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Inside
**CATH
ANGIO**

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From the Chief Nursing Officer

NANCY J. LEE, MSN, RN, CHIEF NURSING OFFICER, VICE PRESIDENT, PATIENT CARE SERVICES



The nursing profession is on the cusp of tremendous change. There is a powerful—and positive—movement toward

disease prevention and coordinated, patient-centered care. The goal is for better outcomes, better services, and better economics.

The Affordable Care Act is designed to make our health care system stronger and make it work better for providers and patients. It provides new resources to address the nation's mounting health problems, such as the increase in chronic diseases and conditions linked to obesity. New disease management models, based on solid, evidence-based studies, will help ensure that patients receive seamless, efficient care.

It's apparent that 32 million newly insured people will affect the health-care system, and nurses are at the heart of this system.

The upswing in primary care demand will translate to the need for about 7,200 new primary care providers in the next 10 years. However medical school enrollment for internal medicine and family practice is slated to just keep pace with current retirement. That means that advanced care providers will be needed to fill this void. While almost 70 percent of today's APNs work in primary care, this change underscores the nursing profession's contributions, and presents us with an opportunity to use our expertise to mold health policy and reform.

It's up to us to step up and demonstrate our value by eliminating waste in time and resources, and by applying the highest levels of professionalism to improve the health and well-being of our patients.

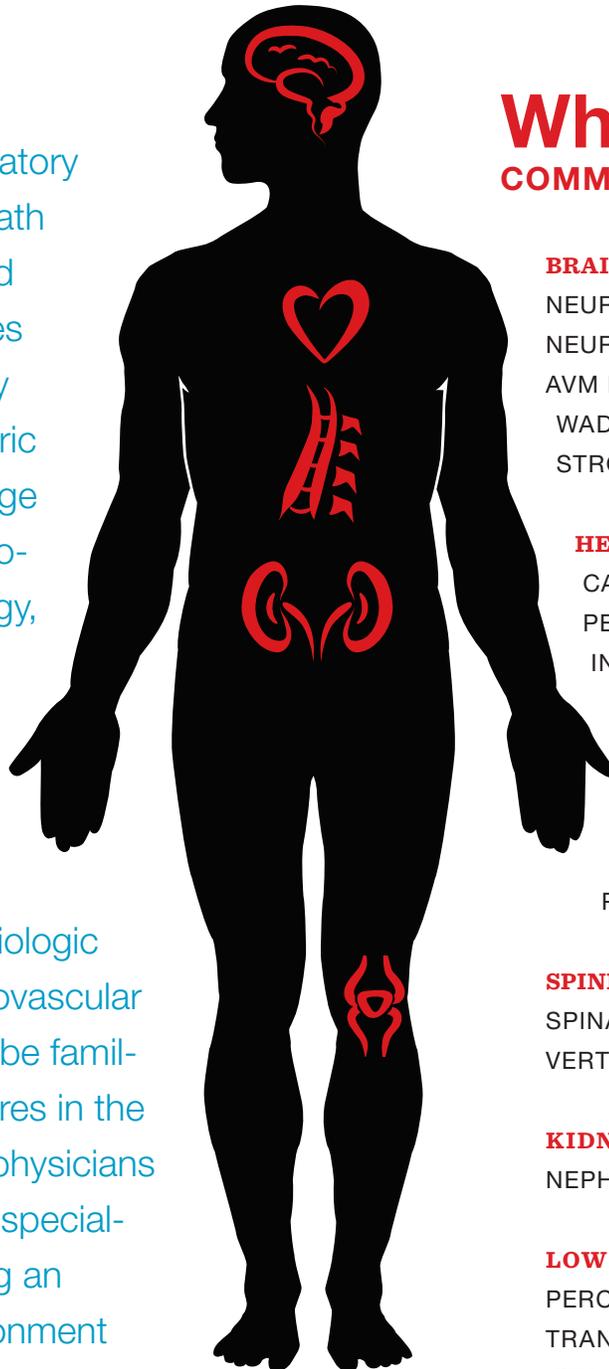
How can nurses meet the challenge? We must focus on health rather than treatment, putting patients at the center of our care model. We must become expert at patient engagement and use role-based practice and decision making to create an environment that supports team efforts and individual expertise. As demands on nurses change, we must work to adjust the current training system from a focus on inpatient care to one based on health and patient participation.

The future holds a great opportunity for nurses, especially nurses who have advanced education. With expanded primary care services will come different approaches to how we deliver care and by whom. Nursing has always been about prevention and wellness, and now we have the opportunity to be the go-to resource to meet expanded access and close the gap in treating patients.

A handwritten signature in black ink that reads "Nancy J. Lee". The signature is written in a cursive, flowing style.

Inside CATH ANGIO

The Catheterization Angiography Laboratory Region (Cath Lab and Cath Angio Pre-Procedure and Recovery/CAPR) provides multidisciplinary specialty care for adult and pediatric patients in fields that range from cardiology to electrophysiology, neuroradiology, interventional radiology, and vascular surgery. The staff that supports the proceduralist in the rooms consists of registered nurses, radiologic technologists, and cardiovascular technologists who must be familiar with multiple procedures in the various specialties. The physicians are renowned leaders in specialized procedures, creating an attractive teaching environment for visiting medical professionals.



Where ARE CATHETERS COMMONLY USED?

BRAIN:

- NEUROANGIOGRAM
- NEUROANGIOGRAM COILING
- AVM EMBOLIZATION
- WADA TESTING
- STROKE THROMBOLYSIS

HEART:

- CARDIAC CATHETERIZATION
- PERCUTANEOUS CORONARY INTERVENTION (PCI)
- VALVULOPLASTY
- TAVR

ARM:

- FISTULAGRAM
- PERIPHERAL STENTS

SPINE:

- SPINAL ANGIOPLASTY
- VERTEBROPLASTY

KIDNEYS:

- NEPHROSTOMY TUBE STENTS

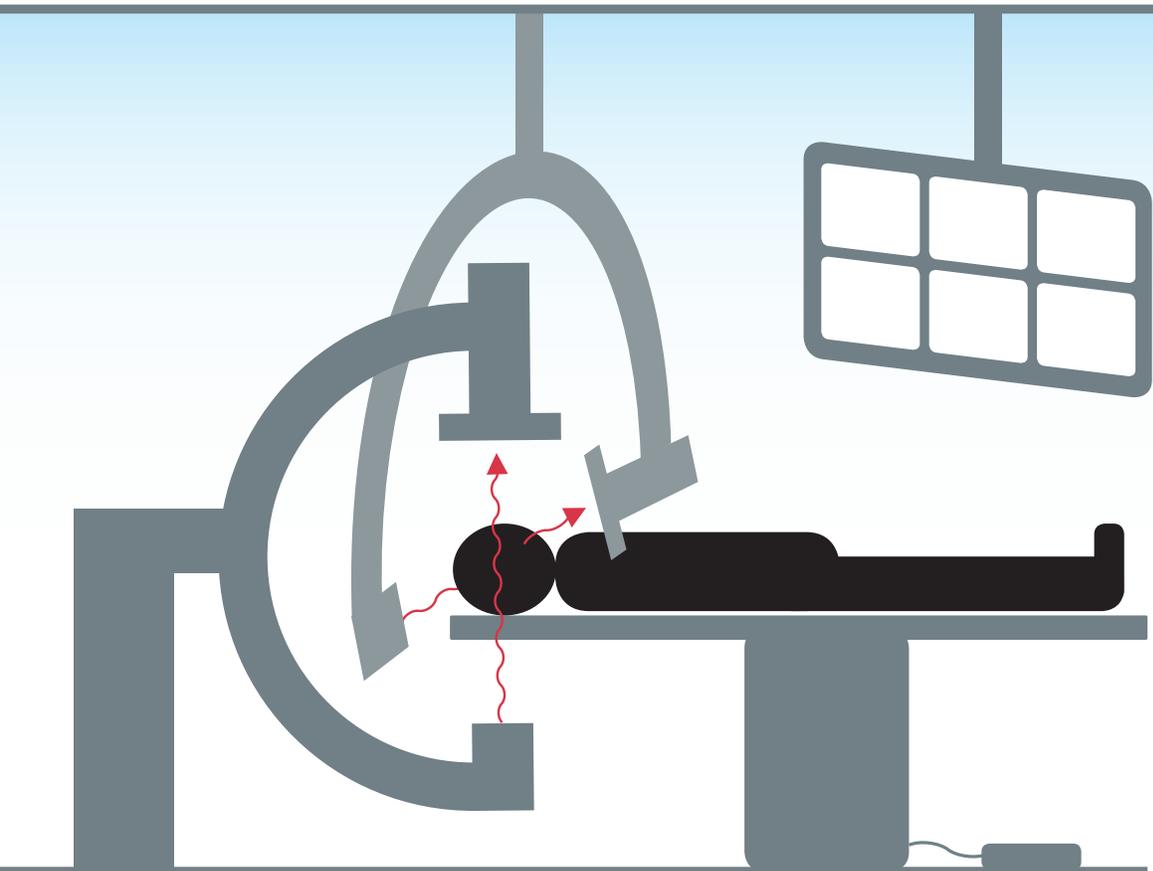
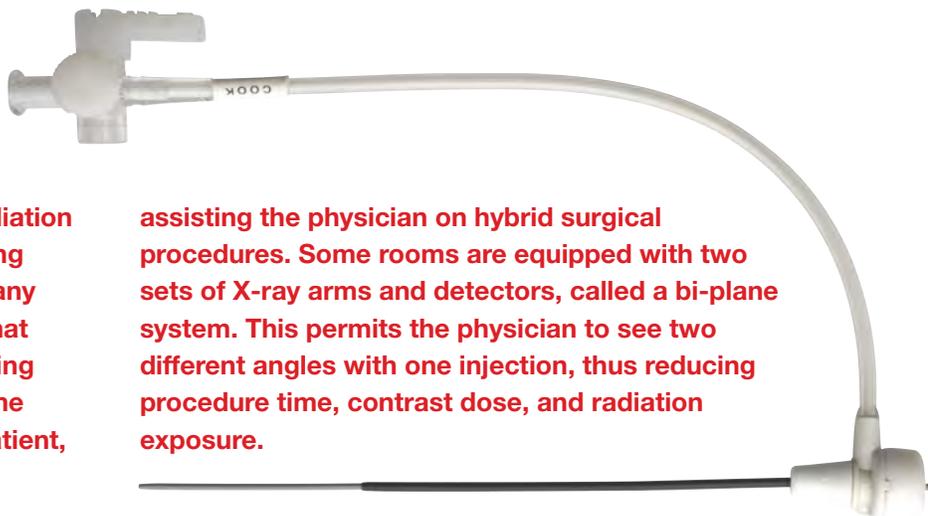
LOWER EXTREMITIES:

- PERCUTANEOUS TRANSLUMINAL ANGIOPLASTY (PTA)

How DOES IT WORK?

THE IMAGING EQUIPMENT uses pulsed radiation to provide imaging in real time while reducing exposure. The semicircular arm can rotate any direction in space. A special table is used that allows X-rays to pass through without causing artifacts in the image. Like an OR table, some rooms are equipped to tilt and cradle the patient,

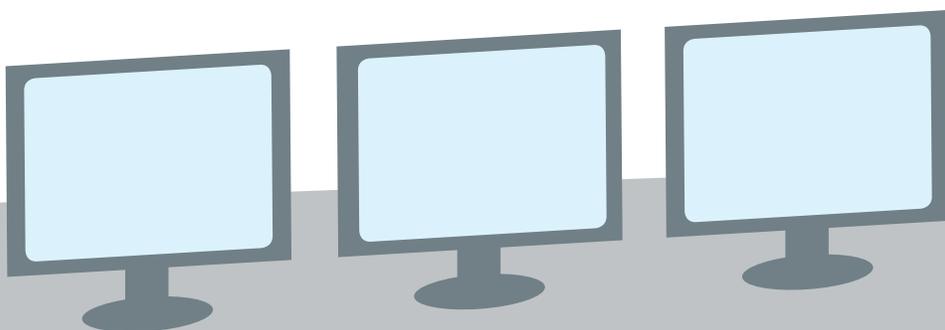
assisting the physician on hybrid surgical procedures. Some rooms are equipped with two sets of X-ray arms and detectors, called a bi-plane system. This permits the physician to see two different angles with one injection, thus reducing procedure time, contrast dose, and radiation exposure.



A BANK OF MONITORS overhead can show any combination of X-ray images from both angles, vital signs, recorded images, PACS, and other ancillary images for the physician to reference.

During a procedure, bedside controls allow the physicians and technologists to position the arm at any angle to magnify, measure, or manipulate the image data for optimal visualization.

BEHIND THE GLASS, the team monitors the hemodynamics and charts the progression of the procedure. They communicate via microphone with the team inside. Specialty imaging equipment, such as intravascular ultrasound, 3D navigation, and 3D reconstruction may also be used.



CAPR

FROM PATIENT PREP TO RECOVERY

COLLEEN BONNETT, RN-BC, AND ANNA CIARAVINO, BSN, RN

What and where is CAPR? Also known as the Cath Angio Preprocedure and Recovery Unit, CAPR is a diverse, dynamic, and exciting department that is unlike any other unit in the hospital.

CAPR (pronounced like caper) prepares and recovers patients who have a procedure in the Cath Angio Lab. In addition, it provides pre-procedure and recovery care to computed tomography (CT) and ultrasound biopsy patients, and CAPR also conducts its own internal cardioversions and paracentesis procedures at the bedside.

CAPR consists of six specialized patient care areas that include the Phase 1 holding room, CAPR Pre- and Post-Phase 2 Recovery, 23-hour Short Stay, and Interventional Radiology (IR) Pre- and Post-Recovery.

The main CAPR area has about 15 to 30 outpatients per day. On the same day, there are as many as 20 outpatients in the Cath Angio Interventional Radiology area. In addition, the holding room and IR Post-Recovery Area will recover between 5-15 inpatients, combined.

SPECIALTY EXPERTISE

CAPR comprises a team of approximately 60 staff members, including a unit director, nurse manager, assistant patient care managers, unit educators, clinical nurses, nursing assistants, and office assistants. All nursing staff are seasoned nurses with at least five years of experience in a variety of backgrounds. Newly hired nurses are required to have critical care experience.

The staff prepares patients for their procedure by performing and charting detailed assessments, starting an intravenous line, doing an electrocardiograph, and checking blood lab results. The post-operative recovery care depends on the patient's procedure, whether the patient will be admitted to the hospital or discharged home, and the patient's acuity level. General anesthesia and moderate sedation patients start their recovery in the holding room.

Holding room staff provides Phase 1 recovery critical care for the immediate post-procedural patients.

The patient population is mainly seen for cardiac procedures, including right and left heart catheterizations, ablations, and cardioversions. These procedures are commonly associated with large-bore catheters, called sheaths, which are inserted into the femoral artery to assist with tunneling lines used to deliver dye and/or radiofrequency. They are also used to perform angioplasty and to insert a stent in the coronary artery. The femoral artery is a large artery and, if punctured, puts the patient at high risk for bleeding. These patients require vital signs monitoring every 5 to 15 minutes, depending on their acuity. Frequent procedure site assessment is needed to check for bleeding or hematoma. Circulatory checks are performed to assess for procedure site, arterial, and venous complications.

The nurses in the holding room are sheath removal experts who practice and understand how to hold pressure on the femoral artery without occluding the distal pulses. They are also qualified to train nurses on other units on how to remove sheaths.

NEW ADDITIONS

The CAPR Short Stay Unit is located in the Phase 2 recovery area, allowing continuity of care for procedure patients who will go home the following morning. Short stay has opened up more inpatient beds for the hospital and helped with the overall flow of available beds. The unit has one area equipped to monitor a stroke patient with a subarachnoid hemorrhage, specifically for a patient who has been transferred from another hospital.



CAPR 23-Hour Short Stay Unit

DAN MARTIN, RN, AND JACQUE KIXMILLER, RN-BC

Overcrowding alerts and transfer center denials due to critical bed shortages have been an ongoing concern here at Stanford. The Cath Angio Pre-Procedure and Recovery (CAPR) Short Stay Unit opened September 2012 to provide care for patients requiring overnight stays following electrophysiology, cardiac catheterization, or interventional radiology procedures. The unit was designed to provide a high level of care in an intimate setting and in a highly cost-effective manner.

The CAPR Short Stay Unit is based on the concept in which a patient is kept in the medical facility for overnight monitoring and care, but is sent home less than 24 hours after a procedure has been completed. By sending the patient home in less than 24 hours, they are considered outpatients. Providing overnight care allows for better utilization of the hospital's inpatient beds, which can now be used to serve emergency room or transfer patients. In addition, the Short-Stay Unit can provide continuity of care to the cath angio patient population since the nurses are cross-trained to work in both the CAPR 23 hour and the pre- and post-procedure units. The patients receive the same standard of care, potentially even receiving care from the same nurse during pre-, post- and short-stay recovery.

CAPR's team of highly experienced registered nurses work directly with the interventional physicians and other members of the interdisciplinary team to deliver the highest standard of care. When patients arrive at CAPR Short Stay, they are welcomed by the staff and their immediate needs are tended to, which includes monitoring vital signs and performing frequent checks on their pain level. Once these needs have been addressed and the patient has settled in, the CAPR office assistant will update the immediate family about the patient's condition and make arrangements for a family visit.

Patients receive welcome bags that include eye masks, earplugs, earphones, personal care items, and other items to make their stay enjoyable. The unit also provides access to iPads, movies, and current magazines.

In the morning, patients can stay current on the latest news by television and complimentary newspapers. Throughout their stay, patients are tracked on telemetry, bedside monitor, and via a central monitor in the nurses' station.

Each staff member of the unit is dedicated to making a difference in the hospital and in the community while providing excellent patient care. Patients are cared for by RNs with backgrounds in intensive and intermediate intensive care units from all over the world, and every nurse in the CAPR Short Stay Unit has extensive critical care and step-down care experience. All are expert in electrocardiogram interpretation skills and are tested annually to make sure their skill level remains of the highest quality.

In December 2011, CAPR took over the pre-procedure and recovery care of interventional radiology patients, adding a pleasant challenge to the CAPR nursing skills. CAPR nurses have learned to care for oncology patients with central catheters, drainage catheters, and newly placed permanent feeding tubes. They also encounter patients receiving embolizations for inoperable liver cancer and uterine fibroids. These oncology patients are a source of inspiration for the nurses, who are moved by their strength and determination.

FOCUS ON THE PATIENT

A patient education room in the CAPR pre-procedure lobby was created by Nurse Educator Colleen Bonnett, CAPR RN-BC, through a Friends of Nursing Patient Education Grant. Future plans for the education room will allow patients and families to learn about the procedure in detail using a web-based training application. Nursing staff are able to use this application to teach patients who are about to be discharged home about new tubes or medications. Anna Ciaravino, BSN, RN, CAPR assistant patient care manager, introduced iPads for patient education and entertainment, which helped launch an iPad program throughout the hospital. Stanford received credit from the media for this innovative pilot program for using progressive technology in the patient care areas.

Jacque Kixmiller, RN-BC, nurse manager in the cath lab, instituted the use of smart phones to streamline communication within CAPR. The system allows the resource nurses to make staffing choices at a more efficient pace in caring for the high and low patient turnover throughout the day. As soon as a patient is wheeled into recovery, the resource nurses and staff can text one another to assign or call for assistance almost instantaneously. And because CAPR staff work among all six areas and between the main adult hospital and the Cancer Center, a programmed contact list on these smart phones has helped nurses and patients find departments and resources more readily. Texting via smart phones has also become a great



Brett Yonally, RN, showing a patient how to use an iPad.

way for the nurses to remain uninterrupted during patient care, allowing them to check messages when convenient.

The Catheterization Angiography Laboratory Region (Cath Angio Lab and Cath Angio Pre-Procedure and Recovery/ CAPR) provides surgical and minimally invasive catheter-based radiological procedures to inpatients and outpatients for diagnostic evaluation and therapeutic intervention. Medical innovations, such as the use of hybrid procedures, minimally invasive therapies, and modern investigative research have made Stanford Hospital & Clinics a referral center throughout the United States and internationally. As technology, methodology, and pharmacology advance, so do the treatments—making it an exciting time to work in CAPR. **SN**



CARING FOR THE Littlest Cath Lab Patients

DYMPNA DOHERTY, RN, PCN

The population of children and the treatment they receive has changed dramatically over the last 30 years. Children minutes old to the age of adulthood frequent the Cath Angio Lab at Stanford Hospital & Clinics for life-saving procedures.

When pediatric cardiac catheterizations began at Stanford in the 1970s, staff would perform only diagnostic procedures, such as recording pressures in the chambers and vessels and injecting contrast into the heart to illustrate anatomy and flow. With today's increased innovation, knowledge, and technology, many life-changing interventions are transarterial and transvenous.

Atrial septal closure devices and ventricular septal closure devices can be inserted femorally. Major pulmonary arterial collateral artery coiling and even pulmonary valve replacements are possible via femoral access. Vessels that were stenotic can be reopened and stented, and vessels that are superfluous or detrimental to the child's health are coiled and occluded.

Life-saving balloon septostomys (procedures that use a balloon catheter to create or enlarge an opening in the septum) are performed emergently in the newborn with congenital heart defects, and extracorporeal membrane oxygenation (ECMO) can be inserted at a moment's notice to preserve lung and heart function in a critically ill child.

There are two designated cardiac pediatric rooms in the Cath Angio Lab. They look the same as many of the other

rooms except that they contain supplies, medications, and staff that care, support, and assist in the diagnosis and treatment of many congenital cardiac disorders. The nurses in this specialized modality are Pediatric Advanced Life Support (PALS) certified, as well as Advanced Cardiovascular Life Support (ACLS) certified.

Nurses in the cath lab often see return patients. Heart transplant patients return weekly, then monthly, then annually for cardiac biopsies to be tested for early signs of rejection. Other children come back for their planned surgical palliation. Though it can seem so unfair that children have to undergo multiple surgeries, these stages are necessary for them to live their lives to the fullest. Sometimes it is the parents the nurses recognize first as the children seem to "grow like weeds" as they recover.

This specialty is not for the faint hearted. If working with children is not daunting enough, nurses in the cath lab work as part of a highly skilled, multidisciplinary team that consist of pediatric cardiologists, pediatric cardiac anesthesiologists, radiology technologists, nurse practitioners, physician assistants, echocardiographers, respiratory therapists, and sometimes surgeons.

The pediatric cath team is a dedicated, hard-working group of nurses and technologists who try to make a visit as easy and as positive an experience as possible for children and their parents. We treat them as if they are members of our family, because in the cath lab, they are. **SN**

Lights, Camera, *Action!*

THE TAVR PRODUCTION TEAM

CHRIS LEWIS, BSN, RN-BC

Transcatheter aortic valve replacement procedures have been done at Stanford since November 2008. Stanford's Cath Angio Lab played a major role in the trials to develop and gain FDA approval for the procedure, and it continues to participate in trials to gain approval for further advances.

Traditionally, patients with aortic stenosis would require open heart surgery with cardio-pulmonary bypass, both which can be very high risk for some patients. Using new technology, the transcatheter aortic valve replacement (TAVR) procedure involves just a small surgical site called a window, with no cardiopulmonary bypass. The TAVR procedure does involve either a femoral cutdown or a mini thoracotomy for a transapical window, a much smaller incision compared to the median sternotomy. The complexity of TAVR requires a full cast of professionals performing together to finish one performance. Here is how a typical day goes:

0600

The first wave of Cath Angio Lab staff arrive. One nurse and one radiology technologist (RT) head to the procedure room where the anesthesia machine and anesthesia supply cart have been set up during the night, along with surgical equipment delivered by the operating room (OR) orderly. The anesthesia resident is already in the room preparing drips and medications, and readying the equipment for the case. The nurse orders the blood units that need to be in the room on standby. The RT assembles all the wires, catheters, sheaths, balloons, procedure packs, and instruments. The nurse safety-checks the defibrillator and pacemaker, prepares the patient bed with a warming blanket, and enters patient information into the hemodynamic monitoring system.

0640

The OR circulating nurse and scrub technician arrive with case carts containing all the equipment required to transition the cath lab into a functioning OR suite. Both

the OR and cath lab instrument tables are opened and set up under sterile conditions. Two perfusionists arrive with the cardiopulmonary bypass machine and carts with equipment that tests levels of blood anticoagulation. The bypass machine is used in case of an emergency to temporarily maintain blood and oxygen circulation while the heart is being repaired.

0645-0650

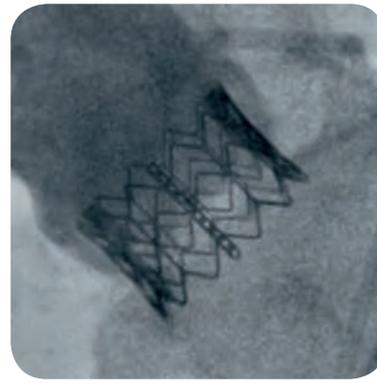
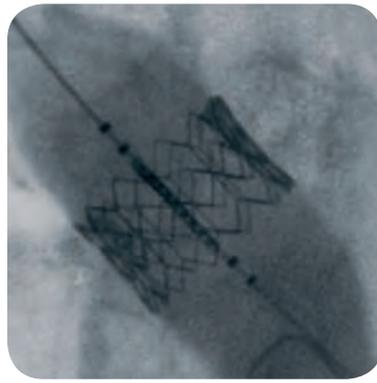
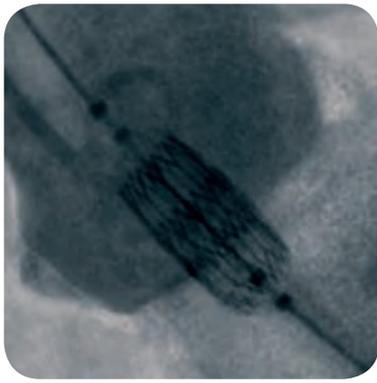
The anesthesia resident and attending physician bring in the patient. A flurry of activity ensues as the patient is attached to hemodynamic monitors. The anesthesia team places peripheral intravenous lines and an arterial line, as well as a Swan-Ganz catheter through the jugular vein to assist with pressure measurements in the right atrium, right ventricle, pulmonary artery, and left atrium via "wedge" pressure. Meanwhile, a second contingent of staff arrives. The second cath lab nurse assumes the role of circulator and pacing nurse in charge of adjusting the pacemaker settings during the procedure. A second RT scrubs in and assists during the procedure.



The actual size of an expanded TAVR is 23 mm or 26 mm.

0730

The nurse circulators work together to insert a Foley catheter into the patient. The echocardiologist is paged to perform the transesophageal echocardiography (TEE), using an echo machine to confirm the size and condition of the native aortic valve. In the meantime, the cardiothoracic surgeon and resident/fellow are paged, and the prepping and draping of the patient begins when they arrive. A third RT scrubs in and assumes responsibility for crimping and prepping the prosthetic aortic valve and the device delivery sheath.



Edwards SAPIEN Transcatheter Heart Valve. Edwards SAPIEN, RetroFlex, RetroFlex II, RetroFlex 3 and RF3 are trademarks of Edwards Lifesciences Corporation.

0800

Another physician arrives, the interventional cardiologist. The patient is draped, the timeout is called. The surgeon begins the operative incision while the cardiologist inserts sheaths in the femoral area, along with a temporary pacemaker wire. At this point a second surgeon and a second interventional cardiologist scrub in. An imaging radiologist arrives to provide optimal X-ray angle estimations based on a pre-procedure computed tomography. At this point the cast of team members is pretty much complete.

0830

Cardiac hemodynamic pressures are captured and recorded. The goal of the procedure is to reduce the gradient between the left ventricle and aorta. A balloon aortic valvuloplasty is performed by the interventional cardiologist while the circulating cath lab nurse, under direction of the cardiologist, rapidly paces the heart. Pacing of the heart is done to decrease the patient's blood pressure so the valvuloplasty balloon will not be pushed out of place by blood flow while it is being inflated. The valve comes from the manufacturer mounted on a stent so the scrub RT crimps the stent valve onto a balloon.

The cardiologist inserts the device delivery sheath and places the stent across the native aortic valve. The position is confirmed by TEE and aortography (a process in which contrast dye is injected while X-rays are taken of the aorta). When the cardiologists, surgeons, and echocardiologist all agree that the stent is in the correct position, the cardiologist inflates the balloon, expanding the stent while the nurse rapidly paces the heart. With the stent expanded into its open position, the new aortic valve leaflets open and regulate the flow of blood in the heart chambers.

As the pacemaker drive is concluded, the circulating OR nurse is positioned at the defibrillator, alert for any lethal ventricular arrhythmias that may occur post-TAVR

insertion. The pacing nurse is ready in the event of bradycardia (slow heartbeat) or asystole (cardiac standstill). Because the procedure requires precision and vigilance, one can almost hear a pin drop despite all the people in the OR.

Pressures are measured to confirm the desired decrease in gradient while the TEE continues to assess for paravalvular leaks. When it is determined that the valve is positioned well and working correctly, the device delivery sheath is removed. If the case has proceeded without complications, surgical closure typically begins at approximately 0930. When anticoagulation has been reversed to a level safe for femoral sheath removal, the scrub RT pulls the sheaths and applies manual pressure until hemostasis is achieved.

1000

The sites are dressed, patient is undraped, and extubated if possible. The staff calls for a hospital bed, a monitor, and an oxygen tank to transfer the patient to the North Intensive Care Unit. It's a wrap!

TAVR requires a great deal of coordination, patience, and flexibility. The RT staff that scrub and assist the physicians and prepare the device must work quickly to achieve technical perfection; the unscrubbed tech must provide superlative imaging essential for this very precise procedure. Nurses from the OR and cath lab must anticipate the needs of the patient, physicians, and scrubbed staff. The OR personnel must import everything the cath lab requires, down to the last instrument and suture. Perfusionists have to be ready to take the lead at any given moment. The anesthesia techs and cath lab assistants must deal with multiple needs and requests.

Even though the cast works in crowded quarters with many challenges, the team performs well together by maintaining a sense of humor, dedication, and trust. They have developed a common goal—to be there for the patient and for each other. Now that's real action! **SN**

IT'S COOPERATIVE

NURSES AND RADIOLOGIC TECHNOLOGISTS IN CATH ANGIO

TIMOTHY R. MATHENY, RN

COOPERATIVE: <adj.> *working or acting together willingly for a common purpose or benefit*

When the first angiogram was performed in 1927, the role of nursing was limited or nonexistent. Procedures were performed by physicians and radiologic technologists (RT) without nursing support. One of the first special procedure labs to utilize nursing staff was in the late 1960s at Stanford.

The Cath Angio Lab is an imaging service designed to diagnose and treat (in lieu of surgery) whenever possible. As interventions became more aggressive and cath angio started to treat more critically ill patients, the roles of the nurse and technologist evolved. Nurses now provide sedation and support for patient comfort and safety which allow the technologist and physician to obtain more precise images. The technologist's role is changing, too, as diagnostic procedures have moved from film to digital imaging, and the equipment has become increasingly specialized and complex.

Cath angio is not a nursing unit; rather it provides imaging and interventional services staffed with both nursing and technical staff. Every aspect of its daily operations is managed jointly by the nursing and technical management groups, including staffing, procedure scheduling, resource allocation, and supply chain management.

Each room team consists of three staff members: a nurse, a technologist, and a monitor. A nurse, RT, or cardiovascular technologist (CVT) can perform the monitoring duties.

Radiologic technologists are essential to providing safe patient care in the Cath Angio Lab.

Teamwork among all of these roles is essential. What might have been considered a traditional nursing role in the past—monitoring/recording vital signs and hemodynamic values—are now often handled by a CVT or RT. Technologists can also assist the nurse with circulating,



especially when the nurse is providing moderate sedation, which requires close patient observation. Conversely, an additional nurse may assist the technologist with handling supplies when they need to scrub in and assist the physicians.

Some of the technologists act as a daily “resource” as opposed to a “charge nurse.” During interviews and orientation, new staff are often told, “The nurse is responsible for administering medication to the patient, the RT is responsible for administering/monitoring radiation, and everything else is a shared responsibility.”

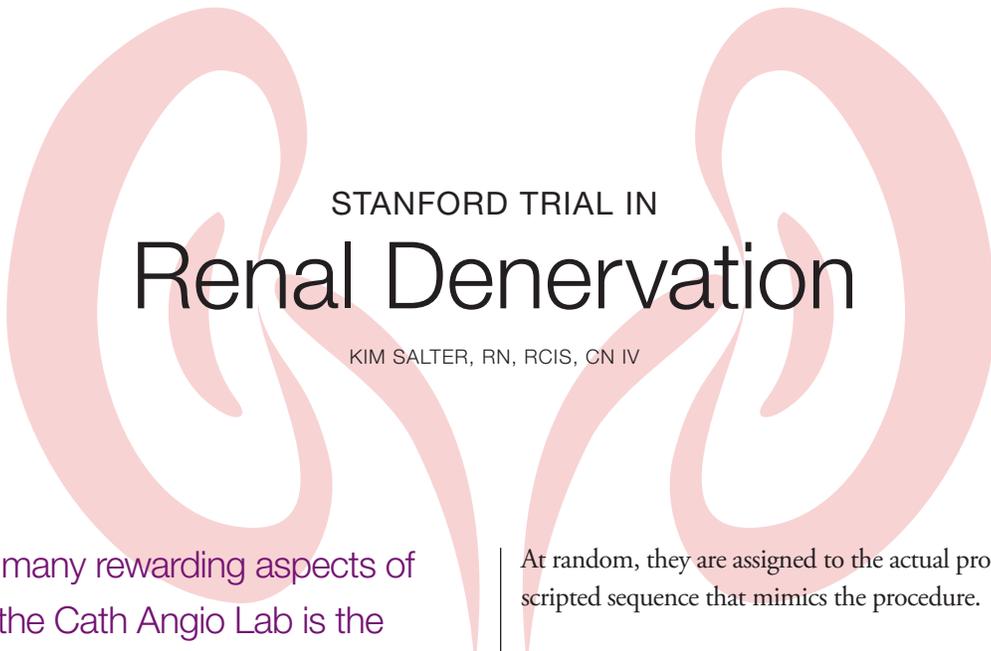
Orientation to the Cath Angio Lab, regardless of the role, is a team effort. The technologists and CVTs assist new registered nurses with learning the supplies, imaging

equipment, and procedural details, and nurses assist with training the technologists and CVTs with hemodynamic monitoring and other patient care duties.

Working in the Cath Angio Lab is a shared cooperative between the nurses and technologists. The collaborative relationship brings together two specialized professions to provide essential safe patient care in this unique environment. **SN**

Prior to coming to Stanford Hospital & Clinics, Tim Matheny, RN worked in an electrophysiology lab that was staffed entirely with nurses. After spending the past few years in the Cath Angio Lab at Stanford, he can say that technologists are essential to providing safe patient care in this type of environment. The focus of this publication is on nursing, but any overview of the department wouldn't be complete without including the technologists.





STANFORD TRIAL IN Renal Denervation

KIM SALTER, RN, RCIS, CN IV

One of the many rewarding aspects of working in the Cath Angio Lab is the opportunity to participate in meaningful research and innovative procedures that improve patients' quality of life. During the last year, the Cath Angio Lab has been involved in a multi-site study aimed at treating patients diagnosed with essential hypertension, which is defined as blood pressure above normal parameters that is unaffected by drug therapy.

The kidneys have a major role in regulating systemic blood pressure. Short radiofrequency impulses to the renal arteries appear to affect the nerve supply (denervate) of the vasculature of the arteries, decreasing the effect of the parasympathetic and sympathetic stimuli on the artery, and hence decreasing blood pressure. The procedure is known as renal denervation.

Electrophysiologists use a similar technique to treat certain cardiac arrhythmias, though renal denervation is still in the trial phase in the United States. Interventional cardiologist David P. Lee, MD, is spearheading the Simplicity Trials at Stanford, assisted by Nurse Coordinator Maria Perlas, RN.

The study is “blinded” to the patients, meaning they do not know if they will receive the denervation treatment. This approach presents a unique set of challenges, especially for the nurse circulating the procedure. As patients enter the procedure room, they are blindfolded and given headphones.

At random, they are assigned to the actual procedure or to a scripted sequence that mimics the procedure.

Patients remain conscious but receive moderate sedation to keep them comfortable since they are usually extremely anxious—especially with the imposed sensory deprivation during the treatment. To decrease anxiety, it is imperative that the nurse remain at the bedside throughout the entire procedure—whether real or staged. Ensuring that medication, often diazepam, is administered in the pre-procedural area also greatly decreases the patients' anxiety.

The actual radiofrequency ablating of the artery can be very painful, and it is common for patients to feel intense “searing” lower back discomfort. The nurse must collaborate with the physician to administer enough moderate sedation to keep patients comfortable while maintaining vital signs within normal parameters. A positive side effect of the sedation is its amnesic properties: The research coordinator has found that the patients do not remember the actual procedure but do recall the excellent care they received. The entire procedure takes approximately 30 to 45 minutes.

Afterwards patients are taken to the post-recovery unit and discharged from the hospital the next day. Approximately six months after the procedure, patients are informed if they were given the actual treatment or not, and patients in the control group are given the opportunity to undergo the renal denervation procedure.

Approximately 30 patients have enrolled in the study at Stanford and eight have been randomized. Preliminary results are very promising, and the hope is that this procedure will be a beneficial option for all essential hypertension patients. **SN**

You can learn more about the trial at www.simplifyBPtrial.com.



Global Exchange: CHINA

BRENDA HANN, MBA, RN, CCRC

As part of a commitment to diversity, the International Medical Services department works with foreign physicians and nurses who want to visit Stanford Hospital & Clinics.

Tarina Kwong, MSN, RN, vascular services clinic manager, approached Shelly Reynolds, MSN, RN, CNOR, director of the Cath Angio Lab, Interventional Services and Electrophysiology and interim director of Perioperative Services, to plan for a two-month visit from two nurses from China.

One of the nurses, Lily, a manager of a vascular surgery department in China, visited the Cath Angio Lab for a week. She wanted to know more about how the nurses are managed, trained, and educated, and was eager to learn how nursing clinical research was carried out and published. Lily was acquainted with the evidence-based projects that were conducted in the lab as well as the presentations and publications. She deepened her learning experience by spending time on other nursing units and even shadowed nursing administration.

After Lily returned to China, she extended an invitation to the Stanford nurses who assisted her during her visit. Five nurses traveled to Shanghai and lectured at the 2012 Endovascology International Conference. The lecture topics included the Magnet® Journey and how to achieve Magnet status, pain management, being an effective nurse manager, innovative procedural nursing, and evidence-based practice. The exchange group was fortunate to include Tarina, a seasoned traveler to Shanghai, and Ling Chen, MSN, RN, CNOR, nurse educator for the ambulatory surgery

services, who translated all of the presentations. Martha Berrier, RN, nurse manager of the coronary care unit, and Darlene Frie, RN, were also included in the group, both of whom received the fellowship award to travel to China. Conference speakers included physicians and nurses from around the world, including Australia, Canada, Germany, Ireland, Italy, Netherlands, and Serbia, as well as China and the United States.

During the visit, the team was invited to visit Changhai Hospital's vascular unit, cardiovascular unit, outpatient emergency department, and its digital subtraction angiography room (DSA), which is the equivalent of Stanford's Cath Angio Lab.



Stanford nurse delegates with chief head nurses for Changhai Hospital.

The nurses had the opportunity to meet and discuss similarities and differences between hospitals, and it emerged that the departments were not that different at all. Similar to Stanford, the DSA is a combined specialty department and the staff is trained to work and assist in multiple specialty procedures. The staff consists of registered nurses

and radiological technologists working together with the physicians. They have five rooms in the cath lab for a 1,500-bed hospital. They have similar ST elevation myocardial infarction (STEMI) practices and response times.

The Cath Angio Lab hopes to continue global education with international visitors. It is vital to the nursing profession not only to learn from our domestic neighbors but also to learn about international successes and issues in providing quality patient care. The exchange of knowledge between countries is an invaluable experience. **SN**

For more information on Stanford's International Medical Services, please visit stanfordhospital.org/forPatients/patientServices/internationalmedicalservices.



The Cath Angio Lab at Stanford has gone green. Recycling in the lab prior to the hospital-wide sustainability initiative was rudimentary and carried out by a small group of personnel. Unused clean materials were collected or repurposed for animal shelters and health clinics, as well as schools in need of plastics and towels for their science classes and experiments.

The electrophysiology personnel collected the platinum tips of diagnostic catheters. The tip collection progressed to a complete reprocessing of catheters that met industry standards. If retrieved platinum tips did not meet reprocessing standards, they were melted and used for other products.

The lab has become more aware of repurposing, reusing, and recycling—saving money in the process. Cath Angio Lab Director Shelly Reynolds, RN, has an interest in recycling, inspiring the lab to divert a considerable amount of material away from the landfill. Lab staff sort and clean

dry packaging materials with special attention to patient contamination. Bags have been designated as blue for linens, green for recycling, and red for medical waste that requires special processing.

Clinical recycling is done in partnership with the Stanford Hospital & Clinics Sustainability Department, which was initiated in August 2012. They link the hospital with other establishments that buy green products. They also work with the City of Palo Alto, GreenWaste Recovery, and local recyclers to aim for zero waste.

The greening of the cath lab started modestly, with all the staff, including ancillary staff, registered nurses, radiology technologists, and cardiovascular technologists. Once the staff was given an inservice on the process, they were required to demonstrate their knowledge by practicing the greening process with sample product waste. Displays were posted as a reminder of which items were recyclable. Initially, to prevent contamination, green bag collection was stopped as the procedure started. The staff wanted to take the process further and promised to secure the green bag where there was less risk for contamination. The initial green diversion was 10 percent and has gradually increased to 15 percent. A “Green Champion” spearheads the project, along with two co-champions who address all staff questions, concerns, and suggestions regarding the program.

The materials collected for the green bags consist of paper, clear and hard plastics, cardboard, and packaging of the catheters and devices. The blue wraps for central supply packaging and sterilization are also recycled and have a higher recycling value because of their weight and content. Non-recyclables include personnel protective equipment and anything used for direct patient care, such as gowns, masks, gloves, and shoe covers. These items are relegated to clear bags if they are not soiled or wet. Supplies that have been contaminated with blood or body fluids go into the red bags and handled according to hospital guidelines.

At the start of the procedure that we call stick time, we remove the green hamper to minimize chances of contamination and to prevent used items from being inadvertently thrown into the green waste, which could render the whole collection as medical waste. Even a glove used for patient care can contaminate the collection. Only dry recyclable materials are permissible. Recycling is dropped in emergency cases in which patient care is the immediate focus.

Cath lab personnel are committed to environmental stewardship and reducing waste. Recycling gains are substantial, and staff members feel that they have contributed to a cleaner environment. There is a noticeable sense of purpose and a strong team effort. After all, green is a terrible thing to waste. **SN**



2.79 lbs

OF WASTE IS RECYCLED PER CASE

15%

OF TOTAL WASTE (BY WEIGHT)
IS RECYCLED PER CASE

12 tons

PER YEAR WILL BE DIVERTED FROM THE
LANDFILL BY THE CATH ANGIO LAB

\$414,588

WAS SAVED IN 2012 BY
REPROCESSING ELECTROPHYSIOLOGY
AND ULTRASOUND CATHETERS

RECYCLABLES

paper
clear and hard plastics
cardboard
packaging
central supply blue wrappers

CARING FOR
*Intrapartum
Patients* IN INTERVENTIONAL
RADIOLOGY

NAOMI NELSON, RN

The Division of Interventional Radiology (IR) is a growing service at Stanford Hospital & Clinics. Section Chief Lawrence Hofmann, MD, has worked hard to make IR known throughout the hospital, informing other services of the multiple procedures that can be utilized to optimize patient recovery. These procedures include line placement for intravenous (IV) access or dialysis treatment; drainage catheters to treat abscesses or to relieve pressure in the liver or kidneys; embolizations to stop uncontrolled bleeding; and chemoembolization to treat cancer. New challenges have arisen with this growth.

In 2012 there was an increase in the number of patients requiring intrapartum care. Women were having complications during their pregnancy that required procedures such as a line placement or a nephrostomy tube placement. The ability to care for these patients is essential for a successful pregnancy.

Our staff had concerns regarding the sedation of these women. While the IR nurses wanted the intrapartum patient to be comfortable for the procedure, they were not sure how much benzodiazepines and narcotics were safe to administer. Line placement for essential access can be fairly straightforward, with pain managed with local anesthetic. However placing a drainage tube into a kidney can be much more painful and require sedation. Unfortunately, the result was undersedated women who were very uncomfortable during their procedure.

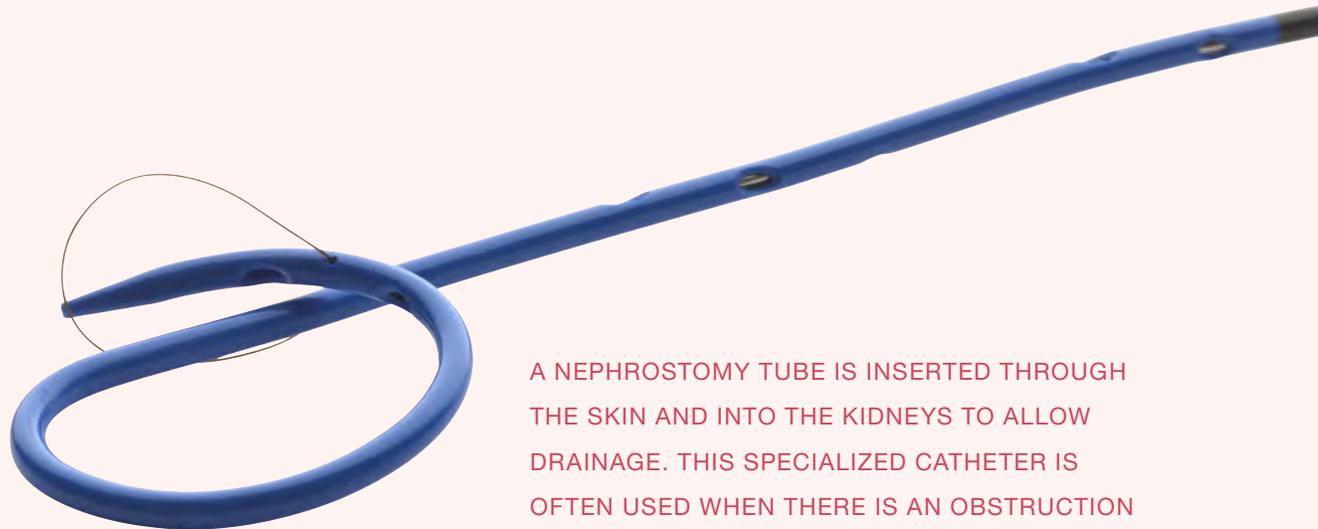
A search of the hospital website and the Internet did not provide policies or guidelines for sedating pregnant women. Women and their unborn children have specific, unique care needs: IR nurses must provide comfort to the mother without risking any complications to the fetus. It is difficult to find recommendations for the IV medicines required.

Perserverence paid off when the nurse manager for Labor and Delivery suggested talking with the Department of Obstetric Anesthesia. Nurses began working with Gillian Hilton, MD, and resources were pooled. We supplied her with the procedure type, procedure length, and pain control needs. She collaborated with the OB anesthesia department and developed guidelines for sedating pregnant women.

Once the guidelines were in hand, careful review confirmed they fit IR's needs. However, we discovered another concern for this patient population: radiation. What were the effects on our patients, and what precautions should be taken?

In all hospital areas where radiation is used, there are three basic precautions: time, distance, and shielding. Working with Kim Reed, RT, to determine the specific needs of intrapartum patients, and utilizing the expertise of radiation safety services and input from the IR doctors, we took these three basic precautions and elaborated on them to cover the specific needs of a pregnant patient. The staff and physicians were educated on the importance of minimizing the time the patient was exposed to radiation, using reference images rather than additional fluoroscopy. Shielding is also important, and the mechanics of fluoroscopy was reviewed to better understand the effects on the patient and how to apply the shields.

Once all the pieces were in place, the findings were presented at a staff meeting. The nurses gained knowledge and confidence in how much sedation was safe and when it was necessary to call for additional support from Obstetric Anesthesia. The nurses could confidently sedate and prepare intrapartum patients for radiation exposure, allowing them to be comfortable while keeping their babies safe. Empowering the staff provides them with the best resources possible to care for this special population of patients. **SN**



A NEPHROSTOMY TUBE IS INSERTED THROUGH THE SKIN AND INTO THE KIDNEYS TO ALLOW DRAINAGE. THIS SPECIALIZED CATHETER IS OFTEN USED WHEN THERE IS AN OBSTRUCTION IN THE URETERS.

My California Adventure

ONE NURSE'S EXPERIENCE JOINING THE CATH ANGIO LAB

B. CAROLE PICKERING, RN

No one could have prepared me for what my husband called our “California adventure”—a chance of a lifetime, almost 30 years ago, when we left the safety and comfort of our Mississippi home and everything familiar in search of new careers. After a new air conditioner, a new radiator, and other car mishaps, we crossed Pacheco Pass and drove down into the famous Silicon Valley.

We moved into a small, quaint apartment and settled in. With my husband at work I decided it was time to pursue my career. I knew Stanford Hospital was where I wanted to work.

Heading to an interview for a position in the North Intensive Care Unit of Stanford Hospital & Clinics, I was not prepared for my first look at the hospital. In the cool mist from the fountain, I saw a bright rainbow

of brilliant colors. Just beyond that rainbow, hiding in the mist, was the hospital.

My interview with the patient care manager went well. At some point during our conversation, she asked me why I had not applied for a cath lab staff RN position. I then interviewed with the nurse manager and Drs. Steven Osterly and Charles Swerdlow of the Cardiac Cath Lab.



“This ‘hip’ country gal from the cotton farming land of the Mississippi Delta, home of the blues, sweet tea, and all things fried, was a nervous wreck but excited to arrive in sunny California.”

At that time, it was normal to be interviewed by one or two physicians for a position in the lab. The short 15 minute interview seemed to be an eternity. I walked out with the sad feeling that they thought my southern drawl somehow reflected my knowledge and experience as a cath lab RN. Despite my accent I was hired. That was August 1984. The start of my new career and exciting relationship with Stanford Hospital.

EARLY DAYS IN THE CARDIAC CATH LAB

The Cardiac Cath Lab was shared by two independent departments: Diagnostic- Interventional Cardiology and Interventional Radiology (IR). The lab consisted of four rooms on the second floor for cardiology and IR cases, and one room on the ground floor that we called the “dungeon” for electrophysiology (EP) studies. It was a dark and spooky room.

One and sometimes two cardiac RNs were in charge of Room 3 along with a radiology technologist (RT) loaned to us from IR. Their responsibilities included checking all emergency equipment, monitoring vital signs, giving conscious sedation, and assisting with the preparation and procedure set up. Two cardiac RNs were in charge of the EP room in the dungeon. Their responsibilities were similar, however, they were also responsible for mixing and giving antiarrhythmic drugs and for recovering the patient post procedure. The “recorder” RN assisted the electrophysiologist with the heart stimulator. The second RN sat at the patient’s left side (called the “hot seat”) and was responsible for recording 12-lead EKGs, defibrillating the patient when necessary, and

keeping the patient comfortable and feeling secure.

Each department was assigned specific types of cases; there was no crossover. Having worked in a hospital cath lab in Mississippi, some of Stanford’s ways were a little strange to me. I had no clue as to how a “teaching” hospital operated. Procedures were more involved and complicated. And protocols? What were those? No two procedures were the same as no two hearts were the same. I was familiar with accessing the heart via the brachial artery and vein. Stanford’s Angio Lab preferred the femoral artery and right internal jugular vein approach. I began to write EVERYTHING down. In time these strange ways became my norm. Having patients peddle on a bike while lying flat, breathing into a big balloon, and a gigantic stainless steel “milking” cylinder soon became normal.

Dedicated physicians have enriched my life by opening my mind to more exciting and thrilling medical practices. They always had an answer to my endless list of questions. Their passion for healing and helping critically ill patients was an inspiration. They taught me not only the basics but also the intricate and complicated aspects of the body’s heart and lungs.

Evelyn Young staffed our analytical lab. She ran our blood work, calculated our Fick cardiac outputs, kept record of our daily charges, and kept us “in line.” Today our blood work is sent to the lab and our charges are computerized.

As time passed, our caseload increased, our imaging and cine (35mm reel film developed in our “dark room” behind the lab) equipment became unreliable and obsolete. The lab underwent numerous remodeling and departmental changes. Old rooms were renovated and new ones added.

THE NEW CATH ANGIO LAB

In time, the Cardiac Cath Lab and Interventional Radiology departments were combined to form one unit. Cases were reassigned and more staff hired to accommodate a growing caseload. New and exciting research protocols were added to our procedures. As the Cath Angio Lab grew, so did our need for better documentation. Handwritten notes became a thing of the past. State-of-the-art X-ray equipment was installed in our new procedure rooms. Pulmonary angiograms with cut films (similar to chest X-rays) became outmoded. Digital subtraction angiograms (DSA) replaced cine. Bi-plane replaced single plane, which was replaced later by DynaCT.

What started out with four RNs grew to 10 to 20 to 30 and to our present number of about 50 to 60 nurses.

Even after 38 years as a nurse, the cath lab is where I will always hang my nursing cape. This is where I fulfill my need for autonomy and “one-on-one” patient care. I leave work with the proud satisfaction of knowing I did my best both mentally and physically to care for each of my patients. **SN**

Remember When?

A RETROSPECTIVE OF 33 YEARS IN THE CATH LAB

Jan Lindell, RN, has been working in the cath lab for over three decades. She has witnessed its history, changing technology, and innovation which still continues to change patient care today. Her colleague, Eva Mendez, RN, interviewed her to gain a perspective of the early days of the cath lab and an appreciation of how nursing care in the cath lab has evolved over time.

EVA: Jan, when did you start working at Stanford?

JAN: 1972

EVA: How many years have you worked in the cath lab?

JAN: 33 years. I came to the cath lab in 1980.

EVA: At that time, how many procedure rooms were in the Stanford cath lab?

JAN: We had two angio suites in the area known as South X-ray, located just inside the hospital at the fountain entrance. One was the pediatrics and peripheral angio room. The adjacent room was the cardiac room. We did pediatric caths, aortograms, run-offs, thoracics, trauma, abdomen studies, and cardiac coronaries there. Down on the ground floor, we studied the neurology patients. The five radiology nurses assisted with all of those cases. I was hired as a radiology nurse.

There were one or two rooms where the present-day cath lab is located; there the five cardiology nurses assisted with valve cases, right and left heart pressures, and electrophysiology cases. Our work was purely diagnostic at that point.

EVA: There were four specialties: pediatrics, cardiac, radiology, and neurology?

JAN: Yes, but there were few interventions done. I remember one of the cardiac nurses, Kaylyn Bockemuehl, told me that the cardiology nurses assisted Dr. John Simpson, a cardiologist, who was attempting to create and perfect the angioplasty balloon. This was an important time in the development of this most important tool, and Stanford was right in the thick of the race! Kaylyn said they spent hours laying catheters and wires out on the procedure table trying to adhere balloons to those catheters, trying to design a workable percutaneous angioplasty catheter.

EVA: What year was that?

JAN: The early 80s. There were no pre-made or pre-formed catheters. We made our own. We maintained a box full of sterile catheter material; different colors meant different types of stiffness or usage. Using an electrical apparatus with a heating coil, the physicians would place the end of the catheter material in the coil, causing the end to flare and trumpet. Then we would slip a metal tip to that end, securing the catheter, and providing a syringe entry port.

EVA: You would be making these catheters as you were doing these procedures?

JAN: Yes. These were just basic catheters. We would also heat the distal end of the catheter to shape, curve, or form the tip of the catheter to what the physician wanted. They would insert it into the patient and after a while it would lose that bend. The catheter would have to be removed and reformed again.

EVA: I realize I take for granted all the pre-packaged and pre-formed sterile catheters and balloons we now have available. As a new nurse without any cath lab experience, what was the training and orientation?

JAN: I remember going into radiology first. Learning was always “hands on”: This is a wire. This is a sheath. This is a catheter. This is what you do with it. You learned by watching. You would remain in that modality until you could do that set of cases by yourself. Then you would move to the next room for the next specialty.

There were no training manuals or procedure documents, formal or hand-written. Training and teaching were done verbally. This was difficult to keep up with at times even though the cases were fairly simple. The pediatric pressures were measured on a huge piece of equipment that had dials and knobs from top to bottom. It had to be calibrated every morning, taking at least 20 minutes of work.

EVA: Was this also a new specialty for the radiology techs coming in?

JAN: It was new for everybody. This was the infancy stage of the cath lab. The technologists were very good at their art, working with the physicians to time the injections with the filming to produce perfect films. Their work was also quite physical: They loaded many of the film changers and developed a good deal of the pictures for the physicians to use.

EVA: How did you record pressures?

JAN: We recorded our nursing notes by hand in green logbooks. As far as coronaries and right/left heart pressures, we used something akin to a film canister. The assistant would load this canister with a type of light-sensitive film. The doctor would call out the pressures, and the nurse would hit the record button. The canister was then taken to be developed. Most of the time this gave us a long strip of pressure tracings, but sometimes the “film” would fanfold inside the canister, and we would lose all of our pressure tracings. This would not be discovered until the patient had left the room!

EVA: It was the beginning of nursing practice in the cath lab and the foundation for what we are doing today. Then again, our cases are much more complex than they were back in those days.

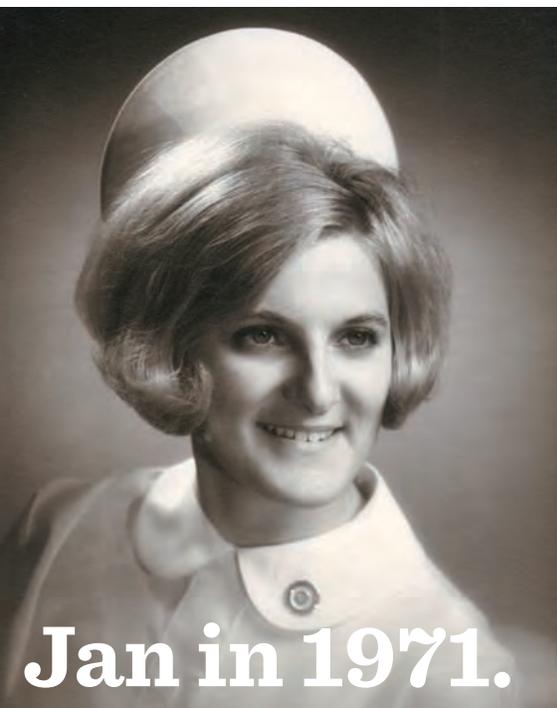
JAN: The nursing care of patients and being a part of the team has evolved. The nurse is no longer just someone who writes down vital signs, and sedates the patient. We also focus now on being proactive, looking forward, as well as planning for things that could go wrong. We didn’t have a lot of things that could go wrong then, because we were not doing interventions. Things were pretty simple.

EVA: As the cath lab evolved, did the roles for each individual of the cath lab team evolve also?



JAN: In the lab’s earlier days there was a real partnership between the physicians and the technologists, perhaps even more than the nurses and the physicians. The technologist role has grown to become a master of angiographic skills, to scrub in with the physicians, to have in-depth knowledge of the cath equipment and the radiologic computers, and even to help the new cath fellow improve his or her skills.

Nurses have gone from sedation providers and recording secretaries to become full partners with the techs and physicians. We research each patient ahead of time to know all information that might be critical to the patient’s safety and care. We set up for procedures, planning individually for specific physicians and specific patients, to provide the best care immediately and to be prepared for any event. We are the patient’s advocate from room entry to exit.



EVA: Did you have crash carts? Were there reversal drugs (Narcan) available for those sedatives?

JAN: No. You just had to watch them. We had ambu bags available.

EVA: How did you pick pediatrics as your specialty out of all the specialties that were there, or did it choose you?

JAN: It chose me as a nursing student. The first patient I lost was an 11-year-old, and I thought “that’s it for pediatrics.” However, when I came to Stanford ICU, the pediatric open heart surgery patients really intrigued me. There were four of us who “fought” to care for those fragile little ones.

Dr. Norman Shumway was a pioneer in pediatric cardiac surgery, and it was amazing to see what he could do. When I

came to the cath lab, it seemed that nobody else wanted to do those peds cases. So, as I learned more, and became more skilled, I really enjoyed doing those cases and teaching the other nurses about peds. Other staff told me that the tiny babies frightened them, but I didn’t share that fear, for some reason. The peds work was so detailed and the patients so delicate; I loved the challenge. If there were emergency peds cases at night, I would sometimes come in to help the call team, as there were only two teams taking calls at night: cardiology, and Everything Else. The Everything Else team was usually busy with other emergency cases.

EVA: Can you describe an event that made you proud to be part of the cath lab staff?

JAN: I remember many times when families, particularly of transplants, have come in with the patient in the room. They have put their arm around me and said, “I’m so glad it’s you” because I’m a face they remember. As a parent myself that would make me feel a little bit better just to have a face in the room that I knew and recognized. It makes me feel like I’m part of a really good team.

I’m also cognizant of the parent’s side of it, not that I could ever imagine being in that situation. Someone even wrote and mentioned that they appreciated I was always there. That’s really made me feel worthy of this calling. It’s also amazingly fun to see how the pediatric interventional world has moved on to where we can

do so many things percutaneously and not have the patient go to surgery. The physicians are so gifted and such patient advocates. They genuinely want what’s best for the patient and will spend hours in a procedure to ensure the best outcome. To be a valued member of the pediatric team makes my day worthwhile.

EVA: You are planning to retire this year. Looking back on your career here, is there anything you would do differently, knowing what you know now?

JAN: I keep a personal diary just for my kids to laugh at one day. But I wish I had kept a diary of the new things that have come along starting with my time in the ICU to the cath lab when it was a diagnostic lab to the interventional things we do now. I wish I had kept a timeline of that. I don’t think I would have changed anything else. I’ve enjoyed working here. I hope that most people’s experiences with me have been positive.

Coming to the cath lab was such good fortune, something I had never thought of, but now I realize what a blessing it has been. I have grown to love every aspect of it—well, maybe most of them! I love the teamwork and the people I work with. It was the best thing that ever happened to me in my career. Absolutely, the best thing!

SN

CERTIFICATION SENDS
THE MESSAGE:

C-I-Care

DAPHNE BREMNER, RN, RCIS, RCES



In a world where technology is changing rapidly and advances in medicine materialize quickly, it can be challenging to stay current in nursing knowledge and practice.

Being a part of the Cath Angio Lab is no exception. The staff takes steps every day to stay ahead of the ever-changing learning curve. Each professional—nurses, cardiovascular technologists, and radiologic technologists—has specific skills that allow them to be an integral part of the team. As in any specialized service, many of these skills are developed and refined by working with mentors and preceptors, and through educational opportunities. Certification plays a significant role in this continuum of professional development.

The benefits of obtaining certification are numerous:

- Certification sets a benchmark allowing the evaluation of knowledge in relation to evidence-based standards set by professionals in the specialty. The certification process is a pathway for personal immersion into an area of expertise.
- The study process is an opportunity to collaborate with team members. Sharing nursing and technical knowledge with colleagues during exam preparation helps solidify learning and strengthens the team.
- Certification fosters the concept of continued learning as continuing education hours are generally a requirement.
- The personal and professional satisfaction is a great reward.

Approximately half of the cath angio staff has achieved professional certification. Many nurses have studied, passed exams, and earned certification from nationally recognized specialty organizations such as the American Nurses Credentialing Center, American Association of Critical Care Nurses, Association for Radiologic & Imaging Nursing, and Association of periOperative Registered Nurses. Certifications include Critical Care Registered Nurse (CCRN), Certified Radiology Nurse (CRN), and Certified Nurse Operating Room (CNOR), to name a few.

Two additional credentials merit an introduction: Registered Cardiac Electrophysiology Specialist (RCES) and Registered Cardiovascular Invasive Specialist (RCIS) are specific to the electrophysiology and catheterization labs and are being recognized by the cardiovascular industry. Both exams are administered by Cardiovascular Credentialing International, a nonprofit credentialing organization.

These exams are unique in that they incorporate both nursing knowledge and technological information into the test matrix. For example, the exams include content related to medication administration and nursing care of the cardiovascular patient as well as calculations related to cardiovascular procedures, such as measuring cardiac valve areas, internal ECG interpretation, and angiographic analysis. The exams are a comprehensive validation that nurses and technologists are striving to provide the highest quality care to their patients.

There is one more very important reason certification is relevant. Seeking a deeper knowledge of a specialty—while validating the knowledge already possessed—is a great way to say to patients, “C-I-CARE.” **SN**



THE STANFORD HOSPITAL & CLINICS

VETERANS' WRISTBAND

GREG HOOVLER, RN

This Memorial Day 2013 marks the one-year anniversary since the launch of Stanford Hospital & Clinics' Honoring United States Military Veterans program.

This unique ongoing patient recognition program gives thanks to our military veterans for their service by honoring them with a one-of-a-kind keepsake wristband identifier during their visit to Stanford Hospital. This simple gesture has yielded tremendously positive feedback not only from our military veterans themselves but also from families, staff, and even the local media. To date, more than 2,000 wristbands have been given to Stanford patients from all

branches of the military and at all levels including a 4- star general. Patients, families, and staff have shared their military stories with each other and more often than not those stories have produced heartfelt emotions, gratitude, and many tears. As we celebrate this Memorial Day, give thanks to a veteran patient who wears a wristband with pride and thank them for their service. Our small gesture is apparently not so small of a gesture in the eyes of a veteran!

One patient, a sergeant in the U.S. Marines, served during the Vietnam war. Hearing many stories from him about all the trials he went through during the service and out of service opened my eyes. When I informed him that Stanford would like to thank him for his courage and time for serving his country, he cried and told me that when he came back home, he didn't get a hero's welcome and was very hurt/scarred by that. He told me he was touched by being recognized and will hold onto the wristband dearly. He gave me words of wisdom: "True friends, eclectic jobs, interests, all the money in the world does not matter when you're sick. Live life and have faith. Problems are just road bumps in life."

ALYSSA CLEMENTE, PATIENT ACCESS REPRESENTATIVE, ASC

When I give the veterans' wristband to outpatients I always say thank you for serving our country and glad you made it home safely. They all smile and say thank you for recognizing them as a veteran.

**NANCY HERNANDEZ DURAN
BEDSIDE ADMISSIONS
COORDINATOR**

I just want to give a heartfelt thank you for the idea of the wristbands. As a 27-year veteran with the privilege of taking care of the sick and injured during Operation Desert Storm 1991 and Operation Iraqi Freedom (Battle of Fallujah) 2004-05, the recognition a military vet receives can never be enough. What you did is indeed special. Thank you.

**HUMBERTO MONGE, PA-C (NAVY LCDR - RETIRED)
MULTI-ORGAN TX PROGRAM**

I had one patient who said, “Well, I’ll be darned, look at that”—he opened it and put it on that same day.

**JEANINE GONZALEZ
STANFORD MEDICINE IMAGING CENTER, PATIENT ACCESS REPRESENTATIVE**

I gave my patient a veterans’ wristband. He served in the Air Force as an Air Force Ranger. I told him that Stanford would like to acknowledge veterans during their hospital stay. He was so thankful and felt very honored. I thanked him for his service to this country.

Later, the patient in the bed next to him told me that she was impressed with Stanford for honoring our veterans. She said that after I left his room, the vet was sobbing with emotion.

I never realized the impact this project would have on me until I actually did it. I’m so proud of our institution for taking such a wonderful step in honoring our veterans.

**RIGEL NEMIS
ED PATIENT ACCESS SERVICES**

It has been my experience that patients feel honored. When asked how many years served and in which rank, they always answer with pride. It is a gratifying feeling to be able to say, “Please accept this small gesture on behalf of Stanford Hospital & Clinics for your service” and know our patients feel appreciated and their service was not in vain.

**MARIA MORALES
PATIENT ACCESS REPRESENTATIVE, MAIN ADMITTING**

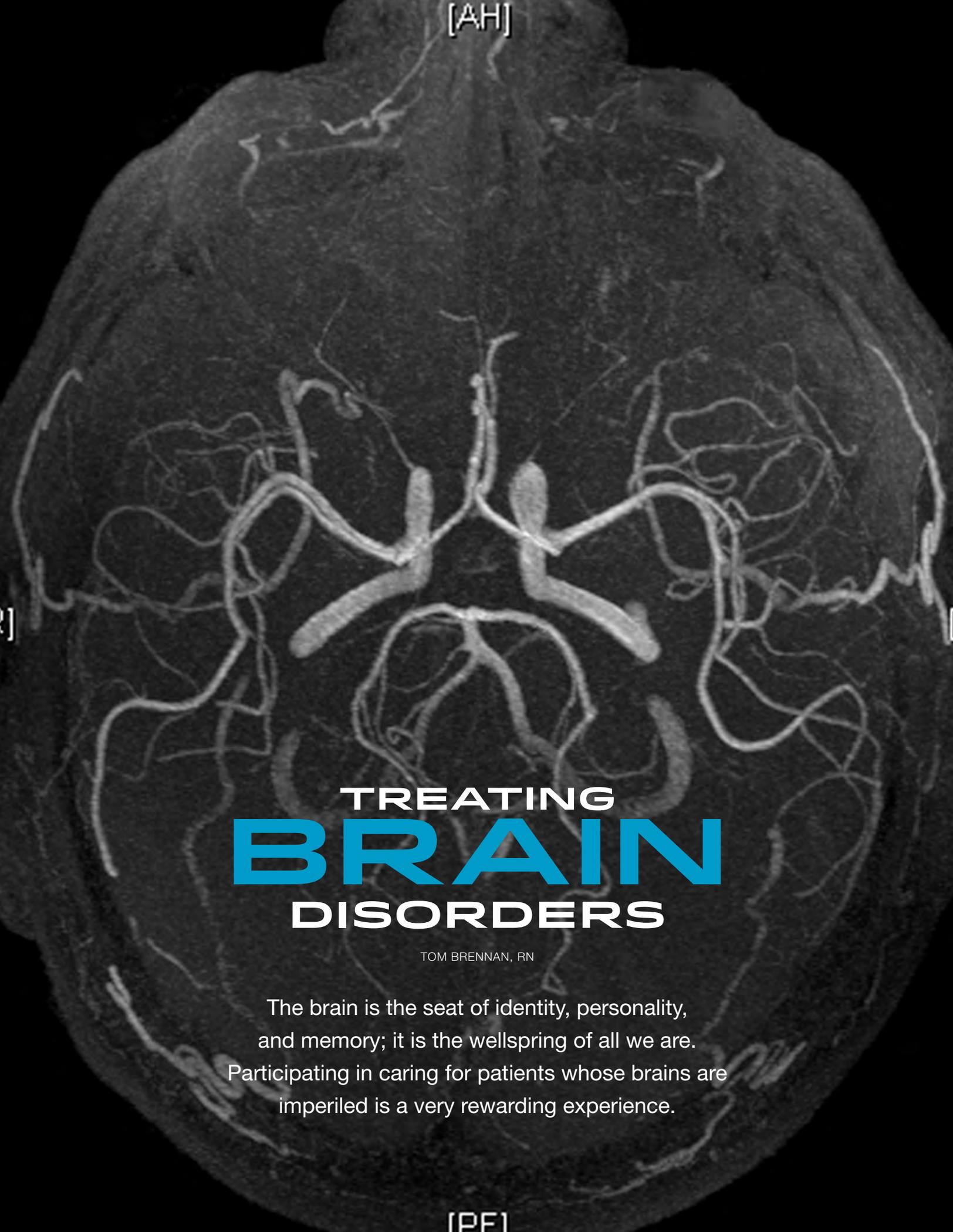


Every patient I see wearing a wristband gets a handshake and a “thank you for your service to our country.” Many times this brief encounter becomes the opening words for an emotional conversation.

You can see the pride in their eyes when we recognize them as veterans and single them out through our Honoring United States Military Veterans program.

GREG HOOVLER, RN, CAPR

[AH]



TREATING
BRAIN
DISORDERS

TOM BRENNAN, RN

The brain is the seat of identity, personality,
and memory; it is the wellspring of all we are.
Participating in caring for patients whose brains are
imperiled is a very rewarding experience.

[PF]

MEMBERS OF THE TEAM

The Stanford Neuroradiology Interventional Team comprises three attending physicians, two interventional fellows, 10 diagnostic fellows, and approximately 40 registered nurses and radiologic technologists.

The team conducts procedures in two of the rooms in the Cath Angio Lab. They care for 30 to 35 patients a week, made up of diagnostic and interventional cases. The teams also are on-call 24 hours a day for emergency cases, which require a 30-minute response time once called in.

Each procedure room operates with a team consisting of an attending, a fellow, at least one nurse, one radiologic technologist, and one monitor person, who may be drawn from either the nursing or radiologic discipline. All nurses and radiologic technologists are Advanced Cardiovascular Life Support (ACLS) certified and are required to go through an in-depth orientation covering interventional and diagnostic neuroradiological procedures as well as intracranial vascular anatomy before qualifying to work on the neuroradiology service.

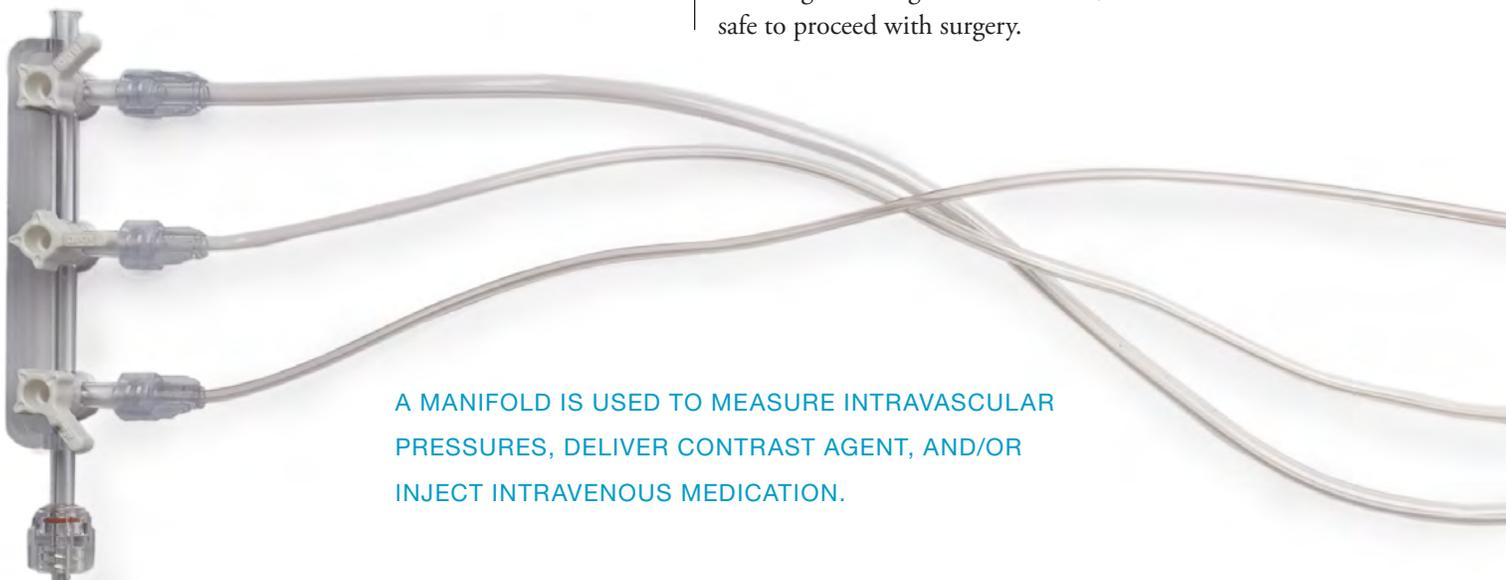
An anesthesiologist may be present for adult cases and is mandatory for pediatric cases. A separate hospital service made up of neurologists and neuromonitoring technicians is also present to monitor changes in neurological function during an intervention. It is not uncommon to have 10 to 15 staff members present for a particularly detailed intervention.

DIAGNOSTIC TESTS

A large percentage of cases in the neuroradiology department are diagnostic angiograms, which involve radiographic examination of the cerebral arteries. Adult diagnostic cases usually are performed under moderate sedation while pediatric patients receive general anesthesia. A sheath is inserted into the femoral artery and then a diagnostic catheter is inserted into the arterial vasculature of the brain. Once in position, the catheter is used to inject a contrast agent that shows the arteries of the brain in great detail. The diagnostic angiogram is considered the gold standard test for neurovascular imaging.

The indications for diagnostic angiograms vary, and the results determine if further intervention is necessary. Diagnostic angiograms enable the physicians to decide what techniques and treatments are most suitable for the patient. For example, a neuroangiogram can reveal signs of moyamoya disease, a neurovascular disease in which arteries of the brain are friable and malformed. Upon discovery of this condition, the patient will most likely be sent to the operating room for neurovascular bypass surgery. Diagnostic angiograms do not stop there for the moyamoya patient. Follow-up care includes post-surgery and additional neuroangiograms to ensure that the vessels are adequately open.

Another diagnostic test is the balloon test occlusion, which is performed on pre-surgical patients to determine if a cerebral artery may be safely sacrificed without harming the patient. A balloon is inserted into a cerebral artery and inflated; the patient is then closely monitored for neurological changes. If none occur, then it is considered safe to proceed with surgery.



A MANIFOLD IS USED TO MEASURE INTRAVASCULAR PRESSURES, DELIVER CONTRAST AGENT, AND/OR INJECT INTRAVENOUS MEDICATION.

In the Wada test, named for a Japanese neurologist, a barbiturate is injected directly into the brain to locate the areas governing speech and memory. This test is generally done pre-surgery to avoid damaging any eloquent areas of the brain.

INTERVENTIONS

For stroke patients, time is brain. Since the rate of brain cell death during an acute ischemic stroke is greater than 1 million cells a minute, the treatment goal for an ischemic stroke is to open the blockage as quickly as possible. A thrombectomy for an ischemic stroke uses special equipment to facilitate removal of a blood clot (thrombus). Devices used include stents, as well as straight and curved wires, along with various catheters and suction devices. In cases in which stents are used, the stent is deployed inside the clot and then slowly pulled out to restore blood flow to the affected artery. Wire devices are used to either break up, or wrap around the embolic particle, to facilitate removal from the blocked artery. In the instance of a distal occlusion beyond the reach of mechanical devices, intra-arterial t-PA may be used to try to lyse the clot in the artery.

In the brain, aneurysms at risk for bleeding may be treated endovascularly by using special devices called coils. A coil is a soft, threadlike metal loop that can be positioned inside an aneurysm, where it then causes a clot to form—neutralizing the aneurysm without requiring a craniotomy. Another recently approved treatment uses a flow diverting covered stent to divert blood flow from an aneurysm.

Arteriovenous malformation (AVM) and arteriovenous fistula (AVF) embolizations are performed on malformed cerebral vasculature. The malformations can cause neurological symptoms and lead to bleeding. Using special liquid embolic agents, these malformations are embolized without open brain surgery.

Since 2009, when the hospital's combined-use, or hybrid, rooms first opened, the neuroradiology and neurosurgery teams have been able to collaborate on craniotomies. The neuroradiology team provides detailed intraoperative imaging as the neurosurgery team performs the operation. Along with vascular interventions, vertebral biopsies and vertebroplasties are done to inject cement into a fractured vertebra and to stabilize a fracture, offering significant pain relief for the patient.

Since the opening of the Stanford Stroke Center in 1992, more than 25,000 patients with cerebrovascular disorders have received treatment. In 2012, the Stroke Center became the first hospital in the United States to achieve The Joint Commission's standards for Disease-Specific Care Comprehensive Stroke Center Certification. Working within this major center for stroke treatment and research, neuroradiology specialists perform endovascular interventions and treat a variety of cerebrovascular illnesses.

NURSING KNOWLEDGE

From a nursing perspective, neuroradiology offers a unique practice environment. Aside from the primary patient care issues of safety, comfort, cleanliness, and teaching inherent to all nursing (i.e., the Four Corners of Nursing), the nurse also deals with the technical issues of 20 different procedures and their variants. A nurse working in the neuroradiology suite has to be knowledgeable in conscious sedation, radiation safety, and potential complications inherent to the procedure, as well as their remedies.

Knowledge of common intraprocedural drugs, radiology equipment, radiographic imaging, diagnostic catheters, guide catheters, microcatheters, sheaths, coils, stents, guide wires, closure devices, liquid embolic systems, thrombectomy devices, retrieval devices, and biopsy equipment is essential. Nurses must know intraoperative sterile technique and be able to set up a sterile procedure table and prepare the patient. On top of all this, the nurse must be able to care for critically ill patients and be competent in the skills inherent to the critical care arena, from vasoactive drips to intraoperative hemodynamic monitoring. Since the neuroradiology department also performs procedures on pediatric patients, the nurse must be prepared for this population as well. It is truly full-spectrum nursing.

The reward is taking patients through a highly complex procedure involving the imaging and endovascular treatment of the brain and spine, and delivering them safely to the recovery area. **SN**

In Recognition

ARTICLES AND PUBLICATIONS

Carol Bell: Cancer-related fatigue in Italian cancer patients: validation of the Italian version of the Brief Fatigue Inventory (BFI), *Supportive Care in Cancer*, February 2013.

Theresa Bell-Stephens: MoyaMoya Disease Can Masquerade as Multiple Sclerosis, *The Neurologist*, November 2012.

Kelly Gould Bugos: Multiple Myeloma: Supportive Care Requirements and Coordination of Patient Centered Care, *Journal of Managed Care Pharmacy*, October 2012.

Garrett Chan: Death Notification After Death, Case Studies in Palliative and End-of-Life Care, Wiley-Blackwell, 2012.

Garrett Chan: Dyspnea and Heart Failure, Case Studies in Palliative and End-of-Life Care, Wiley-Blackwell, 2012.

Lenora Fechter: Update on the Science of Myelodysplastic Syndromes, *Clinical Journal of Oncology Nursing*, June 2012.

Andrea Frederick: APN Plan Improves Outcome for Pregnant Patient With Congenital Heart Disease, *AACN Advanced Critical Care*, April/June 2012.

Annette Haynes: APN Plan Improves Outcome for Pregnant Patient With Congenital Heart Disease, *AACN Advanced Critical Care*, April/June 2012.

Carl Kulpa: Fever: What is It and How is It Treated? *Oncology Nursing Society Neutropenia SIG Newsletter*, May 2012.

Mary Lough: Priorities in Critical Care Nursing, Elsevier, 2012.

Judy Passaglia: Discussing CPR When it is a Non-Beneficial Intervention, Case Studies in Palliative and End-of-Life Care, Wiley-Blackwell, 2012.

Mary Petrofsky: Diagnostic Snapshot: What is the Cause of This Patient's Symptoms? *JADPRO*, March 2012.

Patricia Thompson: Context and Consequences of Delaying Hip Replacement Surgery: A Case Study, *The Journal for Nurse Practitioners*, March 2012.

Pamela Schreiber: Obstructive Sleep Apnea: Patients at Risk, *Med-Surg Matters Newsletter*, Academy of Medical-Surgical Nurses, September 2012.

APPOINTMENTS/AWARDS

Shirdellah Bunuan: First Place Winner, Process Improvement Category, Poster Presentation, "Patient Involvement a New Way to Improve Performance of Peripheral Lines," Infusion Nurses Society Annual Convention, Las Vegas, NV, May 2012.

Angelica Calderon: First Place Winner Process Improvement Category Poster Presentation, "Patient Involvement a New Way to Improve Performance of Peripheral Lines," Infusion Nurses Society Annual Convention, Las Vegas, NV, May 2012.

Jennifer Mosqueda: First Place Winner, Process Improvement Category, Poster Presentation, "Patient Involvement a New Way to Improve Performance of Peripheral Lines," Infusion Nurses Society Annual Convention, Las Vegas, NV, May 2012.

Mary Nejedly: 2012 Poster Presentation Winner, "Anxiety, Depression, and Coping Strategies in Patients Presenting to a Women's Heart Health Clinic," Preventive Cardiovascular Nurses Association National Symposium, Washington, DC, April 2012.

Chrislyne Pineda: Poster Presentation Winner, First Place Winner, Process Improvement Category, Poster Presentation, "Patient Involvement a New Way to Improve Performance of Peripheral Lines," Infusion Nurses Society Annual Convention, Las Vegas, NV, May 2012.

Yvonne Rodrigues: Pacific Coast College Health Association Affiliate Outstanding New Professional Award, American College Health Association, May 2012.

CONFERENCE PRESENTATIONS

Margaret Albreits: "There's an App for That," Case Management Society of America 2012 National Conference & Expo, San Francisco, CA, June 2012.

Michael Baulch: "Legal Issues in Tactical Medicine," Tactical Medicine Update Conference, Sacramento, CA, December 2012.

Martha Berrier: "Pain Management," Endovascular Conference, Shanghai, China, October 2012.

Sheryl Blankers: "Can You Handle The Pressure? Advanced Mechanical Ventilation in the Transport Environment," 2012 Air Medical Transport Conference, Seattle, WA October 2012.

Rosalie Bravo: "Stressed Induced Hyperglycemia in Critical Illness," National Teaching Institute and Critical Care Exposition 2012, Orlando, FL, May 2012.

Rosalie Bravo: "Think Bigger: The Impact of Inflammation on Cardiac Risk Factors," National Teaching Institute and Critical Care Exposition 2012, Orlando, FL, May 2012.

Nancy Brooks: "Autism: A Family Diagnosis," American Academy of Nurse Practitioners 27th National Conference, Orlando, FL, June 2012.

Mary Ann Champagne: "Complex Cases in Dyslipidemia," Preventive Cardiovascular Nurses Association National Symposium, Washington, DC, April 2012.

Garrett Chan: "Palliative Care in the ED," Webinar, Institute of Healthcare Improvement, May 2012.

Garrett Chan: "Role Differentiation Among the NP, CNS, and PA," 13th International Conference on Advanced Practice, Sapporo, Japan, October 2012.

Ling Chen: "OR Nursing Excellence-My Personal Journey," Endovascular Conference, Shanghai, China, October 2012.

Laura Cole: "Early Implementation-BMT Patient Education," Research Days 2012, South San Francisco, CA, October 2012.

Lynn Ellison: "Moving Mobilization Chemotherapy from the Inpatient to Outpatient Setting," American Society for Blood and Marrow Transplant, Salt Lake City, UT, February 2013.

Darlene Frie: "Heart Failure Phone Call Follow-Up," Endovascular Conference, Shanghai, China, October 2012.

Lori Guelman: "The Bladder Pacemaker: Nerve Stimulation for the Overactive Bladder," California Association for Nurse Practitioners Annual Conference, Palm Desert, CA, March 2012.

Lisa Guertin: "Patients in Crisis: Managing Left Ventricular Assistive Device (LVAD)," Santa Clara Emergency Medical Services Annual Conference, Santa Clara, CA, May 2012.

Patricia Jenkins: "2012 BMT ICU Utilization Project Update," American Society for Blood and Marrow Transplant, Salt Lake City, UT, February 2013.

Carole Kulik-Lewis: "Advancing Advanced Practice in the Acute Care Setting," International Nurse Practitioner/Advanced Practice Nursing Network Conference, London, England, August 2012.

Myra Lang: "Leveraging SHC Skylight TV for Nursing Education," Skylight National Client Conference, San Diego, CA, November 2012.

Theresa Latchford: "Cost of the Blood Draw," American Society for Blood and Marrow Transplant, Salt Lake City, UT, February 2013.

Chris Lewis: "Does Offering Pre-procedure Cath Angio Patients a Choice in their Care Regarding Mobility Improve Patient Satisfaction and Decrease Pain?" Research Days 2012, South San Francisco, CA, October 2012.

Janette Moreno: "Use of Simulation in Reducing Sepsis Mortality," BEACON Patient Safety First Collaborative Education, Fresno, CA, March 2012.

Nadine Nakazawa: "Use of Intravascular ECG and IV Doppler for Catheter Placement," 2nd World Congress on Vascular Access, Amsterdam, The Netherlands, June 2012.

May Nejedly: "Anxiety, Depression, and Coping Strategies in Patients Presenting to a Women's Heart Health Clinic," Preventive Cardiovascular Nurses Association National Symposium, Washington, DC, April 2012.

Camille Washowich: "Understanding ILD and CT Analysis," California Association for Nurse Practitioners, Monterey, CA March 2013.

Michelle Woodfall: "Management of Traumatic Brain Injury," AACN Conference, South Bay Chapter, Santa Clara, CA, August 2012.

Laura Zitella: "Anemia," Oncology Nursing Society Conference, Dallas, TX, December 2012.



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