there will be minimal conversation. However, if the question is both focused and open ended and draws from experience, then students learn from each other and can challenge each other on the issues raised. Additional challenges for faculty include grading these discussions. Creating a rubric for “what is substantial,” as well as detailing due dates for posting, is mandatory if grading will be accomplished. Without these prearranged guidelines, students will often post on the last day of the week, which leaves no time for discussion. It is advisable to set a due date for the initial response by day 3 of the week and a response to one or two classmates by day 5. Equally, if there is no expectation of what a substantial post is, the conversation will include many “I agree” type statements. Graduate students should encourage deeper thought, challenging each other politely on opinion and probing for additional thoughts as they discuss the topics at hand. Finally, faculty members should prepare for monitoring these discussions. Ideally, the students should maintain a rich conversation focused on the topic and dig deeper as the week passes. Faculty members may have well over 100 posts in that week, depending on the number of discussion topics, number of students, and number of designated groups. This can seem overwhelming. The faculty role should be one of redirection, probing when necessary, and summarization. It is important for students at distance to perceive that the faculty is involved in the discussion yet not monopolizing it. Maintaining a presence in the discussions is vital.

Social Networking

One significant challenge in online education is creating a sense of community among students. Wills and Stommel (2002) summarized these findings and highlighted the need for better outcome measurement. Their study of 60 graduate students enrolled in online course work reflected overall favorable perceptions; however, the need for adequate socialization and support for students was reported. Beffa-Negrini, Cohen, and Miller (2002) report that course design needs to support active and self-directed learning with rapid feedback and a sense of connectedness with faculty. Though discussion forums allow this, recognizing avenues to bring students together is important. One simple option is to add a picture of each student by the name in the discussion forum. Hybrid courses may bring students together once or twice a term, and this is an excellent time to create a sense of community among the cohort.

Student Perception

Many students consider an online course because they believe it will be less work. Though the flexibility is appealing, there needs to be an accurate perception that realistically describes a distance course. Expectations should be clearly identified and placed in the syllabus. In a traditional F2F course, a 3-credit course should equal 9 hours of out-of-class study per week. This may need to be emphasized. Additionally, though a graduate program should be structured, there is a certain degree of individual motivation necessary from the student to succeed in this different learning environment.

Technology and Infrastructure

There are wonderful distance learning platforms available to schools that help create the online environment for students. What is necessary are those individuals who can deliver technological support to both students and faculty and create an infrastructure to maintain ongoing maintenance, upgrades, and troubleshooting. Having an instructional designer, preferably with some content expertise, is helpful when building courses. Additional considerations to fully implement an online service would be a distance
Moving Forward

As nursing education continues to evolve, attention to distance learning technology is being addressed. The National Organization of Nurse Practitioner Faculties (NONPF) maintains a distance learning special interest group that has identified guidelines to promote quality distance learning in NP education and offers a monograph highlighting innovative teaching strategies that integrate technology into teaching. The group addressed these distance learning issues at its annual conference in April 2008 (NONPF, 2008).

As advanced practice nursing programs move toward the doctorate of nursing practice (DNP) degree, with almost 70 programs now accepting students and more than 140 additional schools considering starting DNP programs nationwide (American Association of Colleges of Nursing, 2008), distance education delivery will be more commonplace. Most programs offered now have at least some degree of distance delivery. It behooves faculty and students to understand what type of educational delivery is present and how the organization is designed to offer these services.

Conclusion

Web-based education is an evolving technological pedagogy with wonderful opportunities available to graduate nursing students as well as to faculty who opt to teach in these programs. Instructional design, sound educational principles, theory, and curriculum remain essential characteristics in course delivery. Knowledge and a desire to strategically teach in this Web-based environment are mandatory should faculty decide to pursue this avenue. These courses are increasingly popular among busy professional nurses desiring a respectable, advanced practice education and are uniquely suited to implement those critical skills necessary in practice.

References


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Advertising the Business of Advanced Practice Nursing

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As hospitals face increasing practice management challenges, as in decreased staffing, decreased reimbursement, increased malpractice, rising costs, and increased quality and safety demands, many hospitals today have turned toward increased use of nurse practitioners (NPs). Utilization of NPs within hospitals has been safe, effective, and profitable and is increasingly accepted. Hospitals are now developing defined clinical leadership roles to oversee the daily practice management of advanced practice providers. A doctor of nursing practice (DNP) is the ideal clinical leader to develop and implement such innovative practice solutions for hospital-based NP programs. This article will address the basic principles of building a practice billing model for acute care NPs at a major medical center in Houston, Texas. Creating new models requires comprehensive analysis and continued evaluation as the complexities in providing health care continuously shift. The direct benefit of NP utilization will become evident through direct reimbursement or practice improvement.

Keywords: acute care nurse practitioner; doctor of nursing practice; billing model; pro forma

Over the past few years, many factors have influenced the increased utilization of nurse practitioners in the acute care setting. One such factor was the implementation of the 80-hour work week for medical residents by the Accreditation Council for Graduate Medical Education (Accreditation Council for Graduate Medical Education, 2002) and another was the Institute of Medicine’s focus on patient safety and quality (Todd, Resnick, Stuhlemmer, & Mullen, 2004). Despite a change in resident structure, the acuity and complexity of patient illness has increased. According to The University Health Systems Consortium (Larkin, 2003), numerous academic institutions began implementing NP models to alleviate resident shortages. The nursing shortage continues to generate challenges in meeting the health care needs of patients. As a result, hospitals across the country are developing alternative patient care teams and models to meet these challenges. Using nurse practitioners (NPs) is one such solution (Todd et al., 2004). The positive historical outcomes and profitability are well-documented. Mundinger et al. (2000) showed that there was no difference in patient care outcomes of patients cared for by NPs or by physicians. Buppert (2006) and Safriet (1992) proved the profitability of NPs. Institutions on the forefront of implementing NP utilization models include but are not limited to.
Mayo Clinic, University of Pennsylvania, The University of Virginia, The Cleveland Clinic, Ochsner Clinic Foundation, Vanderbilt University, Columbia University Medical Center, and The University of North Carolina.

The demand for hospital-based acute care has increased in recent years. NPs are often the primary providers in charge of critical care units, leading multidisciplinary care teams and taking first call at night. As positive outcomes are documented, these innovative practice models demonstrate acceptance by hospital administrators, patients, and physicians (Todd et al., 2004). Hospitals have hired NPs without fully evaluating barriers and management issues that may affect this model of care. As a result, hospitals are forming executive leadership positions for NPs to sustain the growth and demand for these models. Ideal leaders of hospital-based NP programs are doctor of nursing practice (DNP) graduates, who focus on transformation of care at the bedside and translational research. DNPs, with didactic and experiential expertise to develop and initiate profitable models of practice, can lead positive changes in health care. Health care is in the midst of a paradigm shift that will require substantial coordination, integration, and facilitation. This article focuses on the basic principles addressed in building a practice billing model for acute care NPs at a major medical center.

Introducing the Role of Chief of Advanced Practice

A practice model using NPs (and physician assistants [PAs]) to fulfill specialized roles is in place in Houston, Texas. In January 2007, the University of Texas Health Science Center of Houston School of Nursing (UTHSC-HSON) partnered with Memorial Hermann Texas Medical Center (MH-TMC) to create the position of chief of advanced practice, which, to our knowledge, is the first in the nation for a DNP graduate. The mission was to further integrate NPs (and PAs) into the hospital’s health care teams to enhance patient safety, ensure evidence-based protocol use and development, improve physician satisfaction, and achieve improved quality of care patient outcomes. According to Patricia Starck, Ph.D., dean of the UTHSC-HSON, this places a nurse in an equivalent position to that of chief medical officer and signifies nursing care at the highest level (Lake, 2007). The position creates a new frontier in practice that merges dynamic relationships in patient care, education, research, and practice management.

The Advanced Practice Provider Program (APPP)

The APP program is a distinctive department structured to raise the level of professionalism for NP and PA providers. In the first year of the APP program, current models were expanded, new models were developed, and intercollaborative partnerships were developed to establish overall cohesiveness. The department grew from 13 to more than 23 providers. Three new service lines were added, bringing the total to six: cardiovascular, medicine, neuro-trauma, neuro-rehabilitation, transplant/hepatology, and general trauma. Despite the fact that NPs directly benefited the hospital by impacting length of stay; protocol use, resource reduction; improved patient safety, quality, and outcomes—all of which positively impact the hospital’s diagnosis-related group (DRG) prospective payment system—there was still insufficient revenue to completely cover the program’s cost. When the MH-TMC APPP service cost rose to over $3 million in 2 years, the institution decided to implement an APPP billing model. Current NP models and projected expansion of NP services are being evaluated to determine positive patient care outcomes and future revenue opportunities.

Need for a Billing Model

Billing and reimbursement for nonphysicians continues to be an issue for institutions due to lack of provider recognition by third-party payers, despite major lobbying efforts at both state and federal levels. As hospitals partner with academic and private physicians to collaborate with hospital-employed NPs, billing for services becomes complex. Distinct roles and responsibilities must be defined and identified separate from nursing practice and physician services to effectively capture billing. Buppert (2006) notes that if the salary of the NP is not included in the cost report for Medicare Part A or Medicaid, then the hospital may bill those payers for the NP services separately. In addition, once the minimum requirements for NP billing are met as defined by Medicare, and the services are within the NP’s scope of practice as defined by state law, the hospital is justified in embarking toward a billing model.

Billing structure development should begin with a business pro forma income statement that projects future expenses and revenue of the model operations (Wikipedia, 2008). Cost–benefit analysis will determine the area of greatest impact and priority for the hospital. The pro forma will permit the hospital to make informed decisions regarding the tangible and intangible values of the program. Based on this information, and to recoup the most reimbursement possible, the role of the NP must be structured to provide physician services that support independent patient evaluation and management, independently
performed procedures and services that fall outside of global fees and nursing services billed by the facility. Current procedural terminology (CPT) codes must be identified to determine in which service line the NP is most effective and profitable based on the level of reimbursement by payors. Institutions should review the opportunity for billing by reviewing data pertaining to clinical services that NPs perform. The hospital, in collaboration with financial experts, can project revenue and prepare the pro forma. The pro forma should outline staffing and support costs, clinical services volume, cost assumptions, expenses, and revenue projected. Revenue projected will vary depending on the NP collection rate and payor mix for each hospital. The pro forma will serve as the foundation that defines the sustainability and viability of the practice.

A hospital NP who performs high numbers of procedures and daily independent patient evaluations and management services will have the opportunity for increased billing opportunity and reimbursement. Areas where these practices are high lead to the most efficient and optimal reimbursement models (Buppert, 2006). This may be seen in intensive care units that use acute care NPs. In these units, NPs are more likely to perform procedures that fall outside of the daily critical care charge in addition to administrative and independent patient care management services. During the daytime, NPs work with physicians evaluating and managing patient care, performing admissions/discharges, leading multidisciplinary rounds, and monitoring core measures. This allows physicians to perform procedures outside the scope of NP practice. Direct collaboration and discussion by various APPP leaders has indicated increased hospital NP utilization at night as the primary in-house provider in critical care units (Fuchs & Ellis, 2008). The NP role at night usually addresses critical patient issues versus daily evaluation and management, which often leads to the performance of procedures, resuscitation, and potentially participation in rapid response calls (Fuchs & Ellis, 2008). All of these are billable services independent of those of physicians.

The MH-TMC APPP model implementation has shown that non-ICU acute care facility inpatient service lines are less likely to be as efficient. Care for these patients often falls within a daily surgical/anesthesia global fee. A private/academic/community physician may perform some portion of the daily evaluation and management, reducing billable opportunity. Only if the NP has seen the patient and/or addresses issues that physicians did not document are these services billable. NP services also performed by the physician are considered duplicative and not reimbursable. Billable services may be increased by placing NPs in service lines where the greatest number of independent face-to-face contacts with patients occurs and where they may perform procedures. Experience with the MH-TMC model has shown that private/community physicians often would rather the hospital NP perform admission histories, physicals, and discharge services. These NP services are potentially billable, especially if time is spent counseling and providing discharge education. Physicians are then able to remain in ambulatory settings or perform procedures and/or surgeries where their reimbursement is higher. Institutions should provide billing compliance educational opportunities to both the physician and NP to ensure compliance. MH-TMC encourages staff physicians to bill for services rendered but recognizes that NP revenue opportunities are being performed that cannot be captured by the physician. The support and acceptance of NP services by physicians who admit to any unit must be clearly evident prior to implementation if the model is to succeed.

Billing Implementation Plan

Billing model implementations are complex and require planning and evaluation. Administrators and NP leaders should carefully determine where the NP will have the greatest impact on patient outcomes and revenue when structuring models. NP leaders must evaluate and determine where to place NPs and decide which services will be billable and at what rates, depending on the payors contracted for the NP services. Role development should focus on patient management and avoid placing too many administrative duties on the NP as these duties will take away from direct billable patient care services. Service lines where patients fall under surgical/anesthesia global fees should be carefully evaluated before implementing NP services to determine if the benefits outweigh the loss of billing opportunities. If the NP performs evaluation and management services for patient diagnoses that fall outside of the global fees, then this may be an implementation benefit.

Planning should incorporate legal consultation to aid in the evaluation of hospital compliance with state and federal rules surrounding scope of practice, collaboration, and billing reassignment for NPs (Buppert, 2006). This may promote discussions of a separate hospital 501a or limited liability company (LLC) development. Contractual agreements with practice management organizations may be needed if the hospital does not have the infrastructure and staff to support the continuous coding and billing procedures/evaluation or has never embarked on the direct provider billing that will be required. These agencies will be able to facilitate credentialing and billing system development and oversight with
greater ease than hospitals that have no experience in provider billing. Policies will need to be agreed upon by all credentialed staff collaborating with or providing NP services. These policies will require acceptance by private/community physicians as physician reimbursement is directly impacted. Once the infrastructure is in place and all stakeholders are identified, comprehensive employee training around provider coding, documentation, compliance, and NP billing rules at state and federal levels can occur.

Conclusion

The creation of new practice models requires comprehensive analysis and continued evaluation as complexities in providing health care continuously shift. The direct financial benefit of NP utilization will become evident through direct reimbursement or practice improvement and prospective payment systems. As profitability increases, potential pay for performance programs may need to be implemented for NPs to remain compliant in their billing practices with timely submission of charges. NP salaries are increasing and becoming very competitive as job responsibilities and accountability increase, which may cause hospitals to struggle to sustain these programs. Thus, implementing an NP clinical services billing model is essential.

Having a clinical expert leader who can fully comprehend the regulatory and practice issues regarding NPs will establish a stable leadership structure to ensure consistency, quality patient care, and profitability, as well as meet national safety and credentialing standards across institutions. Some institutions view a DNP as an exemplary leader to oversee and manage innovative practice models and billing initiatives because a DNP is prepared in health policy, health care leadership, ethics, emerging science, evidence-based practice, and patient management. However, the DNP should not be viewed as a billing expert.

References


Acknowledgments. As a direct result of hospital utilization and billing challenges, a new special interest group for advanced practice leaders is being led by Jan Fuchs, MSN, RN, of The Cleveland Clinic and this author. Leaders across the nation are collaborating in efforts to address issues facing hospitals that employ nurse practitioners and to share successes and lessons learned. For more information regarding The Advanced Practice Clinical Leadership Group you may contact Jan Fuchs at FUCHSJ@ccf.org or Elizabeth Fuselier Ellis at Elizabeth.Fuselier@memorialhermann.org

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