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We are in a time of growth and transformation at the Vanderbilt University School of Medicine’s Department of Anesthesiology. The Department is vibrant and strong, and we are well prepared to face the challenges that the changing healthcare economy will surely place before us.

The Department is excelling in all areas of our three-fold mission:
- Practicing excellent perioperative medicine
- Providing top-notch education for our medical students, residents and fellows
- Conducting cutting-edge basic, translational and clinical research

We have one of the largest clinical programs in the country, providing on-demand coverage for more than 90,000 adult and pediatric anesthetic encounters annually at more than 90 anesthetizing locations. We cover critical care, pain management and all perioperative anesthesia needs. Vanderbilt University Hospital is the region’s only Level I Trauma Center. Additionally, we have an active high-risk obstetrics program, a busy Transplant Center, and the region’s largest pediatric referral hospital.

Responding to demand for ambulatory procedures, we added off-site service locations by taking over anesthesia services at Vanderbilt Bone & Joint in 2011. Moreover, we expanded our regional anesthesia services, pulling increasingly complex procedures out of the inpatient OR and into the outpatient setting. We have also consolidated our Pain Medicine services in order to provide consistent, comprehensive care for both acute and chronic pain.

Our commitment to patient safety was strengthened with the 2011 formation of the Center for Research and Innovation in Systems Safety (CRiSS) which conducts basic and applied research in healthcare informatics, patient safety and clinical quality, and designs and evaluates informatics user interfaces, care processes and medical technology across VUMC. This center has been awarded a two-year, $750,000 grant from the Patient Centered Outcomes Research Institute (PCORI), one of the first grants awarded by the nonprofit institute established by the Patient Protection and Affordable Care Act of 2010. In 2011, we also formed the Perioperative Data Systems Research (PDSR) group to leverage our wealth of patient data, with the goal of generating valuable research activities.

During the 2011-2012 academic year, our faculty produced more than 160 publications, including seven books and 22 book chapters. At the 2012 Annual Meeting of the American Society of Anesthesiologists, department members contributed 144 entries, including oral presentations, medically challenging cases, poster presentations, problem-based learning discussions, workshops, panel discussions and refresher courses. The Department’s researchers organized, led or presented at a dozen national or international meetings in 2012.

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international leaders in perioperative informatics, and as healthcare reforms promise increased accountability and efficiency, our sophisticated systems provide a unique competitive advantage.

Our educational programs continue to excel. In the 2012 National Residency Match, the Department received 848 applications for 15 positions. After interviewing 116 outstanding medical students, the program successfully filled all positions from the top 43 students on its Match list, including six of the top ten. We provide one-on-one faculty instruction and mentorship, and deep offerings in didactic education with grand rounds, case discussions, lectures, journal clubs, and visiting professorships from our top colleagues across the country.

We nurture enterprising young researchers through the innovative JBI Scholars Program, and we support seasoned research veterans who mentor developing researchers and generate significant extramural research funding. In 2012, the Department’s investigators brought in more than $4.5 million in new extramural research funding from NIH and other sources, and the Department now boasts more than $8.5 million in active research grants. The Department also makes a major investment in protected academic time for its faculty, and the Department’s Perioperative Clinical Research Institute provides complete support for clinical and informatics research activities.

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The Vanderbilt Department of Anesthesiology was one of the first independent departments of anesthesiology in the United States, established on December 12, 1945. After observing that the battlefield-wounded of World War II were more likely to survive if they received immediate, skilled anesthesia care, Vanderbilt physicians advocated that anesthesia be established as an autonomous department. At that time, few medical schools possessed an academic anesthesiology service of any type.

This tradition of pioneering in our specialty continues today. Our exemplary faculty provide top-quality clinical services for a full spectrum of medical specialties. Vanderbilt Anesthesiology is recognized as an innovator in perioperative management, healthcare information technology and scientific discovery. We also have high-caliber basic science and clinical research teams pursuing fundamental and translational knowledge to directly improve patient safety and care.

Vanderbilt Anesthesiology is also:
- a national leader in developing and applying new technologies – often developed in-house by our own physicians and research personnel – to improve the effectiveness and safety of perioperative patient care.
- well-represented on the editorial boards of major anesthesia journals
- highly represented as educators at the Annual Meeting of the American Society of Anesthesiologists and national anesthesiology, critical care and pain medicine subspecialty conferences
- home to a number of NIH-funded principal investigators and eight Board Examiners for the oral exams of the American Board of Anesthesiology.

In addition to our Department’s achievements, recent accolades for Vanderbilt’s medical program are many:
- In 2012, Vanderbilt University Medical Center (VUMC) was recognized for the 13th consecutive year as one of the top 100 hospitals in the country in a study by Thomson Reuters Healthcare.
- Becker’s Hospital Review named VUMC one of America’s 100 Best Hospitals in rankings released in March 2012.
- Monroe Carell Jr. Children’s Hospital at Vanderbilt is included among the nation’s leaders in pediatric health care in U.S. News & World Report magazine’s Best Children’s Hospitals rankings. The hospital achieved rankings in 10 out of 10 pediatric specialty programs.
- VUMC is one of the top medical schools for National Institutes of Health funding, receiving more than $286 million for research initiatives for fiscal year 2012.
- For the eighth consecutive year, VUMC was named one of the nation’s top 100 “Most Wired” hospitals and health systems for its innovative efforts in medical technology, according to the 2012 Most Wired Survey and Benchmarking Study conducted by Hospitals and Health Networks magazine.
- VUMC has been named the top hospital in Tennessee and the top health care provider in the Metro Nashville region according to U.S. News & World Report’s 2012-2013 Best Hospitals edition.
- Vanderbilt University Hospital was ranked among the nation’s 99 Leapfrog Top Hospitals for 2012. Vanderbilt University Hospital also earned an “A” Hospital Safety Score in July 2012 from the Leapfrog Group, placing VUH among the safest hospitals in the nation.
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To support clinicians in their pursuit of excellent patient care, we have redoubled our development of cutting-edge perioperative information systems. We continue to refine and deploy our internally-developed OR Vigilance™ and Vigilant™ applications. These applications provide increased transparency and situational awareness for clinicians by making data visible and pushing it – literally – to the clinician’s hand. We have used these applications to implement quality improvement projects which have brought rebates to the department from the Vanderbilt Self Insurance Trust. More importantly, the automated process monitoring and process control systems developed at Vanderbilt have contributed materially to improving patient outcomes by, for example, reducing wound infection rates and 14-day readmission rates. We are international leaders in perioperative informatics, and as healthcare reform promise increased accountability and efficiency, our sophisticated systems provide a unique competitive advantage.

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  o well-represented on the editorial boards of major anesthesia journals
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Endowments Support Special Lectureships & Awards

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“We are very appreciative of our many donors who support our Department,” said Chairman Warren Sandberg, MD, PhD. “Through these gifts we are able to establish and strengthen programs; support innovative research endeavors; and advance the education and continued betterment of our faculty, staff and students.”

In 2012, Peter Marhofer, MD, Director of Paediatric Anaesthesia and Professor, Anaesthesia and Intensive Care Medicine, at the Medical University of Vienna, Vienna, Austria presented a well-received Grand Rounds lecture on “Regional Anaesthesia in Children: Implications on Perioperative Outcome.”

Past Phythyon Lectureship speakers include: Dean Andropoulos, MD, MHCIM, Chief of Anesthesiology at Texas Children’s Hospital; Shobha Malviya, MD, of The University of Michigan Health System; Philip Morgan, MD, of the University of Washington and Seattle Children’s Hospital; Francis X. McGowan Jr., MD, of the Children’s Hospital Boston; Peter Davis, MD, of the Children’s Hospital of Pittsburgh; and Myron Yaster, MD, of Johns Hopkins University School of Medicine.

Members of Dr. James Phythyon’s family attend the annual lecture named in his honor. Shown here are members of the Phythyon family with Department of Anesthesiology faculty and the 2012 guest lecturer Peter Marhofer, MD.

Dr. James Phythyon Endowed Lectureship in Pediatric Anesthesiology

For the past seven years, the Dr. James Phythyon Endowed Lectureship in Pediatric Anesthesiology has brought renowned experts in the field to Vanderbilt’s campus as visiting professors. At a special Grand Rounds lecture, these experts share their research findings and expertise with the department. During their visit, the speakers also meet with residents and fellows for small group teaching sessions and informal discussions. The lectureship was established by the family of Dr. James Phythyon, a founding member of VUMC’s Pediatric Anesthesia Division. Dr. Phythyon’s widow, Mrs. Martin Sanders, and the couple’s daughters, Mary Neal Meador, Elizabeth Donner and Sarah Miller, are strong supporters of the department. Each year, they attend the lecture and other events in honor of Dr. Phythyon.

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Dr. Charles Beattie Endowed Lectureship

Established in 1998, the Dr. Charles Beattie Endowed Lectureship has brought internationally recognized experts in anesthesiology to Vanderbilt. Past speakers for this special lectureship include: Peter McDermott, MD, PhD, past president of the American Society of Anesthesiologists; and Joseph Gerald “Jery” Reyes, MD, Dean of the College of Medicine at the Medical University of South Carolina (MUSC).

The fund is used to present an annual award to the anesthesiology resident who demonstrates the best overall performance in pediatric anesthesiology. In 2012, Korie Vakay, MD, was the recipient of the Dila Vuksanaj Award. Past recipients include: Justin Sandall, DO; and Elizabeth Lee, MD.

Dr. Bradley E. Smith Endowed Lectureship on Medical Professionalism

Throughout his more than four decades of practice and leadership, former Anesthesiology Department Chairman Bradley E. Smith, MD, defined what it means to be a true professional, and in 2009 a lectureship on medical professionalism was established in his name by then department chairman Michael Higgins, MD. The goal of the lectureship is to reflect on the characteristics, responsibilities, and rewards of professionalism as applied to the practice of anesthesiology.

Past speakers for this special lectureship include: Peter McDermott, MD, PhD, past president of the American Society of Anesthesiologists; and Joseph Gerald “Jery” Reyes, MD, Dean of the College of Medicine at the Medical University of South Carolina (MUSC).

The 2012 guest speaker for the Smith Endowed Lectureship on Medical Professionalism was William D. Owens, MD, seen here with Bradley E. Smith, MD, far left, and Department Chairman Warren Sandberg, MD, PhD.

William D. Owens, MD, was the guest speaker in 2012. Dr. Owens practiced anesthesiology for nearly 40 years and served as president of the American Society of Anesthesiologists (ASA) in 1998, representing the specialty at medical schools and conferences across the U.S. In 2004, he received the ASA Distinguished Service Award, the highest honor awarded by the organization.

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Dr. Charles Beattie Endowed Lectureship

Established in 2011 by the current Chairman, this lectureship honors Charles Beattie, MD, the fourth Chair of the department. “Dr. Beattie was many things to the many people who knew him,” said Dr. Sandberg. “He was at once a great humanist, a color- ful character, and an early and forceful driver in the creation of what we now call ‘systems-based practice,’ the core competency which we exercise to create robust systems to assure that all patients receive consistent, safe, outstanding care in an environment that naturally performs well.”

Dr. Beattie came to anesthesiology after first becoming a nuclear power engineer. This background surely informed and motivated his passions in anesthesiology. The lectureship is intended to bring innovators in anesthesia from unique backgrounds and compelling world views to Vanderbilt as Visiting Professors.

Charles Beattie, MD
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Lectureship in Pediatric Anesthesiology has brought renowned experts in the field to Vanderbilt’s campus as visiting professors.

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In 2010 to recognize and encourage progress in pain management. In 2012, 2010 to recognize and encourage progress in pain management.

Sandidge Pediatric Pain Management Endowed Fund

Retired Vanderbilt anesthesiologist Paula C. Sandidge, MD, created The Sandidge Pediatric Pain Management Endowed Fund to encourage and provide resources in the area of pain management for children.

In 2010 to recognize and encourage progress in pain management for children. Anesthesiologist for 30 years, Dr. Sandidge recognized how lacking her early training had been in controlling pain for the youngest of patients when her grandson was born with a painful form of osteogenesis imperfecta. He lived just one day, but Sandidge realized then that pain control provided infants something irreplaceable: the opportunity to be held comfortaby by the people who love them for the few precious moments they have.

Recipient of the Sandidge Pediatric Pain Management Award include Stephen Hays, MD, FAAP, Associate Professor of Anesthesiology & Pediatrics and Director of Pediatric Pain Services; and Twila Luckett, BSN, RN-BC.

Dila Vuksanaj Memorial Fund for Resident Education

Past speakers for this special lectureship include: Peter McDermott, MD, PhD, past president of the American Society of Anesthesiologists and Joseph Gerald “Jerry” Reves, MD, dean of the College of Medicine at the University of South Carolina (MUSC).

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Dr. Daniel Beattie was a national leader in the development of anesthesiology subspecialties, and was a cofounder of the Society for Obstetric Anesthesia and Perinatology (SOAP), as well as the Society for Technology in Anesthesia (STA). He also represented the state of Tennessee on the ASA Board of Directors for many years.

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As chair of the Department for nearly 25 years, Dr. Smith was a national leader in the development of anesthesiology subspecialties, and was a cofounder of the Society for Obstetric Anesthesia and Perinatology (SOAP), as well as the Society for Technology in Anesthesia (STA). He also represented the state of Tennessee on the ASA Board of Directors for many years.

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The Office of Educational Affairs for the Vanderbilt Department of Anesthesiology supports and oversees the full continuum of education related to anesthesiology and perioperative medicine, which includes undergraduate medical education for medical students, graduate medical education for residents and fellows, and continuing education for faculty and advanced practice nurses. The extensive education and training programs offered by the Department of Anesthesiology integrate scientific and clinical advances with current clinical practice to prepare medical students, residents, fellows, nurses and faculty for productive careers as clinicians, academicians, and scientists.

A major factor in attracting residents, fellows and faculty is the department’s extensive research opportunities, in particular the BH Robbins Scholars program, which offers one-on-one mentorship and collaboration for young physician-scientists preparing for careers as academic anesthesiologists.

“Vanderbilt offers a comprehensive clinical experience that spans the breadth of clinical anesthesia and perioperative medicine, and it does this in the context of one institution,” said John Algren, MD, Vice-Chair for Educational Affairs. “We offer the full scope of training experiences, as well as opportunities for academic development at the fields of research, education, medical informatics and leadership.”

The Office of Educational Affairs is led by Matthew McEvoy, MD, and includes Associate Director Susan L. Eason; Associate Program Director Michael Pilla, MD; Student Clerkship Director Amy Robertson, MD; and four administrative staff members.

Residents

The Department’s fully accredited residency program is highly sought after by the nation’s top medical students. Proof of this is in the numbers: In the 2012 National Residency Match, the Department received 8,484 applications for 15 positions. After interviewing 116 outstanding medical students, the program successfully filled all 15 positions from the top 43 students on its Match list, including six of the top 10.

The National Residency Matching Program Report continues to rank Vanderbilt’s program in the top quartile of all U.S. anesthesia residency programs for key quality indicators: number of positions offered and recruiting efficiency, AOA membership (53%), mean USMLE Step 1 score (240) and mean USMLE Step 2 score (251).

Vanderbilt Anesthesiology’s four-year residency program currently enrolls 15 resident physicians per year of training. Our physician educators are nationally and internationally recognized as leaders in their fields, and the Department successfully supports residents interested in academic anesthesia so they can develop careers focused on advancing knowledge in the specialty. The Department typically has 25-30 residents who present original research and fellow benefit from in-depth training in all subspecialty disciplines of clinical anesthesia, critical care, and pain management. An additional draw is the Vanderbilt International Anesthesia (VIA) rotation, which provides a month-long global health experience to an average of eight residents and fellows every year. Trainees are also attracted by the department’s extensive research opportunities, in particular the BH Robbins Scholars program, which offers one-on-one mentorship and collaboration for young physician-scientists preparing for careers as academic anesthesiologists.

Most of the top 10. The National Residency Matching Program Report

The residency program includes the following clinical experiences:

- Categorical anesthesiology internship
- Fundamentals of Anesthesia Care
- Perioperative patient management
- Regional anesthesia, acute pain management, and chronic pain management
- Multidisciplinary Critical Care
- Comprehensive experiences in anesthesiology subspecialties including:
  - Anesthesia for General Surgery
  - Anesthesia for Orthopedic Surgery
  - Anesthesia for Urologic Surgery
  - Anesthesia for Gynecologic Surgery
  - Anesthesia for Plastic & Burns Surgery
  - Anesthesia for Endocrine Surgery
  - Anesthesia for ENT & Ophthalmologic Surgery
  - Transplantation Anesthesia
  - Cardiac Anesthesia
  - Vascular/Thoracic Anesthesia
  - Pediatric Anesthesia
  - Pediatric Cardiac Anesthesia
  - Ambulatory Anesthesia
  - Obstetric Anesthesia
  - Neuroanesthesia
- Intensive care units
- Pain management
- Critical care
- Cardiac anesthesia
- Vascular anesthesia
- Pediatric anesthesia
- Obstetric anesthesia
- Neuroanesthesia

Fellows

Building from the Department’s strength in subspecialties, six clinical fellowships, as well as a research fellowship, are offered to individuals seeking advanced academic and clinical training. The following clinical fellowships are offered at Vanderbilt:

- Adult Cardiothoracic Anesthesia
- Anesthesiology-Critical Care Medicine
- Obstetric Anesthesia
- Pediatric Critical Care Medicine
- Pain Medicine & - Fear fellows
- Pediatric Anesthesia
- Regional Anesthesia

Advanced Practice Nurses

The Department of Anesthesiology Division of Critical Care Medicine has a unique partnership with the Vanderbilt University School of Nursing to offer an Acute Care Nurse Practitioner (ACNP)

The Department’s educational program for residents, as well as fellows, consists of a combination of comprehensive didactic conferences, mentored clinical training, simulation training and self-study. On average, Vanderbilt Anesthesiology residents have scored at the 70th percentile on standardized examinations when compared to the national cohort. The ACGME core competencies - patient care, medical knowledge, interpersonal and communication skills, professionalism, practice based learning, and systems-based practice - form a framework through weekly and monthly simulation sessions and weekly clinical case conferences taught jointly by members of both departments. Additional partnership programs between the Department of Anesthesiology and the School of Nursing are being planned. Vanderbilt University Medical Center, one of the largest employers of nurse practitioners in the country, and the Department of Obstetrics and Gynecology provide opportunities for clinical education in anesthesiology and perioperative medicine. Fellows and nurse anesthetists participate in approximately 7,000 anesthetics per year while on Vanderbilt rotations. In addition, the on-campus training is coordinated by the Department of Anesthesiology.

Nurse Anesthetists

More than 100 Certified Registered Nurse Anesthetists are employed at Vanderbilt, and the Department of Anesthesiology supports their continuing education with recurring education programs, including Residency Review Committee for Pain Medicine and Addiction Conferences. In addition, Vanderbilt is a primary clinical affiliate of the Middle Tennessee School of Anesthesia (MTSA) in Madison, Tennessee, and of the Union University Nurse Anesthesia program in Jackson, Tennessee. Student nurse anesthetists participate in approximately 7,000 anesthetics per year while on Vanderbilt rotations. In addition, the on-campus training is coordinated by the Department of Anesthesiology.

Continuing Medical Education

The Office of Educational Affairs oversees a full calendar of continuing medical education opportunities for faculty, residents, fellows, nurse anesthetists and nurse practitioners. Some examples are weekly Grand Rounds which feature leading experts from throughout the world, Mortality, Morbidity & Improvement Conferences (MM& I) which focus on recent cases with the goal of improving patient care; Faculty Development Seminars which provide targeted training for professional development; and Combined Integrative Health and Pain Medicine Quarterly Rounds, which focus on issues related to the management and treatment of pain.

Awarding Excellence

The Department recognizes excellence in both its trainees and faculty members. Outstanding performance by residents is recognized through annual Clinical Excellence Awards and exceptional performance in teaching is recognized through the annual presentation of Golden Apple Awards and the Volker I. Striepe Award for Outstanding Teaching.
Office of Educational Affairs

The Office of Educational Affairs for the Vanderbilt Department of Anesthesiology supports and oversees the full continuum of education related to anesthesiology and perioperative medicine, which includes undergraduate medical education for medical students, graduate medical education for residents and fellows, and continuing education for faculty and advanced practice nurses. The office’s educational and training programs offered by the Department of Anesthesiology integrate scientific and clinical advances with current clinical practice to prepare medical students, residents, fellows, nurses and faculty for productive careers as clinicians, academicians, and scientists.

A major factor in attracting residents, fellows and faculty is the strength of the Department’s subspecialties, and residents and fellows benefit from in-depth training in all subspecialty disciplines of clinical anesthesiology, critical care, and pain management. An additional draw is the Vanderbilt International Anesthesia (VIA) rotation, which provides a month-long global health experience to an average of eight residents and fellows each year. Trainees are also attracted by the department’s extensive research opportunities, in particular the BH Robbins Scholars program, which offers one-on-one mentorship and collaboration for young physician-scientists preparing for careers as academic anesthesiologists.

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Vanderbilt Anesthesiology’s four year residency program currently enrolls 15 resident physicians per year of training. Our physician educators are nationally and internationally recognized as leaders in their fields, and the Department successfully supports residents interested in academic anesthesiology so they can develop careers focused on advancing knowledge in the specialty. The Department typically has 25-30 residents who present original research and overview of challenging cases at national meetings every year, a clear indication that the Department’s educational programs are creating physician-scholars who are prepared for both medical practice and scientific investigation.

The Department’s educational program for residents, as well as fellows, consists of a combination of comprehensive didactic conferences, mentored clinical training, simulation training and self study. On average, Vanderbilt Anesthesiology residents have scored at the 70th percentile on standardized examinations when compared to the national cohort. The ACGME core competencies - patient care, medical knowledge, interpersonal and communication skills, professionalism, practice based learning, and systems-based practice - form a framework for the program. Simulation training features prominently in the cognitive, procedural and teamwork aspects of anesthesiology education, and Vanderbilt University School of Medicine’s Center for Experiential Learning and Assessment is a nationally renowned on-campus resource for this training.

The residency program includes the following clinical experiences:

- **Categorical anesthesiology internship**
- **Fundamentals of Anesthesia Care**
- **Perioperative patient management**
- **Regional anesthesia, acute pain management, and chronic pain management**
- **Multidisciplinary Critical Care**
- **Comprehensive experiences in anesthesia subspecialties including:**
  - Anesthesia for General Surgery
  - Anesthesia for Orthopedic Surgery
  - Anesthesia for Urologic Surgery
  - Anesthesia for Gynecological Surgery
  - Anesthesia for Plastic & Burns Surgery
  - Anesthesia for Endocrine Surgery
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  - Transplantation Anesthesia
  - Cardiovascular Anesthesia
  - Vascular/Thoracic Anesthesia
  - Pediatric Anesthesia
  - Pediatric Cardiac Anesthesia
  - Ambulatory Anesthesia
  - Obstetric Anesthesia
  - Neuroanesthesia

Fellows

Building from the Department’s strength in subspecialties, six clinical fellowships, as well as a research fellowship, are offered to individuals seeking advanced focused training. The following clinical fellowships are offered at Vanderbilt:

- **Adult Cardiac Anesthesiology**
- **Critical Care Medicine**
- **Obstetric Anesthesiology**
- **Pain Medicine**
- **Pediatric Anesthesiology**
- **Regional Anesthesiology**

Advanced Practice Nurses

The Department of Anesthesiology Division of Critical Care Medicine has a unique partnership with the Vanderbilt University School of Nursing to offer an Acute Care Nurse Practitioner (ACNP) program. The program draws as part of the ACNP master’s program. The program combines the didactic training of the VUSN ACNP program with supplemental specialty lectures in critical care medicine. Students perform their clinical rotations in seven of the Vanderbilt and Veteran’s Administration ICUs. Students also receive additional exposure to ICU medicine through twice monthly simulation sessions and weekly clinical case conferences taught jointly by members of both faculties. Additional partnership programs between the Department of Anesthesiology and the School of Nursing are being planned. Vanderbilt University Medical Center, one of the largest employers of nurse practitioners in the country, and the Department of Anesthesiology Division of Critical Care Medicine now have 35 Acute Care Nurse Practitioners on staff who provide highly skilled treatment in intensive care settings.

Nurse Anesthetists

More than 100 Certified Registered Nurse Anesthetists are employed at Vanderbilt, and the Department of Anesthesiology supports their continuing education with recurring education programs, including Residency and Fellowship End of Year Conferences. In addition, Vanderbilt is a primary clinical affiliate of the Middle Tennessee School of Anesthesia (MTSA) in Madison, Tennessee, and of the Union University Nurse Anesthesia program in Jackson, Tennessee. Student nurse anesthetists participate in approximately 7,000 anesthetics per year while on Vanderbilt rotations. All on-campus training is coordinated by the Department of Anesthesiology.

Continuing Medical Education

The Office of Educational Affairs oversees a full calendar of continuing medical education opportunities for faculty, residents, fellows, nurse anesthetists and nurse practitioners. Some examples are weekly Grand Rounds which feature leading experts from throughout the world; Mortality, Morbidity & Improvement Conferences (MM&I) which focus on recent cases with the goal of improving patient care; Faculty Development Seminars which provide targeted training for professional development; and Combined Integrative Health and Pain Medicine Quarterly Rounds, which focus on issues related to the management and treatment of pain.

Awarding Excellence

The Department recognizes excellence in both its trainees and faculty members. Outstanding performance by residents is recognized through annual Clinical Excellence Awards and exceptional performance in teaching is recognized through the annual presentation of Golden Apple Awards and the Volker J. Stippe Award for Outstanding Teaching.
The Vanderbilt Department of Anesthesiology provides a full calendar of educational opportunities for anesthesiologists and other medical professionals. Our medical education offerings include:

For Medical Students

Critical Care Skills Week: Weekly, quarterly workshop for third-year medical students to prepare them to recognize and manage critical problems in clinical practice. Training includes hands-on simulation education at Vanderbilt’s Center for Experiential Learning and Assessment (CELA).

Surgery Clerkship Selective: This rotation provides a hands-on, continually monitored and mentored experience. Students become an integral part of an anesthesia care team and participate in perioperative management of adult patients presenting for surgical, diagnostic, or therapeutic interventions. Students participate in preoperative assessment, risk stratification, anesthetic planning and conduct of anesthesia, airway management, and postoperative planning and care of patients.

Introduction to Anesthesia: This rotation provides a hands-on, continually monitored and mentored experience. Students become an integral part of an anesthesia care team and participate in perioperative management of adult patients presenting for surgical, diagnostic, or therapeutic interventions. Students participate in preoperative assessment, risk stratification, anesthetic planning and conduct of anesthesia, airway management, and postoperative planning and care of patients.

Perioperative Medicine Immersion Courses: This 4-week course emphasizes perioperative medicine as a continuum of care with application of both basic science and clinical knowledge. From a variety of rotation experiences, basic science topics are applied to specific disease processes, clinical decision making, and perioperative outcomes. Emphasis is placed upon the importance of the collaboration of care with medical specialists and healthcare team members to achieve optimal patient outcomes.

Senior Anesthesia Elective: Four-week elective for fourth-year medical students providing a multidisciplinary experience in Anesthesiology so that all students rotate through the following venues: Adult anesthesiology at VUH and/or VA; Cardiothoracic Anesthesia; Pediatric Anesthesia; OB Anesthesia; Neuro ICU/SICU/ICU; Acute Pain Service. In addition, students participate in departmental lectures for residents, Grand Rounds, and MM&M Conferences.

For Interns

Boot Camp: Workshops held during orientation, as well as periodically throughout the year, focusing on developing specialized skill sets essential to anesthesia and perioperative care.

Intern Conferences: Introduction to Anesthesia Seminars, Matrix Seminars, practice-improvement discussions, organized using the Healthcare Matrix, and Basics of Anesthesia lectures.

For Residents

Fundamentals of Anesthesia: Daily conferences for CA-1 residents on fundamental concepts and principles of anesthesiology.

Subspecialty Conferences: Conferences coordinated by individual divisions of the department, including Pediatric, Obstetric, Cardiothoracic, Critical Care Medicine, and Multispecialty Adult Anesthesiology.

Senior Seminars: Seminar series for senior residents focused on problem-based learning and preparation for Oral Exams.

Professional Development Conferences: Resident conferences focused on elements of subspecialty selection, career paths, and business practices related to perioperative anesthesia.

For All

Journal Clubs: Informal meetings in which current medical articles pertaining to the specialty are summarized and reviewed. Journal Clubs are held by specific divisions of the department, including Multispecialty, Pediatric, Cardiothoracic, Critical Care and Pain Medicine.

Academic Development Conferences: For fellows, residents and faculty on topics related to educational theory and practical aspects of classroom and clinical teaching, mentorship, etc.

Grand Rounds: Formal, weekly lectures featuring recognized experts in the field of anesthesiology, perioperative medicine or pain medicine.

Mortality, Morbidity & Improvement Conferences: Monthly conferences focused on case studies with the goal of improving patient care. Each quarter, Perioperative MM&M Conferences also include surgical specialties and nursing services to better facilitate the exploration of cases and the exchange of ideas.

Special Courses

Fundamentals of Critical Care Support (FCCS): Multidisciplinary two-day comprehensive course addressing fundamental management principles for the first 24 hours of critical care. This course is sponsored by the Society of Critical Care Medicine. The course is directed by members of the Anesthesiology Department’s Division of Anesthesiology Critical Care Medicine and includes instructors from multiple specialties at Vanderbilt University Medical School.

Simulation Education Provides Invaluable Lessons

Simulation education is a virtual approach to training physicians and other medical providers in the management of complex clinical cases and challenging situations, especially those they might not encounter on a regular basis in the clinical setting. The Vanderbilt University School of Medicine has a remarkable on-campus resource for medical simulation training, the Center for Experiential Learning and Assessment (CELA), and our Anesthesiology Department faculty are national leaders in providing simulation training in anesthesiology airway management, critical care, perioperative management and transesophageal echocardiogram procedures.

CELA, which opened in 2007, is an 11,000-square-foot facility that is home to both the Program in Human Simulation and the Simulation Technologies Program. The center offers advanced simulation technologies, including computerized mannequins that can reproduce both routine and critical clinical situations. One floor of the facility includes flexible space that triples as a six-bed emergency department, a four-bed intensive care unit, or a couple of operating rooms — all monitored by computer-controlled audio/video equipment.

In May 2009, the Vanderbilt Simulation Technologies Program, under the direction of Matthew B. Weinger, MD, was endorsed by the American Society of Anesthesiologists (ASA) as one of about 30 centers in the nation officially approved to deliver certified educational programs. Anesthesiologists can receive Continuing Medical Education (CME) simulation training at CELA that qualifies for American Board of Anesthesiology Maintenance of Certification in Anesthesiology (MOCA®) credit.

Combined Integrative Health and Pain Medicine Quarterly Rounds: Quarterly day-long course for anesthesia faculty, as well as integrative health services providers, including rehabilitation physicians, physical therapists, psychiatrists, and others involved in treatment and management of pain.

Maintenance of Certification in Anesthesiology (MOCA®) Simulation Courses: The Anesthesiology Department, in partnership with the Center for Experiential Learning and Assessment (CELA) at Vanderbilt, offers patient simulation education for ABA Diplomates seeking to fulfill their Practice Performance Assessment and Improvement (PPI) requirement for the American Board of Anesthesiologists (ABA) Maintenance of Certification in Anesthesiology (MOCA®) Program. Endorsed by the American Society of Anesthesiologists’ (ASA) Committee on Simulation Education.

For more information, visit www.vanderbilt.edu/cepa.
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**Fundamentals of Anesthesia:** Daily conferences for CA-1 residents on fundamental concepts and principles of anesthesiology.

**Subspecialty Conferences:** Conferences coordinated by individual divisions of the department, including Obstetrics, Otolaryngology, Cardiothoracic Anesthesia, Pediatric Anesthesiology, and Multispecialty Anesthesiology.

**Senior Seminars:** Seminar series for senior residents focused on problem-based learning and preparation for Oral Exams.

**Professional Development Conferences:** Resident conferences focused on elements of subspecialty selection, career paths, and business practices related to perioperative anesthesiology.

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CELA, which opened in 2007, is an 11,000-square-foot facility that is home to both the Program in Human Simulation and the Simulation Technologies Program. The center offers advanced simulation technologies, including computerized mannequins that can reproduce both routine and clinical critical situations. One floor of the facility includes flexible space that triples as a six-bed emergency department, a four-bed intensive care unit, or a couple of operating rooms — all monitored by computer-controlled audio/video equipment.

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## Educational Courses and Conferences

### Critical Care Week: Weeklong, quarterly workshop for third-year medical students to prepare them to recognize and manage critical problems in clinical practice. Training includes hands-on simulation education at Vanderbilt’s Center for Experiential Learning and Assessment (CELA).

### Surgery Clerkship Selective: This rotation provides a hands-on, continually monitored and mentored experience. Students become an integral part of an anesthesia care team and participate in perioperative management of adult patients presenting for surgical, diagnostic, or therapeutic interventions. Students participate in preoperative assessment, risk stratification, anesthetic planning and conduct of anesthesia, airway management, and postoperative planning and care of patients.

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#### Combined Integrative Health and Pain Medicine Quarterly Rounds: Quarterly day-long course for anesthesia faculty, as well as integrative health services providers, including rehabilitation physicians, physical therapists, psychiatrists, and others involved in treatment and management of pain.

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### Maintenance of Certification in Anesthesiology (MOCA®)

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#### Combined Integrative Health and Pain Medicine Quarterly Rounds: Quarterly day-long course for anesthesia faculty, as well as integrative health services providers, including rehabilitation physicians, physical therapists, psychiatrists, and others involved in treatment and management of pain.
For young scholars, building critical academic research skills under the mentorship of established scientists makes them strong future investigators. With this goal, the Benjamin Howard Robbins Scholars Program began in 2007. The program is named in honor of the Vanderbilt Anesthesiology Department’s first chairman, a renowned physician-scientist. The BH Robbins Scholars Program is multidisciplinary, encouraging and supporting mentorships and collaborations that extend far beyond the traditional boundaries of anesthesia.

“This program provides a unique mentored research experience for young scholars that culminates in a two-year multidisciplinary fellowship, with at least one year devoted to research,” said Department Chair Warren Sandberg, MD, PhD. “Our Robbins Scholars benefit from one-on-one mentorship, a wealth of research and educational resources, protected research time, and a stipend during their residency and fellowship.”

The BH Robbins Scholars program is co-directed by Jerold Denton, PhD, and Pratik Pandharipande, MD. Following is an update on current Scholars’ progress and many achievements.

**Thomas Austin, MD,** has published three articles as a result of his research during his BH Robbins fellowship:


Dr. Austin presented his work on the inhibition of KCC2 in mouse spinal cord neurons at the Association of University Anesthesiologists national meeting in 2011 and won the Association’s resident travel award. This abstract was also presented at the American Society of Anesthesiologists 2011 Annual Meeting, where Dr. Austin won the USA Residents’ Research Award. In 2012, Dr. Austin was awarded a two-year, $175,000 Foundation for Anesthesia Education and Research (FAER) Mentored Research Training Grant for his project, “The Role of Endothelial Dysfunction in Intensive Care Unit Delirium and Long-term Cognitive Impairment.” Dr. Hughes has published several original research articles during his BH Robbins Fellowship including:


- Post-shunt hemochromatosis leading to cardiogenic shock in a patient presenting for orthotopic liver transplant: a case report.

Dr. Hughes has a two-year Foundation for Anesthesia Education and Research (FAER) Mentored Research Grant for his project, “The Role of Endothelial Dysfunction in Intensive Care Unit Delirium and Long-term Cognitive Impairment.” Dr. Hughes has published several original research manuscripts during his BH Robbins Fellowship including:


- Post-shunt hemochromatosis leading to cardiogenic shock in a patient presenting for orthotopic liver transplant: a case report.

Additionally, Dr. Hughes has co-authored two book chapters, the first with Drs. Stuart McGrane and Pratik Pandharipande on “Management of Sedation, Analgesia and Delirium in Anesthetic Pharmacology: Basic Principles and Clinical Practice.” 2nd Edition Cambridge University Press 2011. Editors Alex Evers, Mervyn Maze and Evan Kharasch. The second chapter book was written with Drs. Pandharipande and Dr. Wes Ely on “Management of Pain, Anxiety and Delirium” in Textbook of Critical Care. 6th Edition Saunders 2011. Editors JL Vincent, E Abraham, F Moore and M Fink MD. Dr. Hughes has presented his research at meetings of the American Society of Anesthesiologists, the Society of Critical Care Medicine, the Society of Critical Care Anesthesiologists, and the Association of University Anesthesiologists. He was awarded a National Institutes of Health Clinical and Translational Science Award to study the role of early physical therapy on endothelial function. Dr. Hughes...
BH Robbins Scholars Excel with Publications, Lectures

For young scholars, building critical academic research skills under the mentorship of established scientists makes them strong future investigators. With this goal, the Benjamin Howard Robbins Scholars Program began in 2007. The program is named in honor of the Vanderbilt Anesthesiology Department’s first chairman, a renowned physician-scientist. The BH Robbins Scholars program is multidisciplinary, encouraging and supporting mentorships and collaborations that extend far beyond the traditional boundaries of anesthesia.

“This program provides a unique mentored research experience for young scholars that culminates in a two-year multidisciplinary fellowship, with at least one year devoted to research,” said Department Chair Warren Sandberg, MD, PhD. “Our Robbins Scholars benefit from one-on-one mentorship, a wealth of research and educational resources, protected research time, and a stipend during their residency and fellowship.”

The BH Robbins Scholars program is co-directed by Jerold Denton, PhD, and Pratik Pandharipande, MD. Following is an update on current Scholars’ progress and many achievements.

**Thomas Austin, MD,** has published three articles as a result of research during his BH Robbins fellowship:

- “Inhibition of KCC2 in Mouse Spinal Cord Neurons Leads to Hypersensitivity to Thermal Stimulation.”

**Benjamin Howard Robbins, MD,** the Department of Anesthesiology’s first Chair and a noted physician-scientist.

**Anesthesia & Analgesia.** 2011 December; 113(6): 1509-15;

• The Use of a Continuous Brachial Plexus Catheter to Facilitate Inpatient Rehabilitation in a Pediatric Patient with Refractory Upper Extremity Complex Regional Pain Syndrome.” Franklin A, Austin T. Pain Practice. 2012 May 2.

Dr. Austin presented his work on the inhibition of KCC2 in mouse spinal cord neurons at the Association of University Anesthesiologists national meeting in 2011 and won the Association’s resident travel award. This abstract was also presented at the American Society of Anesthesiologists 2011 Annual Meeting, where Dr. Austin won the ASA Residents’ Research Award. In 2012, Dr. Austin was awarded a two-year, $175,000 Foundation for Anesthesia Education and Research (FAER) Mentored Research Training Grant-Base Science for his project: “Effect of Neuronal K+-Cl Cotransporter KCC2 Activation on Pain Perception.” Dr. Austin is mentored by Eric Delprie, PhD.

**Patrick Henson, DO,** published a review entitled “Complex Regional Pain Syndrome: State-of-the-Art Update in Current Treatment Options” in Cardiovascular Medicine 2010 Apr; 12(2): 156-67 with his mentor Stephen Breu, PhD. Dr. Henson also received a National Institutes of Health Clinical and Translational Science Award for his study of the MRI findings in patients with chronic knee pain. He has begun enrollment in his clinical trial. Dr. Henson will complete a Critical Care Medicine Fellowship in 2012, and will then join the faculty.

Christopher Hughes, MD, was awarded a two-year Foundation for Anesthesia Education and Research (FAER) Mentored Research Grant for his project. “The Role of Endothelial Dysfunction in Intensive Care Unit Delirium and Long-term Cognitive Impairment.” Dr. Hughes has published several original research articles during his BH Robbins Fellowship including:


**Patrick Henson, DO.**

Additionally, Dr. Hughes has co-authored two book chapters, the first with Drs. Stuart McGrane and Pratik Pandharipande on “Management of Sedation, Analgesia and Delirium in Anesthetic Pharmacology: Basic Principles and Clinical Practice.” 2nd Edition Cambridge University Press 2011. Editors Alex Evers, Mervyn Maze and Evan Kharasch. The second book chapter was written with Drs. Pandharipande and Dr. Wes Ely on “Management of Pain, Anxiety and Delirium” in Textbook of Critical Care. 6th Edition Saunders 2011. Editors JL Vincent, E Abraham, F Moore and M Fink MD. Dr. Hughes has presented his research at meetings of the American Society of Anesthesiologists, the Society of Critical Care Medicine, the Society of Critical Care Anesthesiologists, and the Association of University Anesthesiologists. He was awarded a National Institutes of Health Clinical and Translational Science Award to study the role of early physical therapy on endothelial function. Dr. Hughes...
and presented an abstract titled “Utilizing a standardized opioid of opioid-induced hyperalgesia in the chronic pain population, pursuing clinical research projects which explore the implications channels in the modulation of acute and chronic pain. He is now
Dr. Lonergan joined the faculty of the Division of Pain Medicine in Lonergan’s mentors.
authors of the review article were Research Fellow Gautam Bhave, published in Future Medicinal Chemistry 2010 May;2(5):757-74. Co-
Rectifier K+ Channels: Recent Advances and Future Possibilities”
Dr. Longergan’s mentors include Steve Bruehl, PhD; Ruth Young, MD; Amanda Lorinc, MD; and Dan France, PhD.  

Daniel Lonergan, MD, was the second author on original research titled: “Discovery, characterization, and structure-activity relationships of an inhibitor of inward rectifier potassium (Kir) channels with preference for Kir2.3, Kir3.x, and Kir7.1.” Raphemot R, Lonergan DF, Nguyen TT, Utery T, Lewis LM, Kadakia R, Weaver CD, Gugliotti R, Hopkins C, Lindsey CW, Denton JS. Front Pharmacol. 2011;2:75. Epub 2011 Nov 30. He was also second author on a review titled “Small-Molecule Modulators of Inward Rectifier K+ Channels: Recent Advances and Future Possibilities” published in Future Medicinal Chemistry 2010 May;2(5):757-74. Co-authors of the review article were Research Fellow Gautam Bhave, MD, Brian A. Chauder, PhD; and Jerod S. Denton, PhD, one of Dr. Lonergan’s mentors. 

Joe Schlesinger, MD, is researching the utilization of a pediatric pain service in the perioperative management of pediatric patients and an evaluation of perioperative complications in pediatric patients. Her academic interests include the impact of the perioperative environment and pain management in children with special needs. She is mentored by Gretchen Parcell Jackson, MD, PhD, of the Department of Pediatric Surgery and Dr. Stephen Hays.

Carrie Menser, MD, is researching the utilization of a pediatric pain service in the perioperative management of pediatric palliative care patients and an evaluation of perioperative complications in pediatric palliative care patients. Her academic interests include the impact of the perioperative environment and pain management in children with special needs. She is mentored by Gretchen Parcell Jackson, MD, PhD, of the Department of Pediatric Surgery and Dr. Stephen Hays.

important implications for moderating dysrhythmias caused by QT prolongation. Dr. Lorinc presented her research at the 2011 American Society of Anesthesiologists Annual Meeting and the 2012 Association of University Anesthesiologists meeting. Her research was also presented by her mentor, Sabina Kupershmidt, PhD, and co-investigators at the Biannual Meeting of the Swiss Society for Pharmacology and Toxicology in Zurich, Switzerland, at the Aurora Biomed Ion Channel Retreat, in Vancouver, Canada, and at the Denis Escande Symposium in Nantes, France. Dr. Lorinc has also begun two additional research projects: Perioperative complications, patient safety and quality improvement, and the evaluation of the skin to epidural space in infants and toddlers using magnetic resonance imaging. Dr. Lorinc is mentored by Sabina Kupershmidt, PhD; Matt Weiniger, MD; and Dan France, PhD.  

Carrie Menser, MD

Joseph Schlesinger, MD

Carrie Menser, MD

Heidi Smith, MD, MSCI

Amanda Lorinc, MD

Amanda Lorinc, MD


Carrie Menser, MD

Heidi Smith, MD, MSCI

Joseph Schlesinger, MD, at right, discusses his research with Vice-Chair for Clinical Affairs William Furrman, MD.
Dan Lonergan, MD, is mentored by Jerod Denton, PhD, and his research focuses on the role of ion channels in the modulation of pain.

Daniel Lonergan, MD, was the second author on original research titled: “Discovery, characterization, and structure-activity relationships of an inhibitor of inward rectifier potassium (Kir) channels with preference for Kir2.3, Kir3.x, and Kir7.1.” Raphemot R, Lonergan DF, Nguyen TT, Utley T, Lewis LM, Kasakia R, Weaver CD, Gugliott R, Hopkins C, Lindley CW, Denton JS. Front Pharmacol. 2011;2:75. Epub 2011 Nov 30. He was also second author on a review titled “Small-Molecule Modulators of Inward Rectifier K+ Channels: Recent Advances and Future Possibilities” published in Future Medicinal Chemistry 2010 May;2(5):757-74. Co-authors of the review article were Research Fellow Gautam Bhave, PhD, of the Department of Medicine’s Division of Allergy, Pulmonary and Critical Care.

Amanda Lorinc, MD, conducted research on a novel compound which has been shown to reduce dofetilide-induced dysrhythmias in isolated rabbit hearts. This work has important implications for moderating dysrhythmias caused by QT prolongation. Dr. Lorinc presented her research at the 2011 American Society of Anesthesiologists Annual Meeting and the 2012 Association of University Anesthesiologists meeting. Her research was also presented by her mentor, Sabina Kupershmidt, PhD, and co-investigators at the Biannual Meeting of the Swiss Society for Pharmacology and Toxicology in Zurich, Switzerland, at the Aurora Biomed Ion Channel Retreat, in Vancouver, Canada, and at the Denis Escande Symposium in Nantes, France. Dr. Lorinc has also begun two additional research projects: Perioperative complications, patient safety and quality improvement, and the evaluation of the skin to epideral space in infants and toddlers using magnetic resonance imaging. Dr. Lorinc is mentored by Sabina Kupershmidt, PhD, Matt Weinger, MD, and Dan France, PhD.

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Joseph Schlesinger, MD, is examining multisensory perceptual training, and specifically improving unsensory pulse oximetry pitch perception and attention load processing. Dr. Schlesinger has received a Vanderbilt Institute of Clinical and Translational Research (VICTR) grant for his research, and has submitted a journal article for review. He will present his research at the Society for Neuroscience Annual Meeting 2012 and at the American Society of Anesthesiologists 2012 Annual Meeting. He is mentored by Mark Wallace, PhD, Director of the Vanderbilt Brain Institute.

When Mark Newton, MD, speaks of the urgent need to reach medically underserved populations throughout the world, his words of compassion are backed up by 15 years worth of action. Dr. Newton’s humanitarian efforts in healthcare were recognized in 2012 by the American Medical Association with the presentation of the Dr. Nathan Davis International Award in Medicine. Named for AMA’s founder, the award honors physicians whose influence reaches the international patient population and changes the future of their medical care.

Dr. Newton, an Associate Clinical Professor in the Department of Anesthesiology at Vanderbilt University School of Medicine and a pediatric anesthesiologist at Monroe Carell Jr. Children’s Hospital at Vanderbilt, was instrumental in founding, and now directs, the Vanderbilt International Anesthesia (VIA) program. Established in 2007, VIA is the Vanderbilt Department of Anesthesiology’s global service, education, and research division which focuses on anesthesia and ICU issues in low resource countries. Dr. Newton also developed an anesthesia education and training program for indigenous anesthesia providers in Kenya. Dr. Newton divides his time between being a pediatric anesthesiologist at Vanderbilt and serving as chief anesthesiologist for Kijabe Hospital in Kenya.

“Over the span of his career, Mark has contributed substantially, and at great personal sacrifice, to international anesthesia education and training in low income countries,” said Warren Sandberg, MD, PhD, Chairman of the Department of Anesthesiology. “Anesthetic morbidity and mortality are a leading cause of death among surgical patients in developing countries, largely due to lack of trained personnel. Mark embodies, in spirit and action, the true meaning of a physician servant, and his personal contribution to healthcare on an international level will have a perpetual, positive impact.”

Working in partnership with the Vanderbilt Institute of Global Health (VIGH), VIA has sent residents, fellows, and faculty to areas including Haiti, Guatemala, Vietnam, Jamaica, and East Africa (Kenya) for the past five years in order to improve anesthesia provision in these areas. The faculty has provided education to anesthesia care providers in Jamaica and Vietnam through locally organized seminars. Pediatric anesthesiologists, fellows, and CRNAs also share their skills at a new children’s hospital in Guatemala City through a partnership between the Monroe Carell Jr. Children’s Hospital at Vanderbilt and the Shalom Foundation.

Vanderbilt residents in their CA-3 year can participate in an ACGME-approved, one-month, international anesthesia rotation at Kijabe Hospital in Kenya. The program allows four to six residents annually an international opportunity, providing a unique educational experience unlike any other found in US academic anesthesiology training programs. Each resident is exposed to a medical experience in a resource-poor setting where clinical skills must be sharpened to compensate for lack of technology and supplies. The residents also provide clinical training and give classroom lectures to local medical providers. The nurse anesthetist training program in Kenya continues to expand under Dr. Newton’s leadership, with now up to 20 students per class. After graduation, these students provide anesthetic care in remote areas of Africa.

AMA Award Affirms VIA’s Mission

Mark Newton, MD, has developed a close bond with the healthcare providers he helps train in Kenya.
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Dr. Newton was also one of five University of Texas Medical Branch at Galveston alumni honored with the Ashbel Smith Distinguished Alumnus Award during the UTMB School of Medicine’s commencement ceremony in June 2012. The Ashbel Smith Distinguished Alumnus Award — the highest honor bestowed by the UTMB School of Medicine Alumni Association — recognizes outstanding service to the medical profession and to humanity. It honors the memory of Dr. Ashbel Smith, a prominent figure in Texas medicine, politics and education.

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“To further strengthen VIA’s efforts in global outreach/research, Dr. McQueen has been active as a research fellow at the Harvard Humanitarian Initiative, currently chairs the ASA Global Humanitarian Outreach Committee, and directs the Global Surgical Consortium, a non-profit organization dedicated to improving surgical infrastructure in low income countries. She is also a founding member of the Alliance for Surgery and Anesthesia Presence, an advocacy and action group that builds awareness regarding the urgent need for safe global surgery and anesthesia facilities. She has volunteered for more than 20 years for a number of humanitarian organizations including the American Society of Anesthesiology’s Overseas Teaching program in Tanzania; Operation Smile in China, Jordan, Brazil, Peru, Mexico and Haiti; and Doctors Without Borders in Sri Lanka. In 2011, Dr. McQueen was honored with the Arizona Medical Association Humanitarian Award for her volunteerism and commitment to improving global health.

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McQueen Strengthens International Outreach

Kenyan Registered Nurse Anesthetists perform an ultrasound-guided leg block. The students receive training in regional anesthesia techniques through the VIA Regional Anesthesia and Acute Pain Initiative.

Kelly McQueen, MD, lectures to healthcare providers at Kijabe Hospital in Kenya. Dr. McQueen, who joined Vanderbilt Anesthesiology in 2012, has more than two decades of experience in international medical outreach.

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Though he is thankful for the recent accolades he has received as a result of his humanitarian efforts in healthcare, Dr. Newton is eager to translate that personal affirmation into additional recognition, support and growth for the VIA program.

“Over the next year, we hope to strengthen bonds with the University of Nairobi and develop a research base focusing on anesthesia and ICU care,” said Dr. Newton. “We also plan to provide leadership in a Pediatric Anesthesiology Fellowship for East Africa which will be the first fellowship of any kind in East Africa.”

“These are exciting times for our department, and our leadership in global health continues to attract some of the brightest residents and fellows who want to have an impact on the world with their specialty training,” said Dr. Sandberg.

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Vanderbilt residents Jenna Helmer Sobey, MD, at left and Chris Sobey, MD, at right, assist KRNAs during a procedure.

Kenyan Registered Nurse Anesthetists perform an ultrasound-guided leg block. The students receive training in regional anesthesia techniques through the VIA Regional Anesthesia and Acute Pain Initiative.
As one of the largest clinical programs in the nation, the Vanderbilt Department of Anesthesiology’s clinicians provide procedural, critical care, pain management, and all perioperative anesthesia services for more than 90,000 adult and pediatric patient encounters annually at more than 90 anesthetizing locations. Of these, more than 8,000 patients are seen annually in the Vanderbilt Interventional Pain Center, and approximately 20,000 Vanderbilt adult and pediatric patients receive an anesthetic during a radiologic, gastrointestinal, or other diagnostic or therapeutic procedure.

Our faculty, residents, fellows, Certified Registered Nurse Anesthetists (CRNAs), and nurse practitioners provide care in our operating rooms, five adult intensive care units, the pediatric and neonatal intensive care units, and perform approximately 4,000 anesthetics per year in the labor and delivery suite. The inpatient arm of the Vanderbilt Preoperative Evaluation Clinic (VPEC) completed more than 5,000 preoperative assessments in 2011. Also, VPEC clinicians evaluated 19,450 patients in clinic, or approximately 60% of all on campus adult surgical patients.

Our outstanding faculty, residents, fellows, nurse anesthetists, and nurse practitioners provide services in three hospitals (Vanderbilt University Hospital, Monroe Carell Jr. Children’s Hospital at Vanderbilt, and the Nashville Veterans Administration Hospital) and five outpatient facilities. Specialized clinicians provide the full range of anesthetic techniques and procedures in the operating rooms, procedural suites, intensive care units and pain management clinics. All surgical specialties are represented, including adult and pediatric cardiac surgery, all types of solid-organ transplantation, robotic surgery, neurosurgery, and high-risk obstetrics. Our trauma service, which includes our orthopedic trauma program, is among the busiest in the nation.

Our operating room staff practices anesthesia care according to the Anesthesia Care Team model. Anesthetics are provided by one of our highly skilled trainees or CRNAs under the direction of one of our medical faculty. By means of this model, we deliver the highest quality care in a safe and effective manner using the unique skills of all team members.

Our department is also known for innovation in the use and development of new technologies to both deliver and improve patient care and to improve our educational offerings. We use advanced human patient simulators to teach basic anesthesia skills, critical event response techniques, and team management in the operating rooms and intensive care units. We are one of the few medical training centers with a 3-D TEE simulator to teach the essential skill of cardiac ultrasound. The medical information systems at Vanderbilt are second to none and support the delivery of safe and efficient patient care. Perioperative record keeping is highly automated and managed through an anesthesia information management system developed by our department. This system both enhances effective patient care, and supports our clinical research program.

Highlighted on the following pages are the services provided by the Vanderbilt Department of Anesthesiology’s clinical divisions.
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Division of Ambulatory Anesthesiology

National statistics indicate that more than 70 percent of all surgeries are now performed in an outpatient setting. Vanderbilt’s Division of Ambulatory Anesthesiology meets the local manifestation of this increased demand with growth, both in locations and additional services.

In March 2011, the Division of Ambulatory Anesthesiology began providing anesthesia services at Vanderbilt’s newest ambulatory surgery center, Vanderbilt Bone & Joint in Franklin. The three-room center specializes in orthopedic procedures, and the expansion extended VUMC’s regional anesthesia services to Williamson and neighboring counties. The new site also added more than 3,000 ambulatory cases annually.

The Division of Ambulatory Anesthesiology was formed in 2008 to provide services for a growing number of Vanderbilt University Medical Center satellite locations which, in addition to Vanderbilt Bone & Joint, include Nashville Surgery Center (NSC), Vanderbilt Outpatient Surgery (VOS), and Cool Springs Surgery Center (CSSC). Two of the four centers are joint ventures and perform cases from both Vanderbilt and community surgeons, allowing for a broad base of cases rarely seen in an academic practice.

“Overall, our ambulatory surgery centers have a greater than 95% ‘excellent’ patient satisfaction rating, with minimal complications,” said Ambulatory Anesthesiology Division Chief Shannon Hersey. “We’re happy with those numbers, and are continually looking for ways to improve them.”

As NSC is primarily an orthopedic/sports medicine center, the majority of training in peripheral regional anesthesia occurs there. Under the leadership of Randall Malchow, MD, Director of Outpatient Regional Anesthesia, Vanderbilt residents receive training in the techniques of ultrasound guided regional blockade and the placement of regional catheters for home-based post-operative pain management.

“We are unique among resident training programs in that we take the residents out of the OR for an eight-hour didactic training session at the beginning of their regional rotation,” said Hersey. “Attending anesthesiologists do the blocks that day, and residents do not start performing clinical regional anesthesia until we know they have a strong knowledge base.” This approach allows the teaching of regional anesthesia in the setting of a busy surgicenter without compromising efficiency or education. The rotation allows residents to focus on learning the techniques of regional blockade, including utilization of regional catheters for home-based, post-operative pain management. Successful implementation of this program has allowed the migration of complex shoulder and foot and ankle cases out of the inpatient setting into the more patient-friendly ambulatory setting. All regional blocks are documented in a comprehensive database for future academic research, and the regional catheter program will soon be added at the VBJ site as well.

The volume of pain management procedures offered at Cool Springs has also increased with the addition of a satellite location of the Vanderbilt Interventional Pain Center. Dan Lonergan, MD, who completed a Pain Medicine Fellowship at Vanderbilt, performs interventional pain procedures at the Cool Springs location to serve Williamson County and adjacent counties.

Outpatient GI endoscopies have been increasing in volume at CSSC and pediatric volume has been exponentially increasing at every center, with the largest percentage being pediatric ENT cases from community surgeons. The Vanderbilt outpatient surgery center (VOS) is primarily an ENT center where complex ear, sinus, and voice cases are performed, along with routine tonsils and adenoidectomies.

The Division of Ambulatory Anesthesia is led by Dr. Shannon Hersey and consists of five full-time faculty, 16 CRNAs, and two to three residents who rotate through the program monthly.

Katherine Dobie, MD, performs an ultrasound-guided block at the Vanderbilt Bone & Joint Surgery Center.

Shannon Hersey.

Vanderbilt Bone & Joint Surgery Center in Franklin, Tennessee, is the newest ambulatory surgery center in Vanderbilt University Medical Center’s network of satellite locations.

Cool Springs Surgery Center is located on Mallory Lane in Franklin, Tennessee.

Nashville Surgery Center is located on Patterson Street in Nashville, Tennessee.
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Division of Anesthesia Critical Care Medicine

Vanderbilt anesthesiologists provide critical care services in many of Vanderbilt University Hospital’s ICUs, including those in an 11-story Critical Care Tower opened in November 2009. The 239,000-square-foot tower includes 12 state-of-the-art operating rooms and 102 patient beds in medical, surgical and neurological intensive care units. Because Vanderbilt is the region’s only Level I Trauma Center and is home to the Vanderbilt Transplant Center, the Division of Anesthesiology Critical Care Medicine plays a vital role in providing outstanding care to the most complex of cases.

To address growing demands for critical care services, there are now 33 acute care nurse practitioners and one physician assistant in the Department of Anesthesiology Division of Critical Care Medicine, making Vanderbilt one of the largest employers of nurse practitioners in the country. These critical care practitioners have faculty appointments and work alongside the Division’s intensivist faculty. The Division employs a multidisciplinary, intensivist-lead critical care model that is being deployed with increasing frequency across the nation, according to Critical Care Medicine Chief Lee Parmley, MD, JD.

Through a partnership with the Vanderbilt University School of Nursing and the Division of Anesthesiology Critical Care Medicine, acute care nurse practitioner students receive specialty training in critical care. Graduates of the program are invaluable partners in the critical care setting.

By encouraging research and identifying better ways to care for critically ill patients, the Division is taking a proactive approach to ever-changing demands and regulations in health care, and the changing spectrum of critical illness. “With the changes that we will see in health care, it will be incumbent upon those who work in critical care to figure out how to deliver good care at a reasonable cost to the right patients,” said Dr. Parmley. “TEE monitoring in the ICUs is a perfect example of how we can do our jobs better and know exactly what care to provide.”

In addition to the TEE monitoring study mentioned above, several Critical Care Medicine faculty members have ongoing research projects. One study by investigators Chad Wagner, MD, Medical Director for Cardiovascular Surgery for the CVU, and Anne Miller, PhD, looks at the interdisciplinary communication that occurs during the rounding process in the cardiovascular intensive care unit and seeks to identify ways to improve continuity of care across shifts. Dr. Wagner has conducted a number of studies which have received institutional, national, and international recognition. In 2012, he was appointed to the newly formed Joint Commission Task Force for the Reduction of Ventilator-associated Pneumonia.

In addition, both Critical Care Medicine and the Division of Anesthesiology Critical Care Medicine and its faculty members are involved in a number of critical care research projects. These projects include the Acute Care Nurse Practitioner (ACNP) Intensivist Fellowship, an initiative created to provide the knowledge and skill sets necessary to succeed in complex critical care environments.

Division of Cardiothoracic Anesthesiology

Innovation, research, and education are all key components of the Division of Cardiothoracic Anesthesiology, as evidenced by its participation in novel clinical environments such as the hybrid cath lab/OR, the Division’s introduction of transesophageal echocardiography as a monitoring tool in intensive care units, and its many research initiatives; and a strong commitment to being a national leader in cardiothoracic anesthesia education.

The Division works alongside the surgeons and cardiologists of the Vanderbilt Heart and Vascular Institute to perform approximately 1,200 adult cardiac procedures a year. These include coronary artery bypass grafting (the majority of which are performed off-pump), valvular surgery, cardiac transplantation, adult congenital procedures, hybrid bypass procedures, aortic aneurysm and dissection repair, and ventricular assist device insertions. Since 2011, Vanderbilt has been actively involved in the Medtronic CoreValve U.S. Clinical Trial. This is a clinical trial of percutaneous aortic valve replacement for severe aortic stenosis in patients who are too high risk for open-heart surgery. In 2012, with the addition of Edwards Sapien transcatheter valve procedures, Vanderbilt is now on pace to do 250 percutaneous aortic valve replacements per year.

In addition to cardiac surgery, the division works with thoracic surgeons to perform about 600 thoracic cases annually, including thoracic endoscopic sinus surgery, lung transplantation and esophageal procedures. Anesthesia services are also provided for bronchoscopies, placement of internal cardiac defibrillators, valvuloplasty, electrophysiology procedures, and septal ablations, which together account for approximately 2,500 cases annually. A subset of the division’s faculty is also board-certified in intensive care medicine.

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Division of Cardiothoracic Anesthesiology

The Cardiothoracic Anesthesiology faculty conduct research in vascular system function, cardiopulmonary conditioning, renal failure, and perioperative inflammatory response. Extramural grant support comes from the American Heart Association and the National Institutes of Health.

The Division also has significant external and internal education presence. Division faculty have hosted successful workshops in perioperative transesophageal echocardiography (TEE) and hemodynamic echo, drawing anesthesiology residents, fellows, faculty and private practitioners from throughout the region. Cardiothoracic anesthesiologist Julian Bock, MD, received a $100,000 Research in Education Grant from the Foundation for Anesthesia Education and Research which is being used to train CA-1 residents in TEE. A TEE simulator, which provides 3-D, computer-generated views of the heart as a probe is guided through a mannequin, is housed at Vanderbilt’s Center for Experimental Learning & Assessment (CELA). The Division’s TEE training is conducted with the simulator as the centerpiece.

The Division of Cardiothoracic Anesthesiology is led by Dr. Robert Deegan, MD, PhD, and includes ten faculty members and ten nurse anesthetists. Each month, three residents rotate through the service. The fellowship program, under the leadership of Annemarie Thompson, MD, will expand in 2013 to three fellows trained annually. The Division is a microcosm of the larger department within which it resides, supporting the tripartite mission of excellence, academic pursuits in anesthesiology, and education.

Division of Cardiothoracic Anesthesiology

Intraoperative transesophageal echocardiography (TEE) is an integral part of the clinical practice, and is performed on nearly all adult cardiac patients. The CT anesthesiologists are also increasingly in demand to provide intra-procedure TEE in the electrophysiology suite to, for example, rule out thrombosis of the atrial appendage, to guide trans-septal puncture and to look for evidence of cardiac tamponade. All studies are performed and interpreted by the cardiothoracic anesthesiology team and are digitally archived for future study.
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The Division is taking a proactive approach to address the changing spectrum of critical illness. “With the changes that we will see in critically ill patients, the Division is taking a proactive approach to the alliance between the Critical Care Division and the School of Nursing. As such, the Division of Critical Care Medicine Doctor of Nursing Practice (DNP) program, based on the ongoing success of the Acute Care Nurse Practitioner (ACNP) Intensivist Fellowship was created through the generous and kind support of the Davis Endowed Chair in Critical Care Medicine and the School of Nursing. The program was awarded a Health Research Services Administration grant to support its further development. In March 2012, an Acute Care Nurse Practitioner (ACNP) Intensivist Fellowship was created through the support of the Davis Endowed Chair in Critical Care Medicine and the School of Nursing.

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Complementing the on-going research and continued improvements in clinical operations, education is a focus of the Division. Learners all along the continuum from medical students to fellows receive training and education from the Division’s faculty. The division’s ACGME accredited Critical Care Medicine fellowship continues to see an increase in the number and quality of its applicants.

“This is in part due to the recognition that anesthesiologists need to be perioperative physicians,” said Dr. Parmley. “The residents are realizing that having the specialized skills to care for patients in intensive care units is important.”

The Division of Critical Care Medicine, under Dr. Parmley’s leadership, includes 19 physicians, 34 nurse practitioners, 6 physician assistant, and six critical care fellows. The Division’s physicians also provide service in the VU ORs, and thus they bring a holistic appreciation of the entire arc of perioperative medicine to bear in the critical care setting.

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The Vanderbilt Department of Anesthesiology embraces the anesthesia care team approach to patient care, involving anesthesiologists and residents, certified registered nurse anesthetists (CRNAs) and anesthesia technicians. The more than 100 CRNAs at Vanderbilt provide anesthesia for all types of surgical procedures including cardiac, pediatrics, vascular, trauma, neurosurgery, plastics, radiologic and special procedures. CRNAs administer general, regional and monitored anesthesia care for scheduled and emergency surgical, obstetric, and diagnostic procedures.

Key job responsibilities of the CRNA include preoperative evaluation, management of the patient through completion of the operative procedure, safe transport of the patient to the recovery area and assurance of the appropriate postoperative care. Additionally, CRNAs provide instruction and education for student nurse anesthetists (SRNAs). They also support the residency educational mission by providing service coverage to allow residents to attend educational activities and participate in elective rotations. Thus, the CRNAs are essential to many core endeavors. In terms of personnel, the CRNA Division is the largest division within the Department of Anesthesiology, and yet it has a turnover rate of less than 3% over the past two years.

Vanderbilt is also the primary clinical affiliate for the Union University Nurse Anesthesia program in Jackson, Tennessee. Student nurse anesthetists assist in approximately 7,000 anesthetics per year while on Vanderbilt rotations. SRNA coordinators are CRNAs Paul Wilson and Mariah Light.

The CRNA Division mirrors the VUMC operating room pod organization, and the service specialist position within the CRNA structure improves communication with all pod members. The six service specialists are Neurosurgery Service Specialist Tammy Freehling; AON-Ortho Service Specialist Kathy Mitchell; General Oncology/Urology Service Specialist Ken Donnell; Ophthalmology/Otolaryngology/Oral Surgery/Plastics Service Specialist Mark Halfrey; Out-of-OR Service Specialist Ki Szmyd-Hogan; and Pediatric Cardiothoracic Service Specialist Lewis McCarver.

In addition to SRNA training, the CRNA division has developed a strong program of Continuing Education Unit-eligible educational programs designed specifically for CRNAs. These programs are overseen by Pediatric Educator Eileen Griffin, CRNA and Adult Educator Mike Leersnyder, CRNA.

Chief CRNA Steve Blanks and Assistant Chief CRNA Buffy Krauser-Lupear direct the CRNA Division. Five designated lead CRNAs are Brian Reid in Ambulatory; Paul Wilson in Obstetric/Gynecology; Edith Newberry in Adult Cardiac; Robert Atwood in Pediatrics; and John Butrorac in Multiproficiency Adult Anesthesia.

Anesthesia Technicians Provide Critical Support

Vanderbilt University Medical Center is staffed with 38 total anesthesia technicians who contribute to safe, efficient anesthesia care by providing highly skilled assistance to anesthesiologists and nurse anesthetists at both on- and off-campus clinical locations. Anesthesia technician duties also include equipment maintenance and servicing, running laboratory tests on blood samples, maintaining quality assurance records, and operating a variety of equipment used to monitor, evaluate and manage the patient undergoing anesthesia.

As the level of the anesthesia technician’s training, experience and knowledge increases, they provide closer intraoperative support to the anesthesia provider. The Department offers structured classroom lectures to train technicians in a non-distracting clinical setting. The anesthesia technician, the certified anesthesia technician and the certified anesthesia technologist cover areas related to the following adult and pediatric services: neurosurgery, plastics, urology, ophthalmology, vascular, trauma, cardiothoracic, general surgery, orthopedics, obstetrics/gynecology, and ENT. They also provide support for special procedures in the radiology department that include MRI, PET scan, radiation oncology, GI Lab, CT Scan, nuclear medicine and the cardiac catheterization lab.

Buffy Krauser-Lupear, Assistant Chief CRNA, oversees the Anesthesia Technician Program. Sue Christian, a certified anesthesia technologist and long-time member of the Vanderbilt team fills the Anesthesia Technician Manager/Educator position. The technical staff continues to evolve with greater emphasis being placed on teamwork and advancing clinical skills.
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In addition to SRNA training, the CRNA division has developed a strong program of Continuing Education Unit-eligible educational programs designed specifically for CRNAs. These programs are overseen by Pediatric Educator Eileen Griffin, CRNA and Adult Educator Mike Leersnyder, CRNA. Chief CRNA Steve Blanks and Assistant Chief CRNA Buffy Kraus-Lupear direct the CRNA Division. Five designated lead CRNAs are Brian Reid in Ambulatory; Paul Wilson in Obstetric/Gynecology; Edith Newberry in Adult Cardiac; Robert Atwood in Pediatrics; and John Butorac in Multispecialty Adult Anesthesia.

Buffy Kraus-Lupear, Assistant Chief CRNA, oversees the Anesthesia Technician Program. Sue Christian, a certified anesthesiology technologist and long-time member of the Vanderbilt team fills the Anesthesia Technician Manager/Educator position. The technical staff continues to evolve with greater emphasis being placed on teamwork and advancing clinical skills.

The Vanderbilt Department of Anesthesiology embraces the anesthesia care team approach to patient care, involving anesthesiologists and residents, certified registered nurse anesthetists (CRNAs), student registered nurse anesthetists (SRNAs) and anesthesia technicians. The more than 100 CRNAs at Vanderbilt provide anesthesia for all types of surgical procedures including cardiac, pediatrics, vascular, trauma, neurosurgery, plastics, radiologic and special procedures. CRNAs administer general, regional and monitored anesthesia care for scheduled and emergency surgical, obstetric, and diagnostic procedures.

Key job responsibilities of the CRNA include preoperative patient evaluation, management of the patient through completion of the operative procedure, safe transport of the patient to the recovery area and assurance of the appropriate postoperative care. Additionally, CRNAs provide instruction and education for student nurse anesthetists (SRNAs). They also support the residency educational mission by providing service coverage to allow residents to attend educational activities and participate in elective rotations. Thus, the CRNAs are essential to many core endeavors. In terms of personnel, the CRNA Division is the largest division within the Department of Anesthesiology, and yet it has a turnover rate of less than 3% over the past two years.

Vanderbilt is the primary clinical affiliate of the Middle Tennessee School of Anesthesia (MTSA) in Madison, Tennessee, which is the second largest nurse anesthesia program in the country. Vanderbilt is also the primary clinical affiliate for the Union University Nurse Anesthesia program in Jackson, Tennessee. Student nurse anesthetists assist in approximately 7,000 anesthetics per year while on Vanderbilt rotations. SRNA coordinators are CRNAs Paul Wilson and Mariah Light.

The CRNA Division mirrors the VUMC operating room pod organization, and the service specialist position within the CRNA structure improves communication with all pod members. The six service specialists are Neurosurgery Service Specialist Tammy Freyling; AOS/Ortho Service Specialist Kathy Mitchell; General Oncology/Urology Service Specialist Ken Donnell; Ophthalmology/Otologyngology/Oral Surgery/Plastics Service Specialist Mark Halvey; Out-of-OR Service Specialist Ki Szmry-Hogan; and Pediatric Cardiothoracic Service Specialist Lewis McCarver.

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Certified Registered Nurse Anesthetists

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Division of Multispecialty Adult Anesthesiology

The Division of Multispecialty Adult Anesthesiology is the department’s largest division, providing perioperative anesthetic care for more than 15,000 patients annually in 50 operating rooms and procedure suites for a wide variety of surgical services, including general surgery, orthopedics, neurosurgery, urology, plastic surgery, ophthalmology, vascular surgery, otolaryngology, hepatobiliary, renal transplantation, and cardiovascular surgical surgery. MSA faculty and staff also provide 24-hour coverage for emergency and trauma surgery for the region. The division has 48 full- and part-time faculty members, most of whom have significant subspecialty training and expertise. An additional MSA activity is providing support for preoperative services (VPEC). MSA Division faculty provide anesthesiology residents a wide range of introductory and advanced clinical experiences and make many contributions to the educational programs for medical students, residents, and fellows. Additionally, MSA faculty teach and supervise residents from other specialties, as well as student nursing旋转nate in the MSA Division. Division faculty pursue a wide range of academic interests including regional anesthesia, airway management, information technology, perioperative cognitive dysfunction, echocardiography and ultrasound imaging.

The Division’s members are also highly active in research, with numerous investigator-initiated clinical research projects in progress at any given time. For example, MSA Division Chief James Berry, MD, believes the division’s multi-year research efforts to demonstrate the value of wireless monitoring of post-operative patients will ultimately lead to institution-wide adoption of the technology. By using wireless monitors that collect patients’ vital signs in post-op areas not typically monitored, medical staff can be notified and respond immediately if abnormal readings are detected. In another study, an on-line survey is being used to collect patient health data, allowing smoother visits to the Vanderbilt Preoperative Evaluation Center (VPEC). It is believed that such an on-line tool can make the pre-operative process more efficient, while also actively involving patients in their care.

“Our goal has always been to make clinical researchers out of clinicians, and we are well on our way to achieving that,” Dr. Berry said. “We have formerly ‘pure’ clinicians conducting valuable research, and that’s exciting.”

Neuroanesthesiology Expands to Meet Demands

According to U.S. News & World Report’s 2012 rankings for “America’s Best Hospitals,” Neurology and Neurosurgery at Vanderbilt University Medical Center rank among the nation’s best, and the word is spreading. Neurorhadoirg and other neurologic services continue to expand at VUMC, and the Neuroanesthesiology faculty specializing in neuroanesthesia are providing increasingly complex anesthesia and sedation services, including anesthesia for placement of deep brain stimulation for treatment of movement disorders such as Parkinson’s, and, most recently, for patients with obsessive-compulsive disorder. Neuroanesthesia also provides specialized anesthesia services for “awake craniotomies” where patients are sedated but awake to facilitate speech and motor mapping during surgery.

In 2011, the Departments of Neurology, Neurosurgery and Psychiatry at Vanderbilt formed a collaborative group to provide comprehensive care to patients. With the new Clinical Neurosciences Institute attracting more referrals for service, volume has increased with more than 2,300 neurosurgical cases in requiring anesthesia in fiscal year 2011. The Vanderbilt Brain Tumor Center provides comprehensive care for patients with brain tumors, and more than 400 major brain tumor operations are performed annually. VUMC has six designated neurosurgical operating rooms where anesthesia services are provided for neurosurgeries, including brain tumor, MAA vessel malformation, aneurysm, stroke intervention, trauma, complex spinal procedures, functional neurosurgery and chronic pain management. Neuroanesthesia is also provided in neurointerventional radiology suites, at Monroe Carell Jr. Children’s Hospital at Vanderbilt.

“What excites me most is the successful collaboration that we have among the Neurosurgical, Anesthesia and Nursing teams,” said Letha Mathews, MD, Medical Director for Neuroanesthesia Services. “We pride ourselves in our excellent working relationships and communication. Our experienced and dedicated anesthesia faculty ensure that our quality of care is outstanding, resulting in one of the shortest average lengths-of-stay in the country following brain tumor surgery.”

It is the patients that benefit most from the camaraderie of the clinical providers, as top quality care is consistent throughout pre-op, intra-op and post-op stages. Six outstanding certified registered nurse anesthetists led by Tammy Freehling, CRNA, are dedicated to neuroanesthesia services and are an integral part of the patient care team. John Barwise, MBCBCh, Medical Director of the Neurology/Neurosurgery Intensive Care Unit and his team direct post-operative care in VUMC’s state of the art ICU.

Neuroanesthesiologists face many unique challenges including the length of procedures (cerebellopontine angle tumor cases could mean 16 hours or more in the OR), unusual body positioning, and unexpected intraoperative events such as seizures or intracranial hemorrhage.

“We are manipulating neurophysiology with drugs and other interventions during the procedure to facilitate surgery, while we share the target organ with the neurosurgeons,” said Dr. Mathews. Many of these cases involve very large intracranial masses, raised intracranial pressures, and other co-morbidities which makes anesthetic management challenging.”

It is just this challenging environment that excites the residents going through the neuroanesthesia rotation at Vanderbilt, as well as the faculty leading the training, said Dr. Mathews. Residents participate in a variety of unique cases such as intracranial tumors, complex spinal procedures, neurovascular cases, awake craniotomies and acute intervention for strokes.

Another exciting area of growth is clinical research in Neuroanesthesiology. Several faculty members on the Neuroanesthesia team, including Drs. Jesse Ehrenfeld and Letha Mathews, have partnered with faculty in the Department of Neurosurgery on a series of clinical research projects. These activities include evaluation of the cost-effectiveness and impact of a series of interventions in patients undergoing a variety of neurosurgical procedures. One multidisciplinary effort that has already dramatically changed the post-operative care of spine surgery patients at Vanderbilt is a new comprehensive spine pathway which has been spearheaded by Neurosurgeon and Director of Clinical Spine Research, Dr. Matthew McGirt.

In other research endeavors, James Blair, DO, is conducting a double-blinded, placebo-controlled study to determine if dexamethasone can reduce the time required to achieve fitness for discharge after spine surgery. Another study to evaluate the drug guanfacine (GF) for its potential to reduce or halt emergency delirium (ED) in young males is getting under way. The division is conducting a retrospective outcome study following transphenoidal hypophysectomy (TSH) using data collected at VUMC, and is also conducting a survey of neuroanesthesiologists regarding pre-operative evaluation for the presence of patient factors over (PFV) in patients undergoing sitting craniotomies.

“I definitely see us becoming a national leader in the field of Neuroanesthesiology,” said Dr. Mathews. “Our faculty and staff are up to that challenge.”

Division of Multispecialty Adult Anesthesiology: Front row, left to right, Letha Mathews, MD; Amy Robertson, MD; Tekuila Carter, MD; Steve Hyul ultrasound imaging.
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The resumption of in utero repair of myelomeningocele, a procedure pioneered at Vanderbilt University Medical Center in 1997, has brought an added dimension of specialized clinical service to the Division of Obstetric Anesthesiology. The results of a seven-year National Institutes of Health-funded trial, Management of Myelomeningocele Study (MOMS) demonstrated clear benefit for babies who undergo fetal surgery to treat spina bifida. These surgeries began again at VUMC in April 2011. The MOMS trial found fetal surgery significantly improved the child's chances of being able to walk. There was no increased risk of death for the baby or the mother when the fetal surgery group was compared with a group that received surgery after birth. With patients being referred from across the nation, it is estimated that about 15 of these procedures will be performed at VUMC annually, with Obstetric Anesthesiologist Ray Paschall, MD, taking the lead in providing anesthetic care for these complex cases.

Obstetric Anesthesiologist Sarah Starr, MD, and Michelle Collins, MSN, were in the spotlight in 2011 for bringing nitrous oxide into providing anesthetic care for these complex cases. The nitrous oxide is self-administered by the patient with Obstetric Anesthesiologist Ray Paschall, MD, chief of the Division of Obstetric Anesthesiology and director of the Vanderbilt Pain Management Center.

Trainees in the Division of Obstetric Anesthesiology, including both residents (three monthly) and fellows (one or two annually), receive extensive experience in the care of clinically challenging patients. In 2012, the Division of Obstetric Anesthesiology received ACGME accreditation for their fellowship program. The Division is among the first 11 programs in the country that received approval from the ACGME/Resident Review Committee. The program received the full, three-year accreditation, and the first ACGME fellow was welcomed in July 2012. The Division also has a number of on-going clinical research projects, including studies on various anesthetic techniques on patient outcomes. Research projects concerning transversus abdominis block for the relief of pain following Cesarean delivery, factors affecting the choice of pain relief during labor, and the effects of low-molecular-weight heparin on thromboelastographic measurements are ongoing. The Division has also recently resumed work examining the effects of obstetric and anesthetic drugs on both the maternal and fetal vasculature within the placenta using a dual-perfusion technique of isolated placenta tissue subunits. Research examining the transfer of drugs across the placenta from the maternal to fetal side is also planned, as well as work to understand the ion channel expression within in the vasculature of the placenta.

The Division of Obstetric Anesthesiology is directed by Dr. Curtis Bayseinger and includes six other faculty members, two CRNAs, and one administrative assistant. The division’s faculty members have all completed Obstetrical Anesthesia fellowship training and have extensive experience in obstetric care, regional anesthesia, and acute pain management.

The Pain Management Center sees patients with all types of pain, including back, neck, abdominal, pelvic, nerve and joint pain, and chronic headache. During their first clinic visit, a patient’s medical history is thoroughly reviewed and their condition evaluated by Vanderbilt pain specialists to develop a team-based treatment plan. This team could include specialists from anesthesiology, psychology, psychiatry, neurology, neurosurgery, orthopedics and rehabilitation. Part of the treatment plan could include referral to the Vanderbilt Interventional Pain Center or to Division of Pain Medicine

Chronic pain affects an estimated 100 million people in the United States – more than diabetes, heart disease and cancer combined – according to the Institute of Medicine of the National Academies. Because pain is complex and often involves physiological, psychological, emotional and environmental factors, clinicians at Vanderbilt University Medical Center’s Pain Management Center take a multidisciplinary approach to pain care, offering thorough evaluations, consultations, and referrals to a wide range of treatment modalities.

“The Center is for all patients who have pain, regardless of cause and what has or hasn’t been done previously. It is the first stop for pain patients at Vanderbilt,” said Marc Huntton, MD, chief of the Division of Pain Medicine and director of the Vanderbilt Pain Management Center.

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“Providers at the primary care level often haven’t had the right resources for pain care,” Dr. Huntton said. “At the Pain Management Center, we build relationships with primary care providers, get patients the care they need, and work on an ongoing basis with the providers. We see it as a very collaborative and supportive relationship.”

The Vanderbilt Medical Group Pain Advisory Council, which first met in April 2010, began to envision a pain center, striving to create an easy referral resource for both Vanderbilt physicians and outside providers that offered cutting-edge care based on the latest evidence. When Huntton arrived at Vanderbilt in June 2011, he had much the same plan.

“The Pain Advisory Council includes physicians and nurse practitioners from multiple disciplines including anesthesia, psychiatry, neurology, oncology, neurosurgery, orthopedic surgery, cardiology and integrative health,” said Rob Hood, MD, medical director for Vanderbilt Health at One Hundred Oaks and Chair of the Pain Advisory Council. “The council was created to provide organization and coordination among Division of Obstetric Anesthesiology

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A much anticipated $30 million, 33-bed expansion at the Monroe Carell Jr. Children’s Hospital at Vanderbilt in 2012 has kept the Division of Pediatric Anesthesiology on its toes, finding ways to provide top-quality clinical services more efficiently, while keeping both young patients and their families happy.

In 2012, Suanne Daves, MD, was named Anesthesiologist-in-Chief of the Children’s Hospital. Dr. Daves joined the Anesthesiology Department in December 2008 as an associate professor in the Division of Pediatric Cardiac Anesthesia. She was then appointed Chief of the Pediatric Cardiac Division in January 2009.

Knowing they were facing increasing demands on their resources with the hospital’s expansion, members of the Division of Pediatric Anesthesiology began examining their processes under a microscope, identifying areas for improvement. One example is their participation in an initiative to improve perioperative care processes. The initiative is led by a task force consisting of a surgeon, the nurse managers of the ICU areas, two business analysts and Dr. Daniel Roke from Anesthesiology. The group initially focused on First Case Starts, examining the preoperative process thoroughly. Based on their recommendations, first case start times improved dramatically. The on-time first case start rate was 38% in April 2010 and is now above 70%, assuring the more patients and families have a timely start to their procedure.

Modifications were also made in the areas of pediatric pain services and perioperative services in pediatric anesthesia, increasing efficiency and serving more patients. With Drs. Steven Hayes and Drew Franklin both having dedicated clinical time to see patients, the number of patients seen in the pediatric pain clinic each Wednesday has tripled. Increasing internal and external referrals continue to increase. Dr. Peter Chin oversees anesthesiology services for pediatric radiology, and through finding better ways to manage patient flow, volume has increased and Saturday service for MRI procedures has been added.

The division provides perioperative care for more than 13,000 patients per year at Children’s Hospital, the region’s major pediatric referral center. The division’s 21 attendings, 22 CRNAs and four fellows provide services for a variety of pediatric surgical procedures including general surgery, ENT, neurosurgery, urology and orthopedics. The division provides anesthesia services for procedures outside the operating room, including oncology, gastroenterology, and diagnostic and therapeutic radiologic procedures. Faculty also provide both acute and chronic pain management services.

Jill Kilkelly, MD, an assistant professor in the division, spearheads Wake Up Safe has developed the first-ever national registry of adverse peripoperative events in pediatric patients. Its goals is to help define quality in pediatric anesthesia and develop strong quality improvement systems in an effort to help improve anesthetic care in children of all ages.

Dr. Suanne Daves, who is the new Anesthesiologist-in-Chief, has led the Division of Pediatric Anesthesiology to improved efficiency, better patient care and coordination of various care teams, as well as helping families navigate the process. Their success has garnered the attention of primary care providers in the community, as we all accolades from happy families.

Education and training of medical students, anesthesia residents, nurses, and associated healthcare personnel is a major faculty commitment. Several anesthesia residents rotate on pediatric anesthesiology services each month and gain experience in the management of patients undergoing both routine and complex surgical procedures, as well as diagnostic and interventional procedures performed outside the operating room. The Pediatric Anesthesiology Fellowship Program offers a year of subspecialty training in pediatric anesthesia and perioperative care, including critical care and pain management.

Areas of academic interest to the division’s faculty include quality improvement, airway management, pediatric pain management, regional anesthesia, ECMO, and peripartum care of cardiovascular patients. The Division of Pediatric Anesthesiology is an active member of Wake Up Safe, a quality improvement initiative of the Society for Pediatric Anesthesia. It is a Patient Safety Organization (PSO) comprised of the leading children’s hospitals throughout the country. Through voluntary reporting from its member institutions, Wake Up Safe has developed the first-ever national registry of adverse peripoperative events in pediatric patients. Its goal is to help define quality in pediatric anesthesia and develop strong quality improvement systems in an effort to help improve anesthetic care in children of all ages.

Division of Pediatric Anesthesiology: Front row, left to right, Liz Hughes, MD, Kevin Saunders, MD; John Algren, Stephen Hays, and Kimberly Neubilt, Second row: Laura Zeigler, MD; Peter Chin, MBBS; Amanda Lorin; MD; Jill Kilkelly, MD; and Thomas Romanci, MD. Back row: Dan Roke, MD; Humphrey Lam, MD; Andrew Franklin, MD; Thomas Austin, and Mark Newton, MD. Not pictured: Christopher Karsanac; MD; and Vilzam Patel, MD.

The Pain Management Center and Interventional Pain Clinic are housed at Vanderbilt Health One Hundred Oaks, just off Interstate 65 in Nashville, Tennessee. The Interventional Pain Clinic’s 7,000-square-foot space includes state-of-the-art procedure rooms, exam rooms, recovery bays, and multidisciplinary rooms. In July 2011, a branch of the Interventional Pain Center opened in the Cool Springs area of Williamson County, under the direction of Vanderbilt Pain Medicine Fellowship graduate Dan Lotzegan, MD. Services are provided at the Cool Springs Surgery Center on Mallory Lane in Franklin.

Monroe Carell Jr. Children’s Hospital at Vanderbilt is the site of a unique Pediatric Pain Clinic. The clinic sees two to three new patients every week, and additional patients who live at a distance are monitored by telephone, with Vanderbilt providers working with patients, their families and their physicians to provide the best pain management for their specific needs. The Neonatal Intensive Care Unit has its own specialized pain management program, and there is a regional anesthesia program to treat young patients as well.

The Comprehensive Pain Service (CPS) at VUMC also continues to grow as patients are benefitting in increasing numbers from epidural catheters, peripheral nerve blocks, and peripheral nerve catheters for pain management for complex shoulder and arm surgery, knee arthroplasties, extensive ankle rectorizations, and repeated burn debridements. This service incorporated and supercedes the Acute Pain Service beginning in August 2012. The new service has added the capacity and capability to see consults from any medical and surgical service for patients with pain syndromes requiring our expertise beyond perineural consultations from any medical and surgical service for patients with pain syndromes requiring our expertise beyond perineural block placement.

The belief is that patients admitted to Vanderbilt University hospitals should have access to expert pain care, regardless of the reason for admission. The Department of Anesthesiology’s interventional pain implantable device practice is also growing, and the CPS also manages our own patients who are admitted for either device trials or permanent implants. Providing targeted pain control for both chronic and acute pain at the area of injury has produced better pain control, improved patient satisfaction, and the ability to reduce patients’ time in the hospital.

Expanding pain medicine education at Vanderbilt, from the medical student level up, is a goal of Dr. Huntoon and the Division. The Regional Anesthesia and Acute Pain Fellowship has already proven successful under the leadership of Randall Malchow, MD, with two fellows in 2011-2012 learning advanced regional anesthesia and acute pain, developing into educators for residents, and growing to be scholars by developing research studies for publication. In addition, the Division’s chronic pain fellowship grew to include three fellows in 2012-2013. Both the acute and chronic pain fellowships are integral parts of the educational continuum. Dr. Huntoon hopes to incorporate pain medicine topics into the medical student curriculum and to improve both resident and fellow initiatives in the specialty, making use of Vanderbilt’s advanced simulation technology, as well as the anatomy lab setting.

The various individuals at Vanderbilt whose expertise and clinical practice focus on pain management. Our most important goal was to facilitate access for patients with challenging pain syndromes to the right provider and clinic. “Many institutions try to do this to some extent but are unable to achieve the multi-disciplinary vision,” Huntoon said. “The idea is that pain crosses many boundaries. No one specialty has the knowledge and capabilities to best serve all patients, but if we put our heads together, we can reach that optimal care.”
or epidural catheters. The belief is that patients admitted to the Pain Management Center and Interventional Pain Clinic are housed at Vanderbilt Health One Hundred Oaks, just off Interstate 65 in Nashville, Tennessee. The Interventional Pain Clinic’s 7,000-square-foot space includes state-of-the-art procedure rooms, exam rooms, recovery bays, and multidisciplinary rooms. In July 2011, a branch of the Interventional Pain Center opened in the Cool Springs area of Williamson County, under the direction of Vanderbilt Pain Medicine Fellowship graduate Dan Lotenigar, MD. Services are provided at the Cool Springs Surgery Center on Mallory Lane in Franklin.

Monroe Carell Jr. Children’s Hospital at Vanderbilt is the site of a unique Pediatric Pain Clinic. The clinic sees two to three new patients every week, and additional patients who live at a distance are monitored by telephone, with Vanderbilt providers working with patients, their families and their physicians to provide the best pain management for their specific needs. The Neonatal Intensive Care Unit has its own specialized pain management program, and there is a regional anesthesia program to treat young patients as well.

The Comprehensive Pain Service (CPS) at VUMC also continues to grow as patients are benefitting in increasing numbers from epidural catheters, peripheral nerve blocks, and peripheral nerve catheters for pain management for complex shoulder and arm surgery, knee arthroplasties, extensive ankle restorations, and repeated burn debridements. This service incorporated and superseded the Acute Pain Service beginning in August 2012. The new service has added the capacity and capability to see consultations from any medical and surgical service for patients with pain syndromes requiring our expertise beyond perineural or epidural catheters. The belief is that patients admitted to Vanderbilt University hospitals should have access to expert pain care, regardless of the reason for admission. The Department of Anesthesiology’s interventional pain implantable device practice is also growing, and the CPS also manages our own patients who are admitted for either device trials or permanent implants.

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A much anticipated $30 million, 33-bed expansion at the Monroe Carell Jr. Children’s Hospital at Vanderbilt in 2012 has kept the Division of Pediatric Anesthesiology on its toes, finding ways to provide top-quality clinical services more efficiently, while keeping both young patients and their families happy.

In 2012, Suanne Daves, MD, was named Anesthesiologist-in-Chief of the Children’s Hospital. Dr. Daves joined the Anesthesiology Department in December 2008 as an associate professor in the Division of Pediatric Cardiac Anesthesiology. She was then appointed Chief of the Pediatric Cardiac Division in January 2009.

Knowing they were facing increasing demands on their resources with the hospital’s expansion, members of the Division of Pediatric Anesthesiology began examining their processes under a microscope, identifying areas for improvement. One example is their participation in an initiative to improve perioperative care processes. The initiative is led by a task force consisting of a surgeon, the nurse managers of the operating room, anesthesiologists, the surgeons of the divisions in the OR areas, two business analysts and Dr. Daniel Roke from Anesthesiology. The group initially focused on First Case Starts, examining the preoperative process thoroughly. Based on their recommendations, first case start times improved dramatically. The on-time first case start rate was 38% in April 2010 and is now above 70%, ensuring the more patients and families have a timely start to their procedure.

Modifications were also made in the areas of pediatric pain services and in the manner in which services are increased efficiently and serve more patients. With Drs. Steven Hayes and Drew Franklin both having dedicated clinical time to see patients, the number of patients seen in the pediatric pain clinic each Wednesday has tripled. The hospital’s internal and external referrals continue to increase. Dr. Peter Chin oversees anesthesiology services for pediatric radiology, and through finding better ways to manage patient flow, volume has increased and Saturday service for MRI procedures has been added.

The division provides perioperative care for more than 13,000 patients per year at Children’s Hospital, the region’s major pediatric referral center. The division’s 21 attendings, 22 CRNAs and four fellows provide services for a variety of pediatric surgical procedures including general surgery, ENT, neurosurgery, urology and orthopedics. The division provides anesthesia services for procedures outside the operating room, including oncology, gastroenterology, and diagnostic and therapeutic radiologic procedures. Faculty also provide both acute and chronic pain management services.

Jill Kilkelly, MD, an assistant professor in the division, spearheads a unique service at Children’s Hospital known as the CCoC (Complex Coordination of Care). Many children require frequent sedation or anesthetics for procedures or diagnostic testing. Frequent anesthetics create a tremendous burden for these patients and their families in terms of time away from school and work, as well as restrictions on eating and drinking before procedures. The goal of the CCoC is to provide a single, continuous anesthetic for multiple procedures or scans. While this sounds simple, the scheduling of multiple surgical and interventional services, often in different locations, is challenging. Jill Kinch, MSN, is the manager for the nurse practitioners in the Division of Pediatric Anesthesiology in perioperatively preparing patients for anesthesia or sedation. Jill and her team work with Dr. Kilkelly in the scheduling and coordination of various care teams, as well as helping families navigate the process. Their success has garnered the attention of primary care providers in the community, as well as accolades from happy families.

Education and training of medical students, anesthesia residents, nurses, and associated healthcare personnel is a major faculty commitment. Several anesthesia residents rotate on pediatric anesthesiology services each month and gain experience in the management of patients undergoing both routine and complex surgical procedures, as well as diagnostic and interventional procedures performed outside the operating room. The Pediatric Anesthesiology Fellowship Program offers a year of subspecialty training in pediatric anesthesia and perioperative care, including critical care and pain management.

Areas of academic interest to the division’s faculty include quality improvement, airway management, pediatric pain management, regional anesthesia, ECMO, and perioperative care of cardiovascular patients. The Division of Pediatric Anesthesiology is an active member of Wake Up Safe, a quality improvement initiative of the Society for Pediatric Anesthesia. It is a Patient Safety Organization (PSO) comprised of the leading children’s hospitals throughout the country. Through voluntary reporting from its member institutions, Wake Up Safe has developed the first-ever national registry of adverse perioperative events in pediatric patients. Its goal is to help define quality in pediatric anesthesia and develop strong quality improvement systems in an effort to help improve anesthetic care in children of all ages.

Pharmaceutical & Operating Room Services (POS) led by Dr. Christopher Malchow, MD, with two fellows in 2011-2012 learning advanced anesthesia techniques for pediatric and newborns. The POS provides sedation and pain care for children in the hospital. This initiative grew out of a collaboration with the Children’s Hospital, Vanderbilt University Medical Center, Monroe Carell Jr. Children’s Hospital at Vanderbilt, Vanderbilt University Medical Center and the Division of Pediatric Anesthesiology.

While the POS is clearly focused on pediatric sedation, it is utilizing its resources to develop effective, patient-oriented sedation services for children in other settings. The team has developed a protocol for sedation during diagnostic procedures for children with complex medical conditions, and is working with other divisions to develop similar protocols for children undergoing other types of procedures.

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Division of Pediatric Cardiac Anesthesiology

As demand for pediatric cardiac anesthesia services at Monroe Carell Jr. Children’s Hospital at Vanderbilt continues to grow, the anesthesiologists providing those services are committed to ensuring that the quality and safety of patient care is continually improved as more patients are served.

In fact, one of the biggest accomplishments of the Division of Pediatric Cardiac Anesthesiology in 2011 was to tackle the problem of unnecessary blood transfusions and wasted blood products during the treatment of critically ill children. The Division’s effort reduced the number of transfusions by anesthesiologists in pediatric cardiac operating rooms by an average of 40%. And their success did not go unnoticed. In November 2011, the Pediatric Cardiac Anesthesiology Division was selected to be in the new Vanderbilt Quality and Patient Safety Pioneer Program. Selection was based on proposed improvement goals, evidence of past improvement efforts and leader participation. Through the Quality and Patient Safety Pioneer Program, the Division’s members received training, as well as support to design, implement and test additional performance improvements. The group is tapping into valuable, archived patient data to guide their quality improvement plans.

“The ability to continue care through the entire perioperative period has positively impacted the intraoperative management of our cardiac patients,” added Daves. “For example, the operative and critical care teams developed a Hand-Over protocol that facilitates communication of intraoperative information to the ICU team. The second part of this process improvement project, Hand-Over Part II, aims to standardize the physical presentation of the critically ill neonate between the ORs and ICUs.”

Members of the Pediatric Cardiac Anesthesiology Division also team with surgeons for highly specialized procedures such as placement of Berlin Heart devices. The device is similar to other left ventricular devices (LVADs) used in adults, but is much smaller.

The pediatric cardiac anesthesiologists work closely with nurse anesthetists trained in cardiac anesthesia care who have many years’ experience working with these unique patients. The Division also trains pediatric and cardiothoracic clinical nurse anesthetists trained in cardiac anesthesia care who have many years’ experience working with these unique patients. The Division also trains pediatric and cardiothoracic clinical anesthesiology fellows, as well as provides expert assistance and consultative services for children with congenital heart disease and undergoing non-cardiac surgery/procedures.

In the 2011-2012 academic year, several faculty members participated in the annual meetings of the Society of Cardiovascular Anesthesia, the Society for Pediatric Anesthesia, and the Congenital Cardiac Anesthesia Society, and the Division’s members are actively involved in education and quality improvement at the national level.

The Division of Pediatric Cardiac Anesthesiology was formed in 2007 to support the growth of the program that cares for these patients at the Children’s Hospital. The Division’s faculty also provide intraoperative care, whom often require intensive surgical repairs to thrive or even survive into adulthood. The Division of Pediatric Cardiac Anesthesiology provided vital support in the development and growth of the Cardiac Critical Care Division. They split their time between caring for pediatric cardiac patients in the operating room and in the cardiac critical care unit.

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“This is one of our initiatives, to use that data to improve patient care,” said Children’s Hospital Anesthesiologist in Chief Suanne Daves, MD. “We will be looking for outliers, in areas like length of intubation and central line complications, in order to make intelligent decisions to improve patient care.”

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The Vanderbilt Preoperative Evaluation Center (VPEC) continues to earn resounding kudos from the patients that come through its doors for evaluation before undergoing surgery at Vanderbilt University Medical Center. In 2012 – for the fourth year in a row – the service received a Professional Research Consultants, Inc. patient satisfaction award, the coveted 5-Star Award for Overall Quality of Care. This means the center scored at the 90th – 99th percentile based on 2011 calendar year results and as compared to similar centers nationwide. For the first time, both VPEC sites, the main Vanderbilt University Hospital location and the location at Vanderbilt Health at One Hundred Oaks, received the awards.

“VPEC faculty and staff perform comprehensive patient assessments, and consult with our patients’ primary care physicians, specialists, and surgeons,” said VPEC Clinic Manager Russell Kunic, FNP-BC. “We are able to make decisions regarding the need for preoperative testing to assess the patients’ overall risk for surgery. Once the patient report is completed at VPEC, it becomes part of the patient’s electronic medical record and is accessible by any Vanderbilt medical provider with Internet and security access.”

To ensure that patients undergoing scheduled procedures are properly evaluated and that all necessary labs and other patient information are in hand, VPEC offers a free evaluation and consultation service. This better ensures patient safety and helps present surgical delays and cancellations. The inpatient arm of VPEC completed more than 5,000 preoperative assessments in 2011. Also in 2011, VPEC clinicians evaluated more than 19,450 patients in clinic, or approximately 60% of all on-campus adult surgical patients.

VPEC’s main location at Vanderbilt University Hospital has 11 exam rooms and conveniently located adjacent to outpatient lab and radiology on the first floor of The Vanderbilt Clinic. VPEC’s second location was added in 2009 at the Vanderbilt Health at One Hundred Oaks campus. This location has seven exam rooms and is also adjacent to outpatient lab and radiology services. VPEC has received several significant industry accolades including the 2009 Top Performer Award given by Professional Research Consultants, Inc. VPEC is frequently consulted by other hospitals wanting to improve their preoperative processes.

VPEC is comprised of 28 total staff, including 17 nurse practitioners, one of the largest single groups of nurse practitioners at Vanderbilt. VPEC’s Medical co-directors are Vanderbilt Anesthesiologists Susan Calderwood, MD, and Annemarie Thompson, MD.
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Veteran’s Affairs Anesthesiology Service

The Veteran’s Affairs Anesthesiology Service provides perioperative patient care services for more than 9,000 anesthesia procedures annually at the Veterans Administration Medical Center in Nashville and the Alvin C. York campus in Murfreesboro, Tennessee. The Service provides anesthesia care for the full range of surgical procedures including cardiac and thoracic surgery, orthopedic procedures including joint replacements; as well as major vascular, neurosurgical, ENT, ophthalmic, urologic, plastic, bone marrow, and transplant surgeries. In addition, sedation services are provided in several out-of-OR sites, including electro-convulsive therapy, diagnostic and therapeutic radiology procedures, pulmonary procedures, cardiac catheterization, and gastroenterology services. The Service also provides primary coverage for the VA surgical intensive care unit, acute and chronic pain management, emergency airway management, cardioversion, and transesophageal echocardiography.

“Even though 80% of our surgical patients are ASA 3 and 4, our morbidity and mortality rate is lower than the national average,” said Veteran’s Affairs Anesthesiology Service Chief Ann Walia, MBBS. “We have 85% on-time first-case starts, 87% OR utilization and we exceed all service, Medical Center and national performance measures. We have a great team here, and they work hard to provide excellent care to our veterans.”

In addition to patient care, education and training of senior anesthesiology residents and fellows, the VA Service also educates critical care and emergency room physicians and other allied personnel. VA faculty received one of the Department’s Golden Apple Awards (awarded by election for superior teaching) each year from 2009 to 2012. The VA anesthesiology faculty teach the Introduction to Anesthesia and Basic Airway Course for third-year medical students throughout the year. Additionally, first-year medical students are provided summer internship opportunities where they gain their first exposure to patients and learn to establish intravenous access, airway management, and invasive pressure monitoring techniques.

Areas of academic interest in the Division include airway management, ultrasound-guided regional anesthesia, ischemia-reperfusion injury and coronary artery disease in liver transplant recipients, and anesthesia practice pattern variations in liver transplantation. These have resulted in several national and international presentations and publications.

The Division, led by Ann Walia, MBBS, is staffed by 21 anesthesiologists, 15 certified registered nurse anesthetists, five nurse practitioners, three residents, a critical care medicine fellow, and 10 support staff members.

Major translational research initiatives at Vanderbilt are moving discoveries from the bench to the bedside, and our scientists are working to transform both health care and health care delivery. In federal fiscal year 2010, the Vanderbilt University School of Medicine ranked 10th among U.S. medical schools for National Institutes of Health (NIH) funding, and VUSM funding from all sources has more than doubled since 2001. In academic year 2011, faculty across all disciplines received more than $521 million in external funding for research. The Vanderbilt Department of Anesthesiology is a key contributor to the institution’s standing as it is consistently ranked one of the top extramurally funded anesthesia research programs in the nation. In 2012, the Department’s investigators brought in more than $8.5 million in total extramural research funding. This includes more than $3.39 million in awarded NIH grants in federal fiscal year 2012.

Edward Sherwood, MD, PhD., joined Vanderbilt’s Department of Anesthesiology faculty in July 2012 as Vice Chair for Research, and he oversees all of the department’s investigational endeavors. A distinguished translational physician-scientist, Dr. Sherwood previously served as Vice Chair for Research, and Professor/James F. Arens Endowed Chair of the Department of Anesthesiology at University of Texas Medical Branch in Galveston, Texas. Dr. Sherwood’s major research interests include altered antimicrobial immunity in experimental models of sepsis and thermal injury. He has several active research grants, including a National Institutes of Health RO1 grant to define the role of natural killer and CD8+ T cells in the pathogenesis of acute intra-abdominal sepsis.

The Vanderbilt Department of Anesthesiology is unique among academic department for having a strong, multifaceted approach to research, including:

- A strong Basic Science research division focusing on the immunology of shock, ion channel physiology, and pain mechanisms.
- The Perioperative Clinical Research Institute which provides all support services needed for successful clinical research.
- Best-in-class anesthesia and perioperative information systems, with complete control of application development and a dedicated team of analysts devoted to making electronic data widely available to investigators and quality improvement teams. These systems are managed by Perioperative Informatics, an institutional entity co-directed by Brian Rothman, MD.
- The Perioperative Data Systems Research (PDSR) group which is actively leveraging historical and current clinical data, with the goal of generating research and new control algorithms to positively impact patient safety.
- Several statisticians within our faculty with expertise in experimental design and complex analyses of large datasets.
- The Center for Research and Innovation in Systems Safety (CRISS) which serves as an institution-wide resource for basic and applied research in healthcare informatics, patient safety and clinical quality, and designs and evaluates informatics user interfaces, care processes and medical technology across Vanderbilt University Medical Center.

In addition to providing a solid research infrastructure, the Department of Anesthesiology places a strong emphasis on faculty and fellow career development in academic anesthesiology. Active mentoring programs pair young investigators with experienced scientists in both basic and clinical research. For example, the Department’s B.H. Robbins Scholars Program provides a mentored research experience that culminates in a two-year clinical & research fellowship experience. Scholars may request to participate in clinical or basic science fellowship training or pursue additional formal education (e.g., Masters of Science in Clinical Investigation, Master of Public Health, or other degree programs) offered at Vanderbilt during the latter part of the program.

Read more about the Vanderbilt Department of Anesthesiology’s specific research strengths on the following pages. The Vanderbilt Department of Anesthesiology’s multi-faceted approach to scientific investigation includes well-established basic science research laboratories as well as many successful endeavors in clinical research.

Research Overview
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The major focus of the Basic Science Research Division is the study of the physiology, pharmacology, and cell biology of ion channels, transporters, and receptors. These membrane proteins are involved in functions as diverse as shaping the cardiac action potential, salt and water homeostasis in the kidney, hormone and neurotransmitter release, modulation of synaptic transmission, and the gating processing of pain signals. Because the disruption of each of these physiological processes has a significant impact on human health, research in the Basic Science Research Division addresses the translational missions of the National Institutes of Health and of private biomedical research-oriented foundations. Currently, there are two major themes that cut across multiple laboratories: drug discovery and the study of pain mechanisms. Three laboratories within the research division are actively pursuing drug discovery for clinically relevant ion channel and transporter targets. This work is sponsored by the National Institutes of Health's Medical Libraries Probe Center Network.

Work in the laboratory of Jerod Denton, PhD, is aimed at developing potential and selective small-molecule inhibitors and activators for members of the inward rectifier family of potassium (Kir) channels. His group recently performed a high-throughput screen for modulators of the renal outer medullary potassium channel, ROMK (Kir1.1), which is involved in salt and water reabsorption in the kidney tubule and putative target for a novel class of diuretics. Their work has led to the discovery of the first small-molecule inhibitors of ROMK (Lewis et al., Mol. Pharmacol., 76: 1094-1103, 2009; Bhave et al., Mol. Pharmacol., 79: 42-50, 2011). These compounds are being used to map small-molecule binding sites in the ROMK channel structure and to determine whether ROMK is a viable therapeutic target for the treatment of hypertension. Dr. Denton’s group was also recently awarded a Grand Challenges in Global Health grant from the Foundation for the National Institutes of Health to develop chemicals to induce “kidney” failure in the mosquito Anopheles gambiae to help fight malaria. Dr. Denton mentored B. H. Robbins Scholar Dan Lonergan, MD.

The lab of Eric Delpire, PhD, devised a screen to identify potent and specific inhibitors of a transporter, KCC2, involved in modulating inhibitory neurotransmission. By pumping Cl- ions out of neurons, this K-CI cotransporter maintains a low intracellular Cl- concentration, strengthening inhibitory GABA and glycine-mediated inhibition. This cotransporter is therefore involved in preventing hyper-excitability and the development of epileptiform activity. After developing a fluorescence-based methodology to visualize the activity of KCC2, Delpire’s group also screened the 250,000 compound library and identified multiple inhibitors and some putative activators of KCC2 (Delpire et al. Proc. Natl. Acad. Sci. 106: 5383-5388, 2009). The laboratory is currently following-up on some of these compounds examining their structure-function relationship and biological effects. Dr. Delpire mentors B. H. Robbins scholars.

Robbins Tom Austin, MD. Of note, two Robbins Scholars – Dr. Austin and Dr. Dan Lonergan – have won the Association of University Anesthesiologists’ annual Travel Award on the strength of the work they conducted under the mentorship of departmental basic scientists. In 2012, Dr. Austin was also awarded a two-year Foundation for Anesthesia Education and Research (FAER) Mentored Research Training Grant-Basic Science for his project: “Effect of Neuronal K-CI Cotransporter KCC2 Activation on Pain Perception.”

Another interest in the Basic Science Research Division is the study of pain and pain mechanisms. Leading the effort in translational work bridging the basic and clinical sciences is Stephen Bruehl, PhD, who studies endogenous pain modulatory systems, links between these systems and psychological factors, and mechanisms contributing to chronic pain and pain-associated cardiovascular co-morbidities. Work in his lab has identified pain-related alterations in interacting cardiovascular-pain modulatory systems that contribute to enhanced pain responsiveness (Bruehl et al., Pain 2010; 149:57-63) and may elevate future risk for both chronic pain (Walker et al., Pain 2010; 150:568-572) and hypertension (Chung et al., Pain 2008; 138: 87-97). Work in Bruehl’s lab also explores how endogenous opioid pain inhibitory systems are intertwined with brain mechanisms underlying regulation of negative affect (Bruehl et al., Psychosom Med, 2011 Sep;73(7):612-9) and how these opioid systems are altered by persistent pain (Bruehl et al., Pain 148:167-171, 2010). He is also collaborating with Dr. Denton to identify variants in the gene encoding a G protein-coupled Kir channel (GIRK) that may influence opioid modulation of pain pathways. Dr. Bruehl mentors B. H. Robbins scholar Patrick Henson, DO.

The lab of Kevin Currie, PhD, studies the regulation of voltage-gated calcium channels and neurotransmitter/hormone release. N-type calcium channels are expressed on presynaptic nerve terminals of primary afferent nociceptors and play key roles in pain transmission. Currie’s lab investigates how neuromodulators, inflammatory mediators, and drugs alter channel function (Currie, Channels 4: 497-509; 2010) and transmitter release (Yoon et al., J Neurophysiol 100: 2929-392008; 2008; Jewell et al, Mol Pharmacol 79, 987-996, 2011). This includes dissecting the cellular mechanisms by which gabapentin acts. Gabapentin is commonly used to treat chronic neuropathic pain, but acute perioperative dosing can also exert analgesic effects and blunt intra-operative hemodynamic perturbations. Another focus of the Currie lab is the sympathoadrenal stress response, in particular release of catecholamines and neuropeptides from adrenal chromaffin cells. In addition to prominent effects on the cardiovascular system, sympathoadrenal hormones have also been implicated in some chronic pain and hyperalgesic states (e.g., CRPS). This project includes recent collaborative efforts with Dr. Reine Baudenbacher in the Department of Biomedical Engineering to develop novel microfluidic “lab-on-a-chip” devices for analyses of neurotranscretion. Dr. Currie mentored B. H. Robbins scholar David Todd, MD.

The Delpire laboratory’s involvement in pain research includes examining the role of ion co-transport mechanisms in the modulation of GABA and glycine neurotransmission in the terminals of primary afferent fibers and in spinal cord neurons. The presynaptic terminals of primary afferent fibers are loaded with Cl- ions through a secondary active transport mechanism (NKCCI) that pumps Cl- into the cell against its electrochemical gradient equilibrium potential. High Cl- allows depolarization of the terminals upon GABA release and presynaptic inhibition. On the postsynaptic side, a different transporter, KCC2, pumps Cl- out of the cell strengthening GABA and Glycine inhibition. Dr. Tom Austin, B.H. Robbins scholar in the Delpire laboratory, devised a method of implanting intrathecal catheters in mice for the delivery of novel compounds targeting the postsynaptic transporter. The study showed that inhibition of KCC2 shortened the response to heat-evoked nociceptive signals (Austin and Delpire, Anesth. Analg. 2011 Dec;113(6):1509-15). B.H. Robbins scholar Dr. Daniel Lonergan worked with Dr. Denton to develop the first chemical activators of mu-opioid receptor-activated GIRK channels to explore its therapeutic potential in the management of pain.

In October 2012, Brad Gruter, PhD, and Carrie Gruter, PhD, joined the Department. The husband-wife team are both doctoral graduates of the Department of Molecular Physiology and

Jerrold Denton, PhD, at left, and Rene Baphomet work together in the Denton lab to study novel methods of modulating KIR.
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Biochemistry at Vanderbilt University. The goal of the Grueter lab research program is to advance the current understanding of the nucleus accumbens (NAc), a brain region responsible for integrating information from diverse inputs and modifying complex motivated behaviors, including its involvement in adaptive responses to rewarding and aversive stimuli.

Specifically, we strive to elucidate the molecular constituents in the NAc that are necessary and sufficient to drive complex motivated behaviors. As part of the mesolimbic dopaminergic system, the NAc integrates a complex mix of excitatory, inhibitory, and modulatory inputs to optimize adaptive motivated behaviors. Dynamic alterations in synaptic transmission within this circuitry are strongly implicated in the development and expression of many neuropsychiatric disorders. Thus, two broad questions the Grueter address are: 1) how does vivo experience such as cocaine exposure, pain, or high fat diet alter the neurochemistry of the NAc? 2) What are the synaptic mechanisms underlying the behavioral adaptations to in vivo experience? The approaches the Grueter incorporate allow them to thoroughly characterize the synaptic circuitry of the NAc in basal and pathophysiological conditions using a combination of cutting-edge techniques in electrophysiology, molecular biology, metabolic phenotyping, optogenetics and behavior. These studies will provide information on how the NAc circuits integrate environmental stimuli and allow for specific behavioral responses. This enhanced understanding of NAc function may provide a basis for a more individualized approach to the treatment of many psychiatric disorders.

The lab of Edward Sherwood, MD, PhD, is studying several aspects of sepsis and the systemic inflammatory response syndrome. A major interest is to define mechanisms of sepsis-induced systemic inflammation and organ injury with emphasis on the roles of natural killer (NK) and T lymphocytes. Current studies are being performed to evaluate the mechanisms of NK and T cell activation and chemotaxis during sepsis with emphasis on the chemokine receptor CXC3R1 and its ligands, CXCL9 and CXCL10. The Sherwood group showed that CXC3R1 activation is crucial for NK cell trafficking during sepsis and that CXC3R1 blockade will decrease inflammation and organ injury in experimental models of sepsis. The underlying goal is to further understand the contribution of CXC3R1 activation in the pathogenesis of sepsis and develop clinically relevant interventions to block CXC3R1 and improve outcome.

In further studies, the Sherwood lab is evaluating the immunomodulatory properties of TLR4 agonists and their ability to modify the host response to systemic infection. The group showed that the TLR4 agonists lipopolysaccharide and monophosphoryl lipid A are potent immunomodulators that alter cytokine production and enhance innate resistance to bacterial infections. The improved resistance to infection is caused by neutrophil expansion and enhanced neutrophil functions. The group is working to define the mechanisms by which TLR4 agonists promote the antimicrobial functions of neutrophils and develop TLR4 agonists as agents that can be used clinically to improve the resistance of critically ill patients to infection.

Together, the members of Basic Science Division of the Department of Anesthesiology pursue a highly complementary and collaborative program of research to create new knowledge leading to improved practice in anesthesiology. Moreover, the Division provides critical mentorship to a new generation of anesthesiology clinician scientists who will help build the basic science and clinical missions of the Department together even more effectively.

Key Clinical Research Studies

John Algren, MD: Pediatric Anesthesia NeuroDevelopment Assessment Study (PANDAS) (Site PI)

Tom Austin, MD: Anesthetic Management of Newborns for Embolization of Vein of Galen Malformations

Curvis Baysinger, MD: Comparative Effects of Vasopressin, Oxytocin, Potassium Channel Inhibitors XE991 and linopirdine, and Potassium Channel Activator Flupirtine on the Human Fetal Pulmonary Circulation: A Study Using the in Vitro, dual-perfused, single-isolated Coneyldon, Human Placental Model

Multi-Center, Double-Randomized, Double-Blind, Placebo-Controlled Study to Evaluate the Analgesic Efficacy and Safety of Intravenous CR045 Dual Propractively and Postproactively in Patients Undergoing a Laparoscopic Hysterectomy

Julian Bick, MD: Validation of a Transesophageal Echocardiography Simulator

Frederic T. Billings, MD: Effect of Short-term Astrovirustain Use on Acute Kidney Injury Following Cardiac Surgery

James Blair, DO: Does Continuous Perioperative Desmedetodemine Inflation Reduce Time to Discharge in Patients Undergoing Major Limbar Fusion? Double-Blind, Placebo-Controlled Study

Guancine for Improved Sedation to Reduce Perioperative Delirium

Pax-Neuroesthetimaging of Cognitive Droine (PAID): Prospective Pilot Study

Clifford Bowen, MD: Comparison of Periurethral Catheter Deter for the Continuous Popliteal Nerve Block using Ultrasonic Guidance and Dermabond

Elizabeth Card, RN, CPAN, CCP: Prevalence of Delirium in the Post Anesthesia Care Unit

Katherine Dobie, MD: Takeover of a Private Ambulatory Surgery Center Practice by Academic Anesthesiologists: Retrospective Before and After Study Over Two Years

Ultrasound-Guided Isolation and Blockade of the Upper Trunk for Shoulder Surgery: Time to Replace the Traditional Interscalene Approach?

Brian Donahue, MD, PhD: Thrombin Generation Phenotypes in Children with Congenital Heart Disease: Pilot Study

Kristen Eckstrand, BA: A Survey of Lesbian, Gay Bisexual and Transgender Needs at Vanderbilt

Jessica M. Ehrenfeld, MD, MPH: Association of SCIP Compliance with Use of an Anesthesia Information Management System

Automatic Prediction of Perioperative Events

A Standard of Risk of Acute Lung Injury

Central Line Placement Under Ultrasonic: Is Routine Chest X-ray Warranted?

Does Use of Non-depolarizing Neuromuscular Blocking Agents Predict Postoperative Respiratory Complications

Effects of Protease Inhibitors on Post-Operative Pain Control

Effect of a Novel Electronic Blood Ordering System on Patient Outcomes

Evaluation of Disparities in Care of Perioperative Patients

Evaluation of Mobile Clinical Information System on Surgical Workflow

External Validation of the Risk Quantification Index

Health Literacy and Perioperative Outcomes

Impact of Attending Surgical Case Coverage on Perioperative Outcomes

Impact of Diabetes Quality Improvement Protocol

Impact of On-time OR Starts on Workflow Perceptions

Incidence of Hypoxemia During Surgery and Anesthesia

Norethomina and the Risk of Surgical Site Infecction

Objective and Novel Approach to Resident Competency Measurement: Utilizing Data in Anesthesia Information Management Systems for Continuous Evaluation and Feedback

Peri-operative Risk Stratification of Surgical Patients

Prediction Model for Estimating PACU Length of Stay

Predictors of Post-operative Deterioration

Prevalence of Red-Green Colorblind Healthcare Providers: Pilot Study

Real-Time Evaluation of Perioperative Risk Scores

United States Critical Illness and Injury Trials Group (USCITIG)

Informatics Working Group (IWG) Multicenter Performance Site (MPS)

Utility of the Surgical Appar Score on Postoperative Outcomes in Pediatrics

Using Natural Language Processing to Identify Lesbian, Gay, Bisexual, Transgender and Intersex (LGBTI) Patients in the VUMC EMR and determine how LGBTI Status Affects Diagnosis, Treatment, and Health Outcomes

Dan France, PhD: Efficiency Evaluation of Mobile Clinical Information System

Andrew Franklin, MD: Open-label, Extension Study to Assess the Long-term Safety of Twice Daily Oxydrene Hydrochloride Controlled-release Tablets in Opioid-experienced Children-who Completed the OTR3001 Study

Open-label, Multicenter Study of the Safety of Twice Daily Oxydrene Hydrochloride Controlled-release Tablets in Opioid-experienced Children from Ages 6 to 16 Years Old, Inclusive, with Moderate to Severe Malignant or Nonmalignant Pain Requiring Opioid Analgesics

William R. Furman, MD: Electrolyte Abnormalities in Surgical Patients with Renal Failure

Rajnish Gupta, MD: Improving Needle Visualization by Novice Residents During an In-plane Ultrasound Nerve Block Simulation Using the CIVCO InfiniTMT Needle Guide

Stephen R. Hays, MD: Multisite RCT Comparing Regional and General Anesthesia for Effects on Neurodevelopmental Outcome and Aprena in Infants

Open-label, Non-Randomized, Multicenter, Ascending Dose by Age, Single- and Multiple-Dose Evaluation of the Effectiveness, Safety, and Tolerability of Oral Liqui Oxymorphine HCl Immediate-Release Oral Liquid for Acute Postoperative Pain in Pediatric Subjects

Loren Hemachandra, MD: Operating Suite Efficiency: Minimizing the Need for a Dedicated Trauma Room
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Vanderbilt Lands Patient-centered Research Grant

Thanks to a federal grant received by Vanderbilt University Medical Center researchers, patients and their families now have an active role and voice in research designed to improve the quality and safety of patient care.

VUMC investigators have been awarded a two-year, $750,000 grant from the Patient-Centered Outcomes Research Institute (PCORI), one of the first grants awarded by the nonprofit institute established by the Patient Protection and Affordable Care Act of 2010 and the only such grant awarded in Tennessee. The PCORI’s mission is to help patients, providers and other healthcare stakeholders make informed care decisions by producing and promoting information resulting from research guided by patients, caregivers and the broader healthcare community.

The Vanderbilt research will track both patients’/patient families’ and clinicians’ reports of “non-routine” events in four different clinical areas: elective pediatric cardiac surgery, outpatient pediatric cardiac catheterization, non-elective pediatric cardiac surgery and critical care units. The study will examine the incidence of non-routine events and determine whether the VUMC’s efforts to improve patient safety have reduced non-routine events in these areas.

"This project is important because we will be able to determine what aspects of their interaction with the healthcare system patients and families feel reflect lower quality of care and safety," said Weinger, who is also the Norman Y. Smith Chair in Patient Safety & Medical Simulation. “I believe we will also show that patients and their families will provide important new information about ways to change how we deliver care so that it is safer and better meets their needs.

“An unique aspect of this research will be the involvement of patients in designing the studies and analyzing the results,” added Weinger. Only 50 pilot projects out of more than 1,000 applications were selected to receive funding for up to two years. Awards approved include those for projects designed to develop a range of tools and techniques aimed at improving patient-centered care and decision-making; create new patient-centered care measures; and improve delivery of patient-centered counseling in health care settings.
Shannon Hersey, MD: Perioperative Pulse Oximetry in Obstructive Sleep Apnea Patients in the Ambulatory Setting
Douglas Hexter, MD: Cost Containment of Anesthesia-related Intra-operative Costs
End-Tidal Carbon Dioxide Gap as a Surrogate Marker for Duration of Intubation: An Application of Automated Vital Sign Collection
Chris Hughes, MD: Effects of Early Rehabilitation on Endothelial Function and Delirium in the ICU
Role of Endothelial Dysfunction in Intensive Care Unit Delirium and Long-term Cognitive Impairment
Elizabeth Hughes, MD: Post-Anesthesia Care in Children with Communication Disorders: Does Utilizing the e-FACCP Improve Quality of Care and Parental Satisfaction?
Steven Hyman, MD: Survey Evaluating Burnout, Health Status, Depression, Alcohol and Substance Use, and Social Support Among Webinar Participants
Tracy Jackson, MD: Retrospective Comparison Study of Narcotic Prescriptions with the Prescription Monitoring Protection Database
Ira Landsman, MD: Demographic Predictors of NPO Violations in Elective Pediatric Surgery
Radiographic Imaging for Potential Cervical Spine Instability in Patients with Down Syndrome
Jason Lane, MD: Impact of a Change in AIMS to Ensure Compliance with SCIP Intra Blockade Guidelines
Lesley Lirette, MD: Comparing Efficiency in Delivering Regional Anesthesia in a Teaching Model Style Outpatient Surgery Center vs. a Non-trainee Outpatient Surgery Center
Daniel Lonerger, MD: Odontotoxicity Outcomes in an Outpatient Chronic Pain Clinic
Stuart McGrane, MD: Therapeutic Hypothermia after Cardiac Arrest due to Hemorrhage
Anne Miller, PhD: Staff Perceptions of Change Management at VUMC: Pilot/Feasibility Study
Anne Miller, PhD; Chad Wagner, MD: APSF-funded Study on Interruptions and Distractions in the Operating Room
Heidi Smith, MD, MSCI: Assessing the Compliance and Reliability of a Unit-wide Rollout of a Nursing Delirium Screening Tool in a Pediatric Critical Care Unit
Delirium in Pediatric Critical Care: Validation of the Pediatric Confusion Assessment Method for the Intensive Care Unit (pCAM-ICU)
Pediatric Critical Care Illness: Implications for Long-term Cognitive Dysfunction and PTSD
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Paul St. Jacques, MD: Analysis of Vital Signs Documentation Patterns
Comparing Patient Satisfaction to Patient Complaints in an Academic Anesthesiology Department
Chad Wagner, MD: Delirium and Pain in the Postoperative Cardiac Surgery Patient: Retrospective Review
Central Line-associated Bloodstream Infections After Landmark Versus Ultrasound-guided Placement
Ann Walla, MD: F2 Isoprostanes and Ischemic Kidney Injury During Liver Transplantation Surgery
Role of Isoprostane in Hepatic Injury
Liza Weavind, MD: Phase III, Randomized, Double-Blind, Placebo-controlled, Adaptive Design Study of the Efficacy, Safety, and Tolerability of a Single Infusion of MK-3415 (Human Monoclonal Antibody to Clostridium difficile Toxin A), MK-6072 (Human Monoclonal Antibody to Clostridium difficile Toxin B), and MK-3415A (Human Monoclonal Antibodies to Clostridium difficile Toxin A and Toxin B) in Patients Receiving Antibiotic Therapy for Clostridium difficile Infection
Matthew Weinger, MD: Cost of Delayed Extubation: Evaluation of Intraoperative Decision Making
Creating Simulation-based Performance Assessment Tools for Practicing Physicians
Matthew Weinger, MD; Jason Slagle, PhD: Non-routine Events in Anesthesia Practice
Operating Room Workflow and Quality of Care (VA Study)
Gina Whitney, MD: Multimodal Approach to Reduction in Transfer for Children Undergoing Cardiac Surgery
Inhibition of Lipid Peroxidation during Cardiopulmonary Bypass
Amy Robertson, MD: Risk Factors of Acute Renal Injury in the Immediate Postoperative Period After Orthotopic Liver Transplantation
Brian Rothman, MD: Impact of Advance Notification to Complete PACU Orders on Length of Stay, Time to Treat, and Nursing Workload
Impact of Vigilance™VigiVU™ on Perioperative Throughput
Utilization and Efficiency in the Obstetrics Suite
Nahel Saeid, MD: Pressure Support Ventilation in Anesthetized Patients with Supraglottic Airway
Warren Sandberg, MD, PhD: Pilot Implementation and Assessment of a Computerized Pharmacologic Assessment Tool
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Vanderbilt Lands Patient-centered Research Grant

Thanks to a federal grant received by Vanderbilt University Medical Center researchers, patients and their families now have an active role and voice in research designed to improve the quality and safety of patient care.

VUMC investigators have been awarded a two-year, $750,000 grant from the Patient Centered Outcomes Research Institute (PCORI), one of the first grants awarded by the nonprofit institute established by the Patient Protection and Affordable Care Act of 2010 and the only such grant awarded in Tennessee. The PCORI’s mission is to help patients, providers and other healthcare stakeholders make informed care decisions by producing and promoting information resulting from research guided by patients, caregivers and the broader healthcare community.

The Vanderbilt research will track both patients’/patient families’ and clinicians’ reports of “non-routine” events in four different clinical areas: elective pediatric cardiac surgery, outpatient pediatrics oncology (chemotherapy administration), adult day surgery, and adult patients with acute coronary syndrome who are undergoing cardia catheterization. A non-routine event is defined as any event that deviates from optimal or expected care for a specific patient in a specific clinical situation. A multidisciplinary team of nearly 30 Vanderbilt faculty/physicians and staff, including nurses, surgeons, anesthesiologists, oncologists, cardiologists, pediatricians, engineers, psychologists, anthropologists, statisticians and informatics personnel, will be working together on the project. Select patients and patient family members who are members of Vanderbilt’s Patient Family Advisory Council also will be part of the research team.

“I’m excited that Vanderbilt received one of these highly competitive grants,” said U.S. Representative Jim Cooper (D-Tenn.), a strong supporter of the mission of the PCORI. “This important research, done right here in Nashville, will help improve health care delivery and outcomes for patients and their families all over the country.”

Matthew Weinger, MD, professor of Anesthesiology, Biomedical Informatics, and Medical Education; and director of the Center for Research and Innovation in Systems Safety (CRISS), is the study’s principal investigator. Dr. Weinger and his staff have already developed a standardized process for capturing reports of non-routine events from clinicians, and the PCORI-funded study will build on this knowledge to also capture and understand what patients and their families consider non-routine events.

Non-routine events in clinical settings have been shown to occur frequently and are typically due to multiple factors. In a previous study of 918 elective surgical cases representing a cross-section of anesthesiology techniques, surgical procedures, and patient complexity, 39% of cases contained at least one non-routine event, and of those cases, 42% included more than one non-routine event. In another study, 107 intensive care unit nurses reported medication-related non-routine events (incorrect medication or dosage) in 31 of 153 four-hour observation periods in three different hospitals.

“This project is important because we will be able to determine what aspects of their interaction with the healthcare system patients and families feel reflect lower quality of care and safety,” said Weinger, who is also the Norman Ty Smith Chair in Patient Safety & Medical Simulation. “I believe we will also show that patients and their families will provide important new information about ways to change how we deliver care so that it is safer and better meets their needs.

“A unique aspect of this research will be the involvement of patients in designing the studies and analyzing the results,” added Weinger. Only 50 pilot projects out of more than 1,000 applications were selected to receive funding for up to two years. Awards approved include those for projects designed to develop a range of tools and techniques aimed at improving patient-centered care and decision-making; create new patient-centered care measures; and improve delivery of patient-centered counseling in health care settings.

A federal grant awarded to VUMC researchers actively involves patients and patient families in a study hoped to improve the quality and safety of patient care. Members of the research team include Diane H. Buckberg, Jessica Pasley, principal investigator Matthew Weinger, MD, and Susan Morley. Buckberg, Pasley and Morley are Vanderbilt Patient-Family Advisory Council members.
The Vanderbilt Department of Anesthesiology has long been a national leader in the development and advancement of perioperative informatics, and there’s been an increased focus to further strengthen the informatics initiatives at Vanderbilt.

“This department has always had a very strong commitment to informatics, and many notable accomplishments in the field,” said Department Chairman Dr. Warren Sandberg. “By bringing some key talent on board and by providing the faculty already here the dedicated time and necessary staff to expand and improve our informatics programs, we are looking forward to dramatically impacting our specialty, and patient care in total, through new research and technology.”

A combination of world-class research, active software development, and utilization of the latest clinical applications allows the department to drive the use of technology within anesthesiology to improve patient safety and quality. Advances in both research and clinical care is being facilitated by several faculty members in the departments, many of whom have additional faculty appointments in the Department of Biomedical Informatics. The two key groups affiliated with the department driving this effort are the Perioperative Data Systems Research (PDSR) group and Perioperative Informatics.

Perioperative Informatics

Perioperative Informatics, a group directed by Brian Rothman, MD, Medical Director of Perioperative Informatics and Medical Director of Access and Administrative Operations, is a hospital entity that develops and manages the clinical applications used within the perioperative setting. The Vanderbilt Perioperative Information Management System (VPIMS) application suite developed and commercialized by Vanderbilt includes GasChart® application suite developed and managed by the clinical applications used within the Department of Biomedical Informatics. The two key groups affiliated with the department driving this effort are the Perioperative Data Systems Research (PDSR) group and Perioperative Informatics.

• Perioperative glycemic monitoring: In 2012, within an anesthesia documentation, Vigilance™ application VigiVU™, and Patient Tracker™ for electronic nursing documentation during each perioperative phase of care.

• Universal Protocol/Time Out (UP/TO). Time outs are required before any office-clinic-based procedure, but a method supporting consistent time out documentation and performance was not available. The solution created by the Perioperative Informatics team was the Universal Protocol/Time Out (UP/TO) Module for Procedure Areas. This standalone program contains all required UP/TO elements and business logic to document compliance. Data on aborted timeouts are also collected. The module increases procedural area patient safety by compelling clinicians to follow a step-wise process confirming pertinent patient information, procedure type, and appropriate procedure preparation. The program is accessible from any clinical workstation within the institution. The expected result is a 95-100% complaint time rate on qualifying procedures in the areas where it is implemented.

• Focused nursing admission history. A nursing admission history form is required on every patient that is not an inpatient. The history form used by perioperative nurses on qualifying procedures includes for alcohol and abuse screenings. An estimated 25-30 minute savings per preoperative nursing assessment in holding has been noted by nursing staff. These savings should improve first case-on-time starts and decrease unnecessary nursing workload.

On a much larger scale, Perioperative Informatics is working toward data “interoperability” by providing patient information collected through VPIMS in a useful form to the institution. Exchanging data with the Data Institutional Information database and Star are examples of how the group is opening doors to exchange information throughout the continuum of patient care.

“The interoperability with the institution is necessary,” said Rothman. “Because we have such a large volume of Vanderbilt patients passing through our area, we see it as our vital mission to communicate data we collect to other providers across the institution. Likewise, the availability of important care information when a patient receives care in the perioperative space is equally vital. We don’t focus on inbound or outbound data. We focus on bi-directional communication with all systems. That is our goal in the years to come.”

Taken together, the informatics effort in the Department of Anesthesiology seeks to close the loop, ensuring that patients are fully protected from harm and that beneficial interventions are always executed. Because Vanderbilt “owns” its information systems, both literally and figuratively, rapid processes of hypothesis generation, pilot demonstration and full scale implementation of quality improvement projects are uniquely supported.

Putting the Power of Technology into Practice

The Vanderbilt Department of Anesthesiology has long been a national leader in the development and advancement of perioperative informatics, and there’s been an increased focus to further strengthen the informatics initiatives at Vanderbilt.

“Putting the Power of Technology into Practice” said Rothman. “As seen in this pop-up, medical providers are notified about a patient’s diabetes or documented insulin administration. Any positive “hit” initiates surveillance of the GasChart® record for recurrent glucose values within 120 minutes of the last value and 60 minutes if insulin is administered. A glucose measurement reminder displays if a measurement within the desired timeframe does not exist. A direct result of this implementation has been a marked increase in the number of diabetic patients having their glucose measured in the OR. Development of an enhancement to improve glycemic control in the PACU is currently underway.

An improved electronic nursing assessment now includes automated process monitoring for alcohol and abuse screenings. An estimated 25-30 minute savings per preoperative nursing assessment in holding has been noted by nursing staff. These savings should improve first case-on-time starts and decrease unnecessary nursing workload.

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“Our job is to solve known or previously unidentified issues related to workflow and system functionality while understanding how these two elements intersect,” said Rothman. “We are identifying unique solutions that improve patient safety, operating room efficiency, the quality and character of the data collected, staff workflow, and that decrease in cognitive workload on our staff through a combination of creative software design and development, with a particular focus on user interface.”

Following are a few recent Perioperative Informatics successes.

- Perioperative glycemic monitoring: In 2012, within an impressive six-month time frame, the Perioperative Informatics Group addressed the issue of consistent glycemic control of diabetic patients during the perioperative period. Maintaining glycemic control throughout the perioperative period is a critical aspect of patient care. Using a patient’s diabetic status and insulin administration, decision support was applied to remind providers throughout a case to monitor the patient’s blood glucose. The Perioperative Informatics Group enhanced its existing systems to conduct an electronic search of nursing or anesthesia documentation for the diagnosis of diabetes or documented insulin administration. Any positive “hit” initiates surveillance of the GasChart™ record for recurrent glucose values within 120 minutes of the last value and 60 minutes if insulin is administered. A glucose measurement reminder displays if a measurement within the desired timeframe does not exist. A direct result of this implementation has been a marked increase in the number of diabetic patients having their glucose measured in the OR. Development of an enhancement to improve glycemic control in the PACU is currently underway.

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Glucose Monitoring

An innovative hand hygiene monitoring application was developed internally at Vanderbilt.
The PCRI oversees more than 85 active clinical trials, with many studies in development. PCRI is directed by Vice Chair for Research Edward Sherwood, MD, PhD, and Clinical Trials Manager Damon Michaels. The team consists of highly trained and broadly experienced research professionals, including five research nurse specialists, one research assistant, two clinical trials associates, and one research analyst.

“It has been exciting to see the growth in clinical research since PCRI was founded in 2007,” said Michaels. “When I started, the Department was mainly focused on basic science research. Now, the research development process and creates opportunities for the Tennessee Society for PeriAnesthesia Nurses (TSPAN) and as Middle Tennessee Society for PeriAnesthesia Nurses (MTSPAN) and for Excellence in Clinical Research, an annual award presented by the Vanderbilt University Medical Center’s Office of Research.

Elizabeth Card, RN, CPAN, CCRP
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Margaret Haiden, CCRP
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Vanderbilt Anesthesiology Clinical Research Advisory Committee

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The committee mentors potential investigators throughout the research development process and creates opportunities for ongoing learning about research methods, proposal writing, IRB applications, data management and analysis, and presentation/publication skills. The committee also reviews new research proposals and regularly audits ongoing investigations for effectiveness and compliance with regulatory and safety guidelines. Committee members are Edward Sherwood, MD, PhD (chair); James Berry, MD; Jonathan Schindelrot, PhD (co-chair); Pratik Pandharipande, MD, MSCI; Paul St Jacques, MD; Brian Donahue, MD, PhD, Curtis Baysinger, MD; Jason Lane, MD; Dan France, PhD, MPH; and Damon Michaels.

Members of the Perioperative Clinical Research Institute: Front row, left to right, Emily Brink, RN, BSN; Kelen Taylor; Jennifer Morse; Sue Walsh, RN; Donna Nelson, RN, CAPA; and Kristie Lee. Second row, Edward Sherwood, MD, PhD; Damon Michaels, CCRP; Elizabeth Card, RN, CPAN, CCRP; Mary Haiden, CCRP; Maaya Halicka, Christine Goldhaber; William Hardeman, CCRP, and Cleo Carter. Not pictured: James Berry, MD; Kierrston Card, Brian Donahue, MD, PhD, and Patricia Hendricks, RN.

Navigating through countless regulations, mastering the nuances of grant writing, and properly managing finances in order to conduct clinical research is enough to fray the nerves of any fledgling investigator. To keep the process running smoothly, from initial concept to published research, the Department of Anesthesiology’s Perioperative Clinical Research Institute provides a full range of support services including regulatory management, data management, contracts management, biostatistics, bioinformatics, and financial oversight. The group also trains new investigators so they can grow to the point of having their own funded research that leads to major publications.

“We are here to facilitate the research process for our investigators,” said Clinical Trials Manager Damon Michaels. “We assist with compliance with federal, state and local regulations and other details so the investigator can focus on their science. The end goal is stronger research, with an eye toward publication in leading journals.”

Clinical research within the Department includes both industry-sponsored and investigator-initiated clinical projects and focuses on the advancement of medical practice in the fields of perioperative care, chronic pain and medical devices. Most of the Department’s investigators are practicing physicians who use their clinical expertise to develop research protocols that seek to answer clinically significant questions.

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“These individuals support our ongoing investigations, and their contributions are invaluable,” said Clinical Trials Manager Damon Michaels. “They are often the critical contact point ‘in the trenches,’ and are able to make sure nothing falls through the cracks or lags for any reason. They have been growing professionally so that they are more responsible, and are now pursuing their own research.”

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The Perioperative Data Systems Research (PDSR) group, led by Jesse M. Ehrenfeld, MD, MPH, focuses on utilizing information technology within the perioperative environment to improve patient safety and the quality of care delivered. The multidisciplinary group, which has grown from three full-time research support staff in 2010 to nine in 2012, manages more than seventy active clinical research projects and has taken the lead on developing methodologies for evaluating the impact of technology and information management systems within the operating room.

**Milestones Achieved**

Major achievements have included successful competition for a grant from the Anesthesia Patient Safety Foundation (APSF), a complete redesign of the Perioperative Data Warehouse (the ten-year historical archive of data from the Vanderbilt Perioperative Information Management System), and recruitment of five new full-time employees. Realization of these steps was an important milestone for the group, as demand for perioperative data continues to grow in support of the Anesthesiology Department’s research mission. Additionally, PDSR has supported a number of important operational initiatives, such as the development, launch and maintenance of the Perioperative Dashboard Project, which provides a real-time overview of a series of OR management metrics to frontline managers.

“We have successfully positioned the PDSR group to lead perioperative informatics research at Vanderbilt,” said Department Chairman Warren Sandberg, MD, PhD. “It is rewarding to know that our efforts in informatics research will ensure that the decisions made by researchers based on the information we are able to provide them will help ensure the safety and quality of patient care is never compromised.”

**Novel Collaborations, Here and Abroad**

The work accomplished by PDSR has led to recognition of Vanderbilt as home to one of the premier anesthesia informatics research programs in the world, and this has led to fruitful partnerships and collaborations.

“We are appreciative for the opportunities for our group to partner not only with collaborators at Vanderbilt, but also with colleagues performing research across the nation and the world,” said Dr. Ehrenfeld. “Through these collaborations, we have been able to establish and strengthen our group’s mission to promote patient safety and quality of care, both here and abroad.”

One such collaboration is with the National Institutes of Health-sponsored U.S. Critical Illness and Injury Trials Group, in which Vanderbilt is co-leading an effort to bring together diverse high-resolution intensive care unit data from a consortium of medical centers. This unprecedented effort will soon allow researchers across the country to quickly and efficiently answer important questions about how to best care for critically ill patients. An example would be determining what post-surgical blood pressure is ideal to prevent the development of acute renal failure after surgery.

**Innovations in Quality and Delivery of Care**

Discoveries made by researchers in the PDSR group have led not just to the creation of new knowledge, but in many cases have resulted in the direct improvement of care and operative outcomes of Vanderbilt patients—thousands of patients undergoing surgery and anesthesia worldwide. Three projects are highlighted below.

**Better Care for Diabetic Patients**

Vanderbilt is leading a multi-center effort to understand the impact of providing real-time clinical decision support for the management of glucose during surgery. Preliminary results from the study, completed in 2012, have demonstrated an improvement in a variety of outcomes and most notably, a reduction in post-surgical readmission rates in diabetic patients at Vanderbilt.

**Cost Containment of Anesthetic-Related Perioperative Costs**

This two-phase study is geared toward providing a mechanism to decrease the average cost of anesthesia for surgery. The first phase, which was completed in 2012, consisted of the creation and verification of an accurate system to tabulate and display anesthesia-related costs for operative cases. This has allowed PDSR to understand the magnitude of and factors leading to significant cost variability. The second phase of the study will test several ways of sharing this information with providers and assess methods to actively manage anesthesia costs.

**Predicting and Preventing Post-Operative Deterioration**

While the morbidity and mortality attributed to anesthesia is low, there continues to be a high post-operative complication rate. Supported by a grant from the Anesthesia Patient Safety Foundation (APSF), PDSR members have set out to identify characteristics that may be predictive of adverse events in the immediate post-operative setting (i.e., within 48 hours of surgery). To date, PDSR researchers have identified a cohort of 62,850 adult patients who had a surgical procedure and were admitted to the hospital after surgery. Of these patients, 735 had an unanticipated transfer to the ICU within 48 hours. The team is now modeling the differences between patients who experienced these unexpected transfers and those who did not. Ultimately, the plan is to automate a predictive model in order to provide real-time model output to clinicians in the OR.

**Teaching the Next Generation, Inspiring Leadership**

Consistent with the Department’s educational mission, PDSR is actively engaged in the education and training of students, residents, and fellows through a variety of mechanisms including seminars, journal clubs, and a successful summer research training program. During the 2012-2013 academic year, PDSR provided mentorship and research opportunities for 12 students; six undergraduate students, and six medical students who joined PDSR from Vanderbilt and seven other academic institutions.

PDSR continues to attract renowned experts in the fields of biomedical informatics and clinical research to Vanderbilt’s campus as visiting scholars. At the monthly Anesthesia Informatics Research Seminar, which is open to the entire Vanderbilt University community, these specialists share their research findings and expertise.

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**Perioperative Data Systems Research (PDSR) by the Numbers**

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The Perioperative Data Systems Research (PDSR) group, led by Jesse M. Ehrenfeld, MD, MPH, focuses on utilization of information technology within the perioperative environment to improve patient safety and the quality of care delivered. The multidisciplinary group, which has grown from three full-time research support staff in 2010 to nine in 2012, manages more than seventy active clinical research projects and has taken the lead on developing methodologies for evaluating the impact of technology and information management systems within the operating room.

**Milestones Achieved**

Major achievements have included successful competition for a grant from the Anesthesia Patient Safety Foundation (APSF), a complete redesign of the Perioperative Data Warehouse (the ten-year historical archive of data from the Vanderbilt Perioperative Information Management System), and recruitment of five new full-time employees. Realization of these steps was an important milestone for the group, as demand for perioperative data continues to grow in support of the Anesthesiology Department’s research mission. Additionally, PDSR has supported a number of important operational initiatives, such as the development, launch, and maintenance of the Perioperative Dashboard Project, which provides a real-time overview of a series of OR management metrics to frontline managers.

“We have successfully positioned the PDSR group to lead perioperative informatics research at Vanderbilt,” said Department Chairman Warren Sandberg, MD, PhD. “It is rewarding to know that our efforts in informatics research will ensure that the decisions made by researchers based on the information we are able to provide them will help ensure the safety and quality of patient care is never compromised.”

**Novel Collaborations, Here and Abroad**

The work accomplished by PDSR has led to recognition of Vanderbilt as home to one of the premier anesthesia informatics research programs in the world, and this has led to fruitful partnerships and collaborations.

“We are appreciative for the opportunities for our group to partner not only with collaborators at Vanderbilt, but also with colleagues performing research across the nation and the world,” said Dr. Ehrenfeld. “Through these collaborations, we have been able to establish and strengthen our group’s mission to promote patient safety and quality of care, both here and abroad.”

One such collaboration is with the National Institutes of Health-sponsored U.S. Critical Illness and Injury Trials Group, in which Vanderbilt is co-leading an effort to bring together de-identified high-resolution intensive care unit data from a consortium of medical centers. This unprecedented effort will soon allow researchers across the country to quickly and efficiently answer important questions about how to best care for critically ill patients. An example would be determining what post-surgical blood pressure is ideal to prevent the development of acute renal failure after surgery.

**Innovations in Quality and Delivery of Care**

Discoveries made by researchers in the PDSR group have led not just to the creation of new knowledge, but in many cases have resulted in the direct improvement of care and operative outcomes of Vanderbilt patients—thousands of patients undergoing surgery and anesthesia worldwide. Three projects are highlighted below.

**Better Care for Diabetic Patients**

Vanderbilt is leading a multi-center effort to understand the impact of providing real-time clinical decision support for the management of glucose during surgery. Preliminary results from the study, completed in 2012, have demonstrated an improvement in a variety of outcomes and most notably, a reduction in post-surgical readmission rates in diabetic patients at Vanderbilt.

**Cost Containment of Anesthetic-Related Perioperative Costs**

This two-phase study is geared toward providing a mechanism to decrease the average cost of anesthesia for surgery. The first phase, which was completed in 2012, consisted of the creation and verification of an accurate system to tabulate and display anesthesia-related costs for operative cases. This has allowed PDSR to understand the magnitude of and factors leading to significant cost variability. The second phase of the study will test several ways of sharing this information with providers and assess methods to actively manage anesthesia costs.

**Predicting and Preventing Post-Operative Deterioration**

While the morbidity and mortality attributed to anesthesia is low, there continues to be a high post-operative complication rate. Supported by a grant from the Anesthesia Patient Safety Foundation (APSF), PDSR members have set out to identify characteristics that may be predictive of adverse events in the immediate post-operative setting (i.e., within 48 hours of surgery). To date, PDSR researchers have identified a cohort of 62,850 adult patients who had a surgical procedure and were admitted to the hospital after surgery. Of these patients, 735 had an unanticipated transfer to the ICU within 48 hours. The team is now modeling the differences between patients who experienced these unexpected transfers and those who did not. Ultimately, the plan is to automate a predictive model in order to provide real-time model output to clinicians in the OR.

**Teaching the Next Generation, Inspiring Leadership**

Consistent with the Department’s educational mission, PDSR is actively engaged in the education and training of students, residents, and fellows through a variety of mechanisms including seminars, journal clubs, and a successful summer research training program. During the 2012-2013 academic year, PDSR provided mentorship and research opportunities for 12 students; six undergraduate, and six medical students who joined PDSR from Vanderbilt and seven other academic institutions.

PDSR continues to attract renowned experts in the fields of biomedical informatics and clinical research to Vanderbilt’s campus as visiting scholars. At the monthly Anesthesia Informatics Research Seminar, which is open to the entire Vanderbilt University community, these specialists share their research findings and expertise.

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**Perioperative Data Systems Research (PDSR) by the Numbers**

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Vanderbilt University School of Medicine’s Center for Research and Innovation in Systems Safety (CRISS) is an integral part of Vanderbilt’s Institute for Medicine and Public Health (IMPH), led by Robert Dittus, MD.

To fulfill its mission of enhancing healthcare quality and safety, CRISS conducts basic and applied research in healthcare informatics, patient safety and clinical quality; designs, assesses and improves care processes; develops and implements technical and electronic health information systems; and designs, assesses and implements educational state-of-the-art simulation facilities to test and analyze medical equipment and procedures.

Current research includes an Agency for Healthcare Research and Quality (AHRQ)-funded multicenter study to develop and deploy standardized simulation scenarios to test the performance of board-certified physicians. In July 2012, CRISS was the recipient of one of only 50 pilot grants (out of 1,400 applicants) from the Patient Centered Outcomes Research Institute (PCORI). In this project, an analysis will be done of non-routine events reported concurrently by patients and their clinicians in four different domains: pediatric cardiac surgery; adult cardiac catheterization; and adult ambulatory surgery. CRISS is also actively involved in two federal contracts to do informatics research: a National Institute of Standards and Technology (NIST)-funded project to define best practices for the design of Electronic Medical Records (EMRs), and an AHRQ-funded project to study the relationship between workflow and Electronic Health Record (EHR) use in ambulatory settings. Finally, CRISS researcher Richard Holden, PhD, received a federal career development award (KL2) through the Vanderbilt Institute for Clinical and Translational Research to design a home-based software tool for patients with congestive heart failure to manage their symptoms and to track their progress.

Previously, in an AHRQ-funded study, CRISS researchers showed that a simulation-based intervention enhanced the handovers and communication between anesthesiologists and PACU nurses. In a VA-funded study of 1,000 surgical cases, it was discovered that OR teams’ workload ratings were inflated during the usability test of two commercial products. Transactional 2011 Nov;51(11):2311-18.

CRISS faculty and staff are integrally involved in user interface design and evaluation on numerous applications for VUMC’s informatics, including Vanderbilt Outpatient Order Management (a outpatient lab and diagnostic testing order system), StarPanel Customized Views (an improved method of presenting EMR data for specialists), and tools that help track the status of lab results and facilitate surgical timeouts, anesthesia handovers and debriefings. Finally, CRISS launched a new undergraduate course in human factors engineering on the Vanderbilt University general campus in spring 2012.

CRISS faculty members include Director Matthew B. Weinger, MD, MS; David Afsharhossein, PhD, Ana Banerjee, MD; Daniel France, PhD, MPH; Richard Holden, PhD; Kevin Johnson, MD; Audrey Kunto, EdD, MSN; Anne Miller, PhD; Ann Minnick, RN, FAAN; Laurie Lovett Novak, PhD, MHS; Debbie Peterman, PhD, MSN, RNC-NIC; Michael Pilla, MD; Jason Slagel, PhD; Theodore Speroff, PhD; Kim Uncerl, PhD; and Chris Whimbey, MD. CRISS staff include Russ Beebe, Christine Goldsberry; Jeff Hottle; Andrew Kline, Eric Porterfield, MS, and Christopher Simpson.

Selected Publications, 2011-2012

Original Manuscripts

In the 2011-2012 academic year, Vanderbilt Department of Anesthesiology faculty produced more than 160 publications, including 113 peer-reviewed articles, seven books and 22 book chapters.


Austin T, Delpire E. Inhibition of KCC2 in mouse spinal cord neurons leads to hypersensitivity to thermal stimulation. Anesthesia and Analgesia 2011 Dec;113(6):1359-1359.


Baysinger C, Pope J, Lockhart E, Mercaldo N. The medical emergency department with acute coronary syndrome to receive evidence-based care. In a study funded by the Anesthesiology Patient Safety Foundation, Anne Miller, PhD, and her colleagues are the first to evaluate and recommend standard guidelines for clinical care in the cardiovascular ICU.

CRISS involvement with Vanderbilt University Medical Center operational initiatives in quality improvement range from participating in the review and analysis of most serious clinical events at VUMC, to re-engineering blood transfusion processes, improving clinician handovers, and enhancing compliance with perioperative timeouts and checklists.


To fulfill its mission of enhancing healthcare quality and safety, CRiSS conducts basic and applied research in healthcare informatics, patient safety and clinical quality; designs, assesses and improves care processes, medical technology and electronic health record user interface; and develops state-of-the-art simulation facilities to test and analyze medical equipment and procedures.

Current research includes an Agency for Healthcare Research and Quality (AHRQ)-funded multicenter study to develop and deploy standardized simulation training of the Anesthesiologist in Training. In this project, an analysis will be done of non-routine events reported concurrently by patients and their clinicians in four different domains – pediatrics, cardiac surgery, adult surgery, and anesthesia – from multiple medical centers.

Previously, in an AHRQ-funded grant led by CRiSS faculty members, a simulation-based training intervention enhanced the quality of care and improves care processes, medical technology and electronic health record user interface. CRiSS staff include Ross Beebe, Christine Goldsberry; Jeff Hotte; Andrew Kline, Eric Porterfield, MS, and Christopher Simpson.

CRiSS faculty and staff are integrally involved in user interface design and evaluation on numerous applications for VUMC’s EMRs, including Vanderbilt Outpatient Order Management Registry (an outpatient lab and diagnostic testing order system), StarPanel Customized Views (a improved method of presenting EMR data for specialists), and tools that help track the status of lab results throughout the surgical process. CRiSS is also conducting a number of advanced simulation projects.

CRiSS conducts a range of evidence-based care. In a study funded by the Anesthesia and Blood Institute (NHLBI) R21 grant, Dan France, PhD, modeled the factors affecting the ability of patients presenting postoperatively to the PACU to identify impending adverse events. In a VA-funded study of 1,000 surgical patients, CRiSS staff showed that a simulation-based training intervention enhanced the quality of care and improves care processes, medical technology and electronic health record user interface. CRiSS is also actively involved in two federal contracts to do informatics research: a National Institute of Standards and Technology (NIST)-funded project to define best practices for the design of Electronic Medical Records (EMRs), and an AHRQ-funded project to study the relationship between workflow and Electronic Health Record (EHR) use in ambulatory settings. Finally, CRiSS researcher Richard Holden, PhD, received a federal career development award (KL2) through the Vanderbilt Institute for Clinical and Translational Research to design a home-based software tool for patients with congestive heart failure to manage their symptoms and heart failure.

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CRiSS staff worked with members of Perioperative Informatics to develop a Universal Protocol/Time Out (UP/TO) at VUMC which increases patient safety by prompting clinicians – though easily followed visual check lists – to confirm important patient data.

In July 2012, CRiSS was the recipient of one of only 50 pilot grants (out of 1,400 applicants) from the Patient Centered Outcomes Research Institute (PCORI). In this project, an analysis will be done of non-routine events reported concurrently by patients and their clinicians in four different domains – pediatrics, cardiac surgery, adult surgery, and anesthesia – from multiple medical centers.

Selected Publications, 2011-2012

Original Manuscripts

- Austin T, Delpire E. Inhibition of KCa2.2 in mouse spinal cord neurones leads to hypersensitivity to thermal stimulation. Anesthesia and Analgesia 2011 Dec;113(6):1309-15.


disorders with chronic pain and psychiatric comorbidities in adolescence and pain patient subtypes in childhood predict functional gastrointestinal disorders.


Achieving Balance

The Vanderbilt Department of Anesthesiology is a dynamic group, providing the very best in patient care, presenting challenging educational programs for our trainees, and leading our specialty in investigational research. But productivity and career satisfaction isn’t all about work. We know how to take that same energy and have a great time.

We gather regularly for family-friendly events, including our Annual Department Picnic, events to welcome new residents, fundraisers for our Vanderbilt International Anesthesia program, and other fun activities throughout the year. Here are just a few images from our events.