NURSING & TECHNOLOGY

Technology has shaped the way in which care is provided to patients throughout the history of professional nursing. Historically, the challenge of caring for ill family members at home prompted nurse innovations. Bedpans, bandages, a special spoon for dispensing medication, and furniture and clothing to accommodate ill patients were all developed to make home care easier. In the hands of nurses, everyday household items were often transformed into tools for patient care using nursing ingenuity.

"Nurses have always been very good at making do out of very little to more effectively take care of their patients," says Julie A. Fairman, PhD, FAAN, RN, associate professor of nursing, University of Pennsylvania School of Nursing. "Because nurses work so closely with patients, they see what is needed and find ways to increase patient comfort, enhance treatment, and facilitate care. Nurses constantly strive to improve what doesn’t work. As a result, a wide variety of nurse inventions have been incorporated into clinical practice."

Today, a wide variety of technological marvels are revolutionizing how nursing is practiced. Computerized charting makes it easier to track vital patient information. Needle-less IV tubing reduces the risk of dangerous needle sticks. And automatic external defibrillators, PIXIS dispensers, handheld PDA units, and robots enable nurses to deliver even better patient care.

In addition, technology is revolutionizing the methods research nurses use to gather information, track progress of studies, and disseminate results. Nursing educators are also taking advantage of technologies such as distance learning, multimedia, and human simulation laboratories to improve the learning process.

At the same time, nurses have always been concerned about how technology impacts patient care. Because patient care is always primary in nursing, technology only has value to nursing if it improves patient care. Nurses have been cautious about the use and abuse of technology and the problems of simultaneously nursing the equipment and nursing the patient.

This special issue of Pitt Nurse highlights the many ways in which the University of Pittsburgh School of Nursing’s faculty, students, and alumni use technology to advance the practice of nursing.

ASSISTIVE TECHNOLOGY FOR THE ELDERLY

The proportion of elderly in the United States is growing at a phenomenal rate, causing a greater demand for healthcare services and devices that can extend independent living and promote improved health. Yet little of today’s information technology addresses the critical problems that arise as a result of this demographic shift.

Judith Matthews, PhD, MPH, RN, assistant professor in the Department of Health and Community Systems, recognizes that assistive technology can help sustain the independence of this growing population.

With age, people are more likely to experience impairment in sensory and cognitive function, physical endurance and mobility, as well as depression. Because older adults commonly experience multiple chronic conditions that require complicated treatment regimens, it can become increasingly difficult for them to care for themselves.

Most older adults wish to remain as independent as possible for as long as possible, regardless of whether they live in their own homes or reside in continuing care retirement communities. Intelligent assistive technologies that mitigate the ill effects of chronic disorders and prolong independence hold great promise for a burgeoning elderly population whose families may be widely dispersed and for whom in-home supportive services are
“At its best, technology makes life easier and better – but it only has value if people can and will use it.”

JUDY MATTHEWS

Falls and their complications result in one third of deaths from accidental injury among adults 65 years of age and older. As the population continues to age and adults hit milestones of aging, the frailty syndrome becomes more prominent. Frailty is a complex, diverse syndrome that affects strength, gait, and balance; overmedication; poor lighting; and navigating in unfamiliar surroundings.

To prevent or decrease falls, efforts are being made in various arenas to improve safety and support while walking or moving around. Health care providers who work with older adults are learning to evaluate and detect risk factors for falls; how to intervene to prevent or reduce the risk of falls; and to anticipate the need for assistive devices such as canes and walkers, and teach people how to properly use them, before a fall occurs.

At the University of Pittsburgh, the前不久, a team of researchers have embarked on an ambitious project to develop a robotic walker that can guide older adults in their daily activities. The project, known as the Intelligent Mobility Platform (IMP), has the potential to revolutionize the way older adults interact with their environment.

The IMP is a robotic device that is capable of autonomous navigation and can guide older adults in their daily activities. It can provide physical assistance with walking and other activities of daily living, and can guide people to their destinations. It can also provide voice guidance and visual displays to help older adults navigate their environment.

The IMP is designed to be user-friendly and intuitive, and can be used by older adults who are able to walk independently. It can be programmed to follow specific routes and can be used for a variety of purposes, such as shopping, visiting friends, or attending medical appointments.

The IMP is currently being tested in a pilot study at a long-term care facility in Pittsburgh. The results of the study will help determine the effectiveness of the IMP in improving the quality of life for older adults.

Dr. Matthews and her colleagues envision a robotic walker that embodies several functions tailored to an individual’s evolving needs, such as: issuing reminders to eat, drink fluids, and take medication; monitoring health status and adherence to the prescribed treatment regimen; enhancing communication with family, friends, and health care providers; providing physical assistance with walking and other activities of daily living; and promoting personal safety.

As a result of this collaboration, two prototype robots for older adults are in development. One is a mobile robotic personal assistant named Pearl, previously described in the Winter 2002 issue of Pitt Nurse. The other is a robotic walker, named the IMP or Intelligent Mobility Platform. Matthews stresses that, “These robots are intended to provide cognitive and physical assistance that augments, rather than replaces, human caregiving and support. They are meant to supplement what professional or family caregivers do, not replace them.”

The IMP is adapted from a regular, commercially-available, collapsible, rollator-type walker equipped with a seat, a basket, and hand brakes with a locking feature to prevent rolling when a person is seated. The basic walker has been modified with a laptop computer, mapping technology, a mechanism for self-parking and retrieval by remote control, and a touch-screen sensitive display that can display directional guidance and other information.

Existing walkers can be hazardous when not used correctly, and can encourage someone to move, eat, drink, and take medication, nor do they provide assistance or support for other needs.

Walking is often the primary form of exercise for the elderly. Since inactivity contributes to increased morbidity and mortality in older adults, devices that facilitate daily exercise may promote improved health and well-being. Ambulatory assistive devices such as canes and walkers offer stability, at least. They do not help with navigation or orientation. And, they do not encourage someone to move, eat, drink or take medication, nor do they provide assistance or support for other needs.

From her experience working with older adults in a variety of settings, Matthews is aware that escorting elderly residents to medical and therapy appointments, social activities and meals is just the beginning of a long process that will be required to establish whether such robots can have a positive impact on people’s health and well-being. Matthews believes it will be 15 to 20 years before robots are adequately sophisticated and reliable for use in everyday life.

“Falls are the single most common cause of fatal and non-fatal injuries among older adults. As the population continues to age and adults hit milestones of aging, the frailty syndrome becomes more prominent. Frailty is a complex, diverse syndrome that affects strength, gait, and balance; overmedication; poor lighting; and navigating in unfamiliar surroundings.

Efforts to prevent or decrease falls include disease control and medication management; increased physical activity to enhance strength, gait, and balance; and the use of assistive devices for improved stability and support while walking or moving around. Health care providers who work with older adults are learning to evaluate and detect risk factors for falls; how to intervene to prevent or reduce the risk of falls; and to anticipate the need for assistive devices such as canes and walkers, and teach people how to properly use them, before a fall occurs.”

Though the IMP is unpowered while the user is walking, it is capable of autonomous navigation. That is, the IMP “knows” where it is in relation to a two-dimensional map it creates of its environment, and it can guide the user with text instructions or graphics, such as a shifting arrow displayed on the touch-sensitive screen.

“At its best, technology exists to make life easier and better – but it only has value if people can and will use it,” Matthews says. She and her colleagues recognize that it is essential to involve potential users of robotic devices in the design and evaluation process.

“We also value the perspective of people who see the evolving dependency in older adults day-by-day. To assure access to these two distinct groups of older adults and their caregivers, working relationships have been cultivated with several retirement communities. One of these communities is Longwood at Oakland, with homes and apartments for independent living, an assisted living facility, and a health center, or skilled nursing facility. At Longwood, separate focus groups have been conducted with residents as well as administrators, professional staff, and support staff to learn their views about desirable functionalities for the robots being developed.

As Pearl and the IMP attain enough robustness to permit human experiments, team members are conducting field studies to see how older adults interact with the robots and respond to various design features such as audio guidance and visual display.

This is just the beginning of a long process that will be required to establish whether such robots can have a positive impact on people’s health and well-being. Matthews believes it will be 15 to 20 years before robots are adequately sophisticated and reliable for use in everyday life. “I believe the technology being developed will ultimately help improve older adults’ stamina, mobility, mood, independence, adherence to healthy behaviors, and quality of life, as well as the quality of life of their family members and caregivers,” she says. “But we are a very long way from having robots replace people or make autonomous decisions.”

According to the U.S. Department of Health and Human Services Administration on Aging, there were 35.6 million older adults—people 65 years or older—in 2002 (the latest year for which data are available). Older adults represented 12.3% of the U.S. population, or about one in every eight Americans. By 2050, when the “baby boom” generation reaches age 65, that percentage is expected to grow to 20% of the population. And, the 65+ population is projected to increase from 4.6 million in 2002 to 19.4 million in 2050.

About 30% (10.5 million) of all non-institutionalized older adults in 2002 lived alone. The proportion living alone increases with advanced age. Among women aged 75 and over, for example, almost half lived alone in 2000, in addition, approximately 20% of the elderly lived in various types of senior housing, many of which offer support services for their residents.

Most older adults have at least one chronic condition and many have multiple conditions. Among the most frequently occurring conditions among the elderly in 2000-2001 were: hypertension (43.2%), arthritis (36.1%), all types of heart disease (31.1%), any cancer (20.0%), and diabetes (15.0%).

Most older adults have at least one chronic condition and many have multiple conditions. Among the most frequently occurring conditions among the elderly in 2000-2001 were: hypertension (43.2%), arthritis (36.1%), all types of heart disease (31.1%), any cancer (20.0%), and diabetes (15.0%).

Walking is often the primary form of exercise for the elderly. Since inactivity contributes to increased morbidity and mortality in older adults, devices that facilitate daily exercise may promote improved health and well-being. Ambulatory assistive devices such as canes and walkers offer stability, at best. They do not help with navigation or orientation.

And, they do not encourage someone to move, eat, drink or take medication, nor do they provide assistance or support for other needs.

From her experience working with older adults in a variety of settings, Matthews is aware that escorting elderly residents to medical and therapy appointments, social activities and meals is just the beginning of a long process that will be required to establish whether such robots can have a positive impact on people’s health and well-being. Matthews believes it will be 15 to 20 years before robots are adequately sophisticated and reliable for use in everyday life.

“Falls are the single most common cause of fatal and non-fatal injuries among older adults. As the population continues to age and adults hit milestones of aging, the frailty syndrome becomes more prominent. Frailty is a complex, diverse syndrome that affects strength, gait, and balance; overmedication; poor lighting; and navigating in unfamiliar surroundings.

Efforts to prevent or decrease falls include disease control and medication management; increased physical activity to enhance strength, gait, and balance; and the use of assistive devices for improved stability and support while walking or moving around. Health care providers who work with older adults are learning to evaluate and detect risk factors for falls; how to intervene to prevent or reduce the risk of falls; and to anticipate the need for assistive devices such as canes and walkers, and teach people how to properly use them, before a fall occurs.”

Though the IMP is unpowered while the user is walking, it is capable of autonomous navigation. That is, the IMP “knows” where it is in relation to a two-dimensional map it creates of its environment, and it can guide the user with text instructions or graphics, such as a shifting arrow displayed on the touch-sensitive screen.

“At its best, technology exists to make life easier and better – but it only has value if people can and will use it,” Matthews says. She and her colleagues recognize that it is essential to involve potential users of robotic devices in the design and evaluation process.

“We also value the perspective of people who see the evolving dependency in older adults day-by-day. To assure access to these two distinct groups of older adults and their caregivers, working relationships have been cultivated with several retirement communities. One of these communities is Longwood at Oakland, with homes and apartments for independent living, an assisted living facility, and a health center, or skilled nursing facility. At Longwood, separate focus groups have been conducted with residents as well as administrators, professional staff, and support staff to learn their views about desirable functionalities for the robots being developed.

As Pearl and the IMP attain enough robustness to permit human experiments, team members are conducting field studies to see how older adults interact with the robots and respond to various design features such as audio guidance and visual display.

This is just the beginning of a long process that will be required to establish whether such robots can have a positive impact on people’s health and well-being. Matthews believes it will be 15 to 20 years before robots are adequately sophisticated and reliable for use in everyday life. “I believe the technology being developed will ultimately help improve older adults’ stamina, mobility, mood, independence, adherence to healthy behaviors, and quality of life, as well as the quality of life of their family members and caregivers,” she says. “But we are a very long way from having robots replace people or make autonomous decisions.”
NURSES INVOLVED IN DAILY CLINICAL CARE must rapidly assess and interview patients in a system that places increasing emphasis on speed, productivity, and efficiency. Cutting edge human simulation devices and a realistic environment in the Human Simulation Lab at the School of Nursing allow graduate and undergraduate nursing students to develop Crisis Resource Management (CRM) skills in a safe, low risk setting which is as close as possible to reality. The lab contains the MPL/ALSim-Man® Human Simulator, an Ohmeda® Anesthesia Gas Machine, anesthesia cart, emergency cart, malignant hyperthermia (MH) cart, Operating Room (OR) supplies, critical care supplies, gas supply, vacuum, OR lights, intercom, and alarm systems. It can set up as an OR, Intensive Care Unit (ICU) or Emergency Room (ER). The lab also has full audiovisual capability with three active cameras, audio and video mixers, monitor, DVD recorder, and VCR recorder.

During high fidelity simulations, students work in teams, and their performances are recorded while they perform pre-scripted scenarios. Each student has a role in the scenario such as: primary nurse, first responder, charge nurse, or recorder nurse. Various other health team providers may be assigned, depending on the scenario. Students not directly participating may view the events from one of five integrated multimedia classroom settings.

Students must suspend their disbelief long enough to forget the environment and patient are not real. It isn’t difficult when the “patient” speaks (from an embedded microphone), generates EKG output, breath sounds (both normal and abnormal), bowel sounds, exhaled carbon dioxide, and produces heart tones and pulses. Computerized controls and software allow simulation of tongue edema, laryngospasm, airway obstruction, and various cardiac arrhythmias.

The scenarios are scripted to give each student experiences in assessment, decision making and skill development. If the students deviate from the expected scenario, a supervisor in the control room can override the program and create responses for SimMan that match the students’ actual actions and activities. “In one instance,” recalls Gereen Zewe, RN, MN, AACE and Tertiary Care instructor, “a student called out ‘We have no pulse or respirations!’ and began compressions. This wasn’t in the scripted scenario.” Observers in the control room were surprised. But they instantly switched to manual control and had SimMan perform appropriately for the student’s responses. “We just went with the flow,” she says. It turns out, the student was right. A review of the data after the scenario revealed a glitch in the program that caused a momentary pause in the pulse and respirations at the very moment the student checked those signs. “The student was commended for an appropriate response,” says Zewe.

Not all outcomes are so positive. Sometimes SimMan dies – because of, or in spite of, the students’ efforts. Success is important but, “failure promotes intense learning,” says John O’Donnell, CRNA, MSN, director of the Nurse Anesthesia Program. “The beauty of simulation training is that students get to perform in a secure, non-threatening environment so if they make a mistake, it’s safe – to both the student and the patient.”

At the end of the scenario, students undergo ‘after-action’ debriefing, and often receive a short lecture on the key points behind the event. “The debrief is arguably the most important component in the training,” says O’Donnell. “Self-debriefing is the most effective. The challenge is to make sure the student’s esteem and confidence are not undermined as a result of the experience.” A successful debrief requires skill, so training faculty how to debrief effectively is an important part of the simulation program at the School of Nursing.

The simulation experience can be intense, and performing under pressure in front of peers can be intimidating. Students are required to sign confidentiality agreements to ensure that, “what happens here stays here,” explains Rosemary Hoffmann, RN, MSN, AACE and Tertiary Care instructor. “Students need to know they are safe.”

The new Peter M. Winter Institute for Simulation, Education, and Research (WISER) Center, which opened on April 29, 2004, offers new opportunities in simulation education for the School of Nursing. Developed in partnership with the School of Medicine, the School of Nursing, School of Dental Medicine, Center for Emergency Medicine, the University of Pittsburgh Medical Center, and the Lendal Corporation, this state-of-the-art enterprise is the largest civilian full body human simulation facility in the world. Located at 230 McKee Place, the Center’s floor plan comprises approximately 12,000 square feet, includes more than 10 simulation areas, and has fully integrated audiovisual capability. Internet-ready classroom and conference capability allow the Center to serve the local as well as the national and international community of interest. The Center houses a variety of simulation devices including 16 Lendal SimMan, 4 Lendal AirMan, three satellite facilities, one Sim-Van (Center for Emergency Medicine), an Obstetric Simulator that delivers a full term infant and serves as a Beta-test site for the Lendal Corporation with the most recent product SimBaby, currently under evaluation. In 2003 WISER trained approximately 9,000 students and at least 12,000 trainees are anticipated during 2004. In addition, a large number of procedure and partial task training mannequins are available.

The University of Pittsburgh School of Nursing Nurse Anesthesia Program has been participating in human simulation work since 1994, originally conceived to aid training in Anesthesia Crisis Resource Management (ACRM). This training approach, advanced in the early 1990’s by Dr. David Gaba of the Stanford University School of Medicine, ACRM is now an accepted component of many nurse anesthesia and anesthesiology program curricula.
The theory is modeled on simulation work done in the military and industry and parallels Crew Resource Management that has been widely adopted in aviation.

Simulation efforts have proven extremely popular with students, and feedback from clinical instructors has indicated significant impact on student readiness for practice. As a result, a variety of courses have been developed to help students in the Nurse Anesthesia Program develop both basic and critical event management skills culminating in high level courses in which students practice management of high intensity, low frequency events. Current programs include Preparation for Clinical Practice (1st year anesthesia students), Crisis Management Team Training (2nd year anesthesia students and MD residents), Trauma Call (2nd year anesthesia students), and Anesthesia Crisis Resource Management (2nd year anesthesia students).

Building on the success of the simulation education in the anesthesia program, other School of Nursing programs have integrated this approach into their curriculum including Critical Care Course (undergraduate senior year); Advanced Clinical Problem Solving (undergraduate senior year); Demonstrating the Nursing Process Through Simulation (freshman year); Pharmacology Simulation (Accelrated BSN Program); Re-entry to Practice (Fast Track Back Program); and Hypothenosis Simulation (ACNP students).

Starting this fall, the University of Pittsburgh School of Nursing will begin to integrate simulation training more fully at the freshman, sophomore, junior, and senior levels. Emphasis will be on medical-surgical courses, but other offerings will include the use of simulation in demonstrating nursing process, the development of critical thinking, and obstetric and pediatric care. Outcomes of the simulation experience will include acquisition of critical level appropriate clinical skills and attainment of level-specific competencies throughout the undergraduate educational process.

“High Fidelity Human Simulation training enhances clinical experience, it does not replace it,” says Rosemary Hoffmann. “It’s a great tool. An experience our students get in simulation training helps accelerate learning and improve retention while ensuring patient safety.”

Rosemary Hoffmann

"I THINK THE NURSE ANESTHESIA PROGRAM (NAP) may be the most technology-driven program in the school," says John O’Donnell, CRNA, MSN, director and instructor of the Nurse Anesthesia Program.

"We have several initiatives: Human simulation, both at the School and WISER, Typhon on-line record keeping and evaluation system; and the Nurse Anesthesiist Rural and Elderly Expansion Project (NAREEP) grant for distance education. We also run multiple web sites for the program and other events," says Laura Palmer, MNEd, CRNA, assistant director and instructor, Nurse Anesthesia Program is the NAP technology advisor and webmaster.

The University of Pittsburgh School of Nursing Nurse Anesthesia Program simulation efforts have increased in quality and quantity over the last year. Full body high fidelity simulation experiences in student education for anesthetic induction and maintenance, Anesthesia Crisis Management Leadership/Team training, Anesthesia Crisis Resource Management principles, Difficult Airway, Double Lumen Endobronchial Tube Placement, Trauma Call, and remediation efforts are offered. All simulation courses are now tied with specific didactic courses. In addition to these full scale efforts, ‘patient-tail’ training in the areas of intubation (adult, child, infant), central venous access, arterial access, intraoperative access, spinal insertion, epidural insertion, and patient positioning are used. Current Nurse Anesthesia Program simulation efforts are highlighted at www.pitt.edu/~napcrna/simulation.htm

ON-LINE CASE DATA ENTRY

In fall 2003, the Nurse Anesthesia Program purchased a student case tracking system and evaluation system from Typhon Group Healthcare Solutions. This product is designed specifically for anesthesia students and provides for on-line case data entry; time log creation; custom reports for students and program faculty; and AANA transcript generation. The companion evaluation package (EASE™) allows for the creation of on-line evaluation tools for students and faculty in a secure web server. This summer, the addition of FIDA case data entry software has allowed portability in the clinical area. These systems have allowed the Nurse Anesthesia Program to “go paperless” for required clinical case record keeping and has provided more accurate and detailed student experience information. This information is used to evaluate the program’s clinical offerings and guide clinical assignments.

DISTANCE EDUCATION

Through a $36,500 grant awarded in 2002 by the Office of Advancement of Telehealth (IH3), the Nurse Anesthesia Program is transmitting didactic presentations to students rotating to four clinical sites outside the Pittsburgh area. Currently, distance education material is transmitted to Covenant Healthcare in Saginaw MI, Elk Regional Hospital in St. Mary’s PA, Altoona Hospital in Altoona PA, and UPMC Lee Regional in Johnstown PA.

WEB-ENHANCED EDUCATION

Every aspect of the didactic curriculum is supported on the web using the University Counte/Web server and other intranet sites created specifically for the Nurse Anesthesia Program’s educational needs. All presentation materials are available in either Word or PowerPoint and enhanced with digital photos, graphics, and video clips. More extensive learning materials are provided on CD-rom.

There is even an anatomy website, originally constructed as a class assignment for the Applied Physiology and Pathophysiology course in the spring of 2003, and updated and managed by Laura Palmer. Several other websites are under development, including one explaining Anesthesiist Positioning needs and a Regional Anesthesiist Techniques website. The program maintains an informational website focused on the needs of prospective applicants and alumni. Because of the communication challenges with students at over 20 clinical sites spread across the US (most distant is University of Washington, Seattle) a separate website provides current students, site coordinators and faculty with essential clinical and administrative information.

2003 CERTIFICATION EXAMINATION SCORES AGAIN SET A NURSE ANESTHESIA PROGRAM RECORD!

The University of Pittsburgh School of Nursing Nurse Anesthesia Program Class of 2003, National Certification Examination scores set a three-year program record.

Twenty-eight students graduated from the Nurse Anesthesia Program on December 13, 2003. All twenty-eight 2003 graduates (100%) passed the National Certification Examination on the first attempt, ten (35.7%) received the maximum score of 600 on the exam, and the average score was 590.0, the highest in program history.

Over the past three years, 42 out of 81 graduates (52%) received the maximum score of 600 and 100% passed the Certification Examination on the first attempt.
WHEN KIDNEYS FAIL, patients must undergo renal replacement therapy, either with peritoneal dialysis or hemodialysis. Mary Ann Sevick, ScD, RN, associate professor, Health & Community Systems, and Terry Starrett, BS, MA, RN, MSN, project director, are using personal digital assistants (or PDAs) to help hemodialysis patients deal with their complicated treatment regimen.

The most common treatment approach for patients with kidney failure is hemodialysis three days per week, for about 5 hours per dialysis session. In hemodialysis, the blood is allowed to flow a few ounces at a time, through a machine with a special filter which removes wastes and extra fluids normally removed by the kidneys. The clean blood is then returned to the body. Removing the harmful wastes and extra salt and fluids helps control blood pressure, keeps the proper balance of chemicals in the body, and prevents the development of bone and cardiovascular complications. Hemodialysis patients also usually take multiple medications and must limit their fluid intake.

But perhaps one of the most complicated aspects of the hemodialysis regimen is the “renal diet.” Because the kidneys are not working properly, patients must limit their intake of sodium (to prevent fluid overload during dialysis sessions), potassium (to prevent serious heart arrhythmias), and phosphorus (to prevent bone problems and vascular calcifications). At the same time, many hemodialysis patients suffer from malnutrition. It is not uncommon for them to lose their appetite and so they struggle to eat enough calories, in particular, high quality protein.

“Most dialysis patients don’t feel well most of the time, and they don’t want to eat,” says Sevick. “As a result, their body begins to consume itself, breaking down fat and muscle, and the patient becomes increasingly weak over time.” Anybody who has tried knows how difficult it is to change lifelong eating patterns. And keeping track of just one nutrient, such as calories, carbohydrates, or saturated fat, can be difficult for the average person. Imagine trying to eat enough calories and protein, and at the same time limiting sodium, potassium and phosphorus! Further, imagine doing so on a schedule disrupted by time consuming dialysis treatments, and when you are not feeling particularly well.

Sevick and Starrett teach hemodialysis patients how to balance their diet using current technology. “I was in that chair. I was on dialysis, I had kidney failure and I had a kidney transplant,” says Starrett, a passionate woman who is intent on making a difference with dialysis patients. “I know what these people are feeling by having been where they are.” Sevick and Starrett designed a computer-based intervention to assist dialysis patients in monitoring their diet. The interactive programs, which can be viewed on a laptop computer during dialysis, educate patients about the importance of maintaining adequate calories and protein, and limiting sodium, potassium, and phosphorus. A computer program for the laptop that teaches patients how to use a PDA to monitor their diet using special dietary software called BalanceLog. Starrett says, “The laptop program walks them through the process of logging what they have eaten into the BalanceLog program. They follow along step-by-step using their own PDA to enter foods into BalanceLog while the laptop shows them how.”

Because hemodialysis patients often have memory problems, this program is especially helpful. “BalanceLog is a great way to help us determine what patients are eating without having to rely on their memory,” says Starrett. “We teach them to enter what they’re eating as soon as they finish a meal. When patients enter meals as directed (right after eating) we get a pretty accurate, real-time record of their diet. BalanceLog also allows us to generate reports by the week or month, so we can see dietary trends.”

Most patients find learning how to use the PDA and dietary software has been surprisingly easy. “They do occasionally have problems,” Starrett says. “Sometimes they may not be able to find the food in the PDA because they are misspelling it or the food may need to be added to the data base. The program allows people to enter recipes, such as a soup they make all the time. We work with the patient to determine the food content of their own personal recipes and enter the nutritional content in the PDA.” Using a new technology can be overwhelming, but Starrett says, “The technical issues have been minimal. If people have a problem with their PDA, they just write their foods down. We enter their meals during their next visit to the dialysis unit and work with them to resolve the problem.”

Starrett was one of the lucky ones who went on to receive a kidney transplant. She is determined to help her patients eat well and stay healthy so they too can go on to be transplanted. “When I was on dialysis, I never imagined I would be able to do something like this!” says Starrett. “For me, technology has opened up a whole new world of possibilities.” The research Sevick and Starrett are conducting will demonstrate how useful technology can be to help hemodialysis patients manage their diet and avoid possible complications from poor dietary patterns.
John Henry Newman once proclaimed, “A man would do nothing if he waited until he could do it so well that no one could find fault.” Scott Rhoades, RN, BSN ‘95, PHRN, recently made this statement a personal motto and enthusiastically added, “We dare to dream!”

Rhoades serves as secretary and charter member of the Space Nursing Society (SNS). SNS is strategically headquartered in Palmdale, California, which is home to several NASA facilities, contractors, and the military. However, members span the country and extend to the United Kingdom and Australia. The SNS represents nurses working in the space program, and nurses sharing similar interests. Membership is also open to non-nurses who do not have voting privileges within the society but who are encouraged to participate in discussions.

Rhoades has promoted the combination of nursing, aviation, and space throughout his ten-year professional nursing career believing that, “Nurses have much to bring to the table. However, nursing is not recognized as a hard-science. I want to help change that misconception.”

“Nursing has been part of the space program from the beginning, it’s just not that well-known,” Rhoades explains. Dee O’Hara, considered America’s First Space Nurse, made significant contributions to the space program without ever flying into space. While working as an Air Force Nurse, O’Hara was assigned to NASA in 1959 to assist in coordinating healthcare for the Original Seven Mercury astronauts. She claimed the role of ‘support person’ for the astronauts’ families during the missions and remained with NASA until the mid-1970s.

Currently, the SNS is developing a curriculum and a textbook and is looking to attract nurses with a variety of nurse theory backgrounds, writing, research, education, and clinical experiences. “We welcome everyone to contribute,” Rhoades adds.

Rhoades currently practices as a Nursing Coordinator and EMS/Pre-hospital Coordinator at Indiana Regional Medical Center, located in Indiana, Pennsylvania. His duties involve managing Float Pool Personnel, EMS/Medical Center Interface, EMS Education, Transfer and Transport Issues, and Flight Operations. Rhoades is the acting medical officer for the United States Air Force Auxiliary/PAX Wing/Group 17 Squadron 714, where he is also involved in emergency services, air and ground search/rescue team and aerospace education. He is enrolled in the United States Air Force Institute for Advanced Distributed Learning (AFIADL).

The SNS strives to illuminate the importance of nurses’ roles in space exploration. Nurses participate in discussions and contribute their expertise to problem analysis and preparing astronauts to utilize the appropriate and necessary medical equipment and medications. Nurses explain changes in medications in space after exposure to zero-gravity and radiation. They help train non-medical personnel to act as the Crew Medical Officer (CMO) since not everyone on the mission has a medical background. Nurses teach astronauts’ long-term health, nutrition, exercise, hygiene, countermeasures to space adaptation syndrome, bone loss, cardiac changes, fluid shifts and re-adaptation to the Earth’s gravity on return. They monitor the psychological well-being of not only the astronauts, but everyone involved in the mission, including support staff, families, and all employees of the space program. Nurses prepare for “futureistic” developments that may arise with exploration of our solar system and beyond, such as reproduction, fetal growth and development, labor/delivery and pediatric growth. They even consider development issues on lunar or Martian bases.

Rhoades is the principle investigator on an NINR (National Institute of Nursing Research) funded study examining the effectiveness of a relapse intervention in maintaining urinary continence in homebound older adults, as well as the cost-effectiveness of providing behavioral therapies for urinary incontinence in this population.

“Women experience incontinence twice as often as men. Physical changes resulting from pregnancy, childbirth, and menopause often cause the pelvic floor muscles that support the bladder to weaken, resulting in incontinence. Older women experience incontinence more often than young women,” says Engberg. “Incontinence can lead to feelings of isolation as the older individuals become afraid or embarrassed to go out.”

Kegel exercises to strengthen or retrain pelvic floor muscles can reduce or eliminate stress and urge leakage. Men and women of all ages can experience bone demineralization, muscle atrophy, and cardiac de-conditioning. The same occurs to the body in a zero-gravity environment. Bedrest patients suffer from decreases in immune response due to stress. Zero-gravity and radiation exposure affect the astronauts in the same way. It takes longer for their wounds to heal and longer for antibiotics to work. Rhoades adds, “Bacteria loves to flourish in Zero-G.”

The SNS strives to illuminate the importance of nurses’ roles in space exploration. Nurses participate in discussions and contribute their expertise to problem analysis and preparing astronauts to utilize the appropriate and necessary medical equipment and medications. Nurses explain changes in medications in space after exposure to zero-gravity and radiation. They help train non-medical personnel to act as the Crew Medical Officer (CMO) since not everyone on the mission has a medical background. Nurses teach astronauts’ long-term health, nutrition, exercise, hygiene, countermeasures to space adaptation syndrome, bone loss, cardiac changes, fluid shifts and re-adaptation to the Earth’s gravity on return. They monitor the psychological well-being of not only the astronauts, but everyone involved in the mission, including support staff, families, and all employees of the space program. Nurses prepare for “futureistic” developments that may arise with exploration of our solar system and beyond, such as reproduction, fetal growth and development, labor/delivery and pediatric growth. They even consider development issues on lunar or Martian bases.

Currently, the SNS is developing a curriculum and a textbook and is looking to attract nurses with a variety of nurse theory backgrounds, writing, research, education, and clinical experiences. “We welcome everyone to contribute,” Rhoades adds.

Rhoades currently practices as a Nursing Coordinator and EMS/Pre-hospital Coordinator at Indiana Regional Medical Center, located in Indiana, Pennsylvania. His duties involve managing Float Pool Personnel, EMS/Medical Center Interface, EMS Education, Transfer and Transport Issues, and Flight Operations. Rhoades is the acting medical officer for the United States Air Force Auxiliary/PAX Wing/Group 17 Squadron 714, where he is also involved in emergency services, air and ground search/rescue team and aerospace education. He is enrolled in the United States Air Force Institute for Advanced Distributed Learning (AFIADL).

The SNS strives to illuminate the importance of nurses’ roles in space exploration. Nurses participate in discussions and contribute their expertise to problem analysis and preparing astronauts to utilize the appropriate and necessary medical equipment and medications. Nurses explain changes in medications in space after exposure to zero-gravity and radiation. They help train non-medical personnel to act as the Crew Medical Officer (CMO) since not everyone on the mission has a medical background. Nurses teach astronauts’ long-term health, nutrition, exercise, hygiene, countermeasures to space adaptation syndrome, bone loss, cardiac changes, fluid shifts and re-adaptation to the Earth’s gravity on return. They monitor the psychological well-being of not only the astronauts, but everyone involved in the mission, including support staff, families, and all employees of the space program. Nurses prepare for “futureistic” developments that may arise with exploration of our solar system and beyond, such as reproduction, fetal growth and development, labor/delivery and pediatric growth. They even consider development issues on lunar or Martian bases.

Currently, the SNS is developing a curriculum and a textbook and is looking to attract nurses with a variety of nurse theory backgrounds, writing, research, education, and clinical experiences. “We welcome everyone to contribute,” Rhoades adds.

Rhoades currently practices as a Nursing Coordinator and EMS/Pre-hospital Coordinator at Indiana Regional Medical Center, located in Indiana, Pennsylvania. His duties involve managing Float Pool Personnel, EMS/Medical Center Interface, EMS Education, Transfer and Transport Issues, and Flight Operations. Rhoades is the acting medical officer for the United States Air Force Auxiliary/PAX Wing/Group 17 Squadron 714, where he is also involved in emergency services, air and ground search/rescue team and aerospace education. He is enrolled in the United States Air Force Institute for Advanced Distributed Learning (AFIADL).

The SNS strives to illuminate the importance of nurses’ roles in space exploration. Nurses participate in discussions and contribute their expertise to problem analysis and preparing astronauts to utilize the appropriate and necessary medical equipment and medications. Nurses explain changes in medications in space after exposure to zero-gravity and radiation. They help train non-medical personnel to act as the Crew Medical Officer (CMO) since not everyone on the mission has a medical background. Nurses teach astronauts’ long-term health, nutrition, exercise, hygiene, countermeasures to space adaptation syndrome, bone loss, cardiac changes, fluid shifts and re-adaptation to the Earth’s gravity on return. They monitor the psychological well-being of not only the astronauts, but everyone involved in the mission, including support staff, families, and all employees of the space program. Nurses prepare for “futureistic” developments that may arise with exploration of our solar system and beyond, such as reproduction, fetal growth and development, labor/delivery and pediatric growth. They even consider development issues on lunar or Martian bases.

Currently, the SNS is developing a curriculum and a textbook and is looking to attract nurses with a variety of nurse theory backgrounds, writing, research, education, and clinical experiences. “We welcome everyone to contribute,” Rhoades adds.

Rhoades currently practices as a Nursing Coordinator and EMS/Pre-hospital Coordinator at Indiana Regional Medical Center, located in Indiana, Pennsylvania. His duties involve managing Float Pool Personnel, EMS/Medical Center Interface, EMS Education, Transfer and Transport Issues, and Flight Operations. Rhoades is the acting medical officer for the United States Air Force Auxiliary/PAX Wing/Group 17 Squadron 714, where he is also involved in emergency services, air and ground search/rescue team and aerospace education. He is enrolled in the United States Air Force Institute for Advanced Distributed Learning (AFIADL).

The SNS strives to illuminate the importance of nurses’ roles in space exploration. Nurses participate in discussions and contribute their expertise to problem analysis and preparing astronauts to utilize the appropriate and necessary medical equipment and medications. Nurses explain changes in medications in space after exposure to zero-gravity and radiation. They help train non-medical personnel to act as the Crew Medical Officer (CMO) since not everyone on the mission has a medical background. Nurses teach astronauts’ long-term health, nutrition, exercise, hygiene, countermeasures to space adaptation syndrome, bone loss, cardiac changes, fluid shifts and re-adaptation to the Earth’s gravity on return. They monitor the psychological well-being of not only the astronauts, but everyone involved in the mission, including support staff, families, and all employees of the space program. Nurses prepare for “futureistic” developments that may arise with exploration of our solar system and beyond, such as reproduction, fetal growth and development, labor/delivery and pediatric growth. They even consider development issues on lunar or Martian bases.

Currently, the SNS is developing a curriculum and a textbook and is looking to attract nurses with a variety of nurse theory backgrounds, writing, research, education, and clinical experiences. “We welcome everyone to contribute,” Rhoades adds.
Medication adherence is critical for symptom management, disease control, and health outcomes in acute and chronic illnesses. ‘You can’t tell by looking at someone if they will be adherent,’ says Dr. Carol Stilley.

The Center for Research in Chronic Disorders (CRCD), an independent NIN/NIN/N funded center within the School of Nursing has been using automated electronic monitoring caps, ‘Medication Event Monitoring System, or MEMS’ to evaluate medication adherence among patients with chronic illnesses for over 19 years. The first step in promoting adherence is knowing when patients take medications. This not only alerts the clinician as to patterns of under-dosing, over-dosing, and difficulties with dose scheduling but can serve as an intervention tool to improve adherence. ‘Understanding how a patient is nonadherent helps to research on why, which can help the clinician design more effective interventions,’ she says. ‘We can’t just assume that patients are forgetful,’ says Stilley while she believes psychosocial factors and cognitive function may be crucial. ‘This is especially true when some patients are nonadherent, there are many reasons patients don’t take their medications. Patients may worry about side effects, they may feel fine and think they no longer need the medication, or they may be concerned about the cost. ‘Simple reminders may not help patients with those concerns.’

MEMS cap technology dates back to the 1980’s – a practically ancient by current standards. It has been modified over the years and is still considered ‘state-of-the-art’ for measuring medication adherence.

The system uses simple pill bottles with computer chips embedded in the pill bottle caps. The bottle cap is attached to the bottle and when the patient takes the pill, the cap records the time and day of time on every occasion the bottle is opened. Each opening is counted as the patient taking the pill. The system tracks the date and time on every occasion the bottle is opened. The chip can record the date and time of day on every occasion the bottle is opened. Each opening is counted as the patient taking the pill. The system tracks the date and time on every occasion the bottle is opened. Each opening is counted as the patient taking the pill. Eight of the school’s eleven classrooms are equipped with the newest technology, including Smartboards and podium-based touch screens for the instructors, direct audio and video feeds to the students, and permanently mounted equipment for ITV distance education. This summer, two more labs were renovated and a wireless network added to a number of the classrooms. By fall, an on-line video server will feed live Internet audio and video into most of the classrooms.

The school’s distance education and technology solutions enable undergraduate and graduate students to obtain clinical experience in locations that range from St. Mary’s, Johnstown Pennsylvania to Saguaro Michigan. Three undergraduate students took their clinical sessions from Miami, Florida using ITV. Distance education is also a convenient option for continuing education and RN Options (RN to BSN and RN to MSN) students.

Dr. Mary Beth Happ doesn’t use a single technology in her research. She is researching multiple technologies – specifically, human-technology interactions. ‘My research focuses broadly on human-technology interactions with patients who are receiving mechanical ventilation and are unable to speak,’ Happ says.

Happ currently leads a multidisciplinary team working on a National Institute of Child Health and Human Development-funded study, to ‘Improve Communication with Nonspeaking ICU Patients.’ The research team includes a speech language pathologist, critical care nurse specialist, pulmonary critical care physician, and bio-statistician. The study is testing two different interventions to improve communication between nurses and ICU patients who are unable to speak during treatment with a breathing tube and mechanical ventilation (respirators). Happ says, ‘This is cutting-edge research to ascertain and improve the communication status of non-speaking ICU patients.’

Other NIH-funded research conducted by Happ and SON co-investigators, Drs. Valerie Swigart and Leslie Hoffman, examines the care and communication processes with patients on long-term mechanical ventilation (4 or more days of ventilator support) in a step-down critical care unit. ‘I am interested in how people are treated when they don’t have voice and can’t speak back,’ she says. ‘How do caregivers communicate with patients who do not have voice? How do we interact or check to see if a patient is in delirium (mental confusion resulting from high fever, intoxication, shock, or other causes), characterized by anxiety, disorientation, memory impairment, hallucinations, trembling, and increased cardiac function? Can they say they can’t speak back? How can we know what a patient is thinking or how they feel if they don’t have voice?’

Part of the problem is that waiting to address the psychosocial needs until the patient is liberated from the ventilator may actually exacerbate the patient’s condition. ‘Not addressing a patient’s fear, confusion, and anxiety while they are on a ventilator may prolong their critical illness and extend the time they need to be on the ventilator,’ Happ says. ‘Being on a ventilator can cause a patient to be agitated. An agitated patient may be restrained, and research shows that physical restraint can prolong hospitalization and worsen delirium, thus potentially extending the time patients need to be on a ventilator. As a result the patient experiences decreased mobility and increased morbidity.’

Potential solutions to improve communication with non-speaking, critically ill patients may be high-tech or low-tech. The research team is looking at everything from electronic augmentation and alternative communication (AAC) devices to simple picture boards and written choice and non-verbal communication techniques. Improved communications may help seriously ill patients get off ventilators and get well faster. Most importantly, understanding patients’ communication will improve their experience of mechanical ventilation and critical illness.