Cleveland Clinic

Outcomes 2006

Anesthesiology, Critical Care Medicine and Comprehensive Pain Management


U.S.News
America's Best Hospitals
U.S.News
America's Best Hospitals
U.S.News
America's Best Hospitals
U.S.News
America's Best Hospitals
U.S.News
America's Best Hospitals
U.S.News
America's Best Hospitals
U.S.News
America's Best Hospitals
U.S.News
America's Best Hospitals

Outcomes | 2006

Quality counts when referring patients to hospitals and physicians, so Cleveland Clinic has created a series of outcomes books similar to this one for its institutes and departments. Designed for a health care provider audience, the outcomes books contain a summary of our surgical and medical trends and approaches; data on patient volume and outcomes; and a review of new technologies and innovations. We hope you find these data valuable. To view all our outcomes books, visit Cleveland Clinic's Quality Web site at clevelandclinic.org/quality/outcomes.

Table of Contents

Chairman's Letter

Outcome data have been like car styles. Everyone claims to have the best and only the Edsel is out of the running. This year is when car styles and the outcome data separate; we now have some substantial data about our results and what matters to morbidity ("hard" complications) and mortality after operations, and after pain therapy. Increasingly, we are gathering outcome data and data on the empathy patients feel. We are best at the former and we hope to become best at the latter.

I have been privileged for 20 months to be Chair of this Division and to visit in the last six years over 60 different institutions that profess to have high quality care. I am proud to have been asked to work here – this Division of Anesthesiology, Critical Care Medicine and Comprehensive Pain Management has the best outcomes I've seen. Patients here have fewer complications and have a quicker functional return after surgery and after pain therapy than any institution I have visited in the nation, or the world. Those are bold statements. I believe these are the best Anesthesia, Critical Care and Pain Therapy teams in the world. But we are just now accumulating the outcome data that substantiate those statements. Clearly, Cleveland Clinic has the best outcomes in the world for cardiac surgery; Cleveland Clinic cardiac surgical data is not just the result of the surgeons alone. It is a tremendous team in which preoperative evaluation and optimization, intraoperative care, critical care, and, yes, even in some instances, pain therapy contribute to a continuum that promotes excellent outcomes.

Last year this Division provided over 100,000 anesthetics, over 40,000 critical care consultations, and served around 110,000 pain therapy visits. In the prior year's book we saw a quicker return to functional recovery and reduced costs for those having their back pain treated by our Department of Comprehensive Pain Management. This year we have gathered more true outcome data, to show that those who refer patients for surgery, for preoperative evaluation and for pain therapy to Cleveland Clinic, are smart and make their patients' outcomes better.

Many of you know that I am involved in promoting preventive care; we do that daily in our preoperative clinics, trying to optimize patient well-being and, thereby, make them the equivalent of 10 years younger perioperatively. That decreases their perioperative morbidity since in every operation studied, complications and mortality increase with age of the patient.

I believe you will enjoy this book and I hope you will feel confident to refer the patients preoperatively for surgical care, for critical care and for pain therapy to Cleveland Clinic. We aim to serve your patients and through them, you, to make them consider you the smartest physician possible. Thank you for taking the time to read this and to more than kick the tires on these important outcome data.

Michael F. Roizen, M.D.
Chairman, Division of Anesthesiology, Critical Care Medicine
and Comprehensive Pain Management

Division Overview

2006 Statistical Highlights

Cardiothoracic Anesthesiology

Staff anesthesiologists	22
Certified registered nurse anesthetists	19
Total anesthetics for acquired adult cardiac surgery patients (See Pediatric Anesthesiology for pediatric cardiac cases)	3,577
Total anesthetics for thoracic surgery patients	1,357
Total Cardiovascular Intensive Care Unit (CVICU) beds	55
Total Intensive Care Unit (ICU) patient days	15,985
Full-length scientific publications with resident or fellow co-authors	4
External lectures presented	24

General Anesthesiology

Staff anesthesiologists	57
Certified registered nurse anesthetists	37
Surgical anesthesia cases	>37,000
Surgical anesthesia case-hours	>109,000
Preoperative consultations with patients	14,259
Faculty appointments in Cleveland Clinic Lerner College of Medicine	14
Full-length scientific publications with resident or fellow co-authors	29
External lectures presented	>80
Sustained patient satisfaction “excellent” rating	>87%

Perioperative Care integrates preoperative assessment, same-day surgery unit, post-anesthesia care unit and in-house consultation team.

Surgical Critical Care Section provided critical care services for >10,700 patient-days in Surgical Intensive Care Unit, new Vascular Surgery Care Unit and new Hospital Transfer Unit.

Pre-Anesthesia Consultation & Evaluation (PACE) Clinic collaborates with Internal Medicine Perioperative Assessment Consultation & Treatment (IMPACT) Center for medical optimization.

Research emphasis in department achieved impressive results

Peer-reviewed or indexed publications	>40
IRB-approved research protocols involving 22 staff anesthesiologists as principal investigators	42
Externally funded grants	8

Department continued developments in state-of-the-art electronic information systems

Anesthesia Record-Keeping System (ARKS)

HealthQuest© patient assessment and clinical history

Perioperative Health Documentation System (PHDs) to capture risk-adjusted outcomes, recovery quality and patient satisfaction

Outcomes Research

Staff anesthesiologists	15
2006 published peer-reviewed papers	17
Number of patients enrolled in studies in 2006	280

Pain Management

Pain Management Specialists	21
Nurse Practitioners and Physician Assistants	9
Total patient visits	111,846
Procedures performed	37,983
New patients	11,089
Main Campus patients outside Ohio	37%
Full-length scientific publications with resident or fellow co-authors	17
External lectures presented	96

Pediatric Anesthesiology

Staff anesthesiologists	14
Certified registered nurse anesthetists	5
External lectures presented	11
Pediatric general anesthetic cases	6,257
Pediatric cardiac anesthetic cases	522

Regional Anesthesiology Practice

Staff anesthesiologists	62
Certified registered nurse anesthetists	66
Total anesthetic cases	5,999

2006 Division Overview

Cardiothoracic Anesthesiology

The Department of Cardiothoracic Anesthesiology provides anesthesia and critical care for the largest cardiothoracic surgical practice in North America. The Cleveland Clinic Heart and Vascular Institute's rating as America's #1 Heart Center for 12 consecutive years by *U.S.News & World Report* stems from great contributions from each of the cardiac diagnostic, therapeutic, surgery and patient care groups with their various administrative services.

Our anesthesiologists and critical care specialists provide a full spectrum of perioperative anesthesia services for cardiac and thoracic surgical patients including a full-time intensivist's presence in the Cardiovascular Intensive Care Unit (CVICU), respiratory consultation and postoperative pain management.

The mission of the Department of Cardiothoracic Anesthesiology is to demonstrate excellence within each of the various disciplines under its direction and a commitment to quality in every facet of practice, particularly for patients and their families. We strive to collaborate and interact with other caregivers within Cleveland Clinic and to respond positively to problems brought to our attention.

General Anesthesiology

The mission of the Department of General Anesthesiology is "To be the leader in patient care, education and patient-focused research in anesthesiology and critical care medicine."

The department achieved significant progress in 2006, consistent with our mission statement, by focusing our efforts in the areas of patient care, practice environments, academics and planning. The department's largest growth areas were in venues outside the main operating suite, specifically in anesthesia for neuro-interventional procedures, the electrophysiology suite and the endoscopy suite.

We are especially pleased to recognize our anesthesia section heads and the section staff anesthesiologists for their efforts that resulted in top rankings nationally for Cleveland Clinic specialties in the July 2006 "America's Best Hospitals" issue of *U.S.News & World Report*.

Our professional staff anesthesiologists make up one of the most accomplished academic anesthesia departments nationally. They pursue clinical teaching, didactic and leadership roles in each of these programs:

Anesthesiology Residency, among the three largest training programs nationally.

Nationally recognized Cleveland Clinic Lerner College of Medicine.

Cleveland Clinic School of Nurse Anesthesia.

Our staff anesthesiologists are highly accomplished in medical literature and in leadership positions in national anesthesiology societies. In 2006, we collaborated in the first accomplishments of our Division's new Department of Outcomes Research and coordinated efforts within our department by appointing a Director of Research.

Outcomes Research

The Department of Outcomes Research is part of the international Outcomes Research Group. The group, with leadership at Cleveland Clinic, includes more than 80 investigators in 10 countries who have appointments in 25 universities.

Outcomes Research is anesthesia's largest academic research organization. The group typically runs about 90 simultaneous studies and publishes more than 35 full papers per year, including many in high-profile journals.

Daniel I. Sessler, M.D. is Chair of the Cleveland Clinic Department and Director of Outcomes Research; the Associate Director and Vice-chair Designate is Andrea Kurz, M.D.

Pain Management

Cleveland Clinic's Department of Pain Management is one of the first institutions of its kind in the nation. Its physicians have been pioneers in interventional and comprehensive pain management for nearly two decades; it is dedicated to serving the needs of people with pain. We are the nation's most comprehensive pain clinic, managing the whole spectrum of acute, chronic and cancer pain. By far, care is delivered to the largest number of patients with the most diverse pain conditions. Under the leadership of the Founding Chair, Nagy Mekhail, M.D., Ph.D., the department has grown dramatically from 9,000 total patient encounters in 1996 to 111,846 in 2006.

Our staff performs the largest number of interventional pain procedures in the country. For 2006, 37,983 procedures were performed, including therapeutic, diagnostic and prognostic blocks in patients with acute, chronic and cancer pain. A large number of neuromodulation devices are implanted to manage intractable pain conditions. These implants include spinal cord stimulators, peripheral nerve stimulators and intrathecal pumps. Total number of new neuromodulation implants was 367, a 15% increase over 2005.

Our physicians pioneered the use of some of the most innovative and cutting-edge interventions in pain management, including intradiscal electrothermal annuloplasty (IDET), nucleoplasty, kyphoplasty, radiofrequency ablation, cryoneurolysis, and

neuromodulation devices. Some innovative and novel applications of new technologies include the use of spinal cord stimulation to treat chest wall pain, pelvic pain, headache, neuropathic pain as well as peripheral vascular disease.

We are first in the nation to master and utilize transdiscal radiofrequency ablation, a novel technique to treat symptomatic degenerative disc disease.

Inpatient acute-pain and chronic-pain consult services are provided. A large number of neuraxial and peripheral nerve catheters for perioperative pain have been placed and managed. We also manage intravenous patient-controlled analgesia pumps for a large number of patients referred by various surgical services. In addition to providing consults for chronic pain patients, patients admitted with implanted devices or catheters are managed. The department also boasts an active complementary pain management service, including acupuncture and spinal manipulation therapy.

The Department of Pain Management is a leader in a number of areas of clinical and basic research. We are involved in and lead a large number of prospective, randomized, controlled trials. These trials include medication management, interventional blocks, and devices and implantable neuromodulation technology.

Our research projects on calcium regulation of sensory neurons and in locomotion are funded by substantial grants from the American Heart Association and the National Institutes of Health.

The Pain Management fellowship program is one of the largest and most prestigious programs in the nation. Advanced training to residents, fellows and practice physicians from around the world is provided.

We believe in the comprehensive interdisciplinary and multimodal approach to the management of pain. For that reason, a Cancer Pain Clinic service is being established in collaboration with our oncology and palliative care services; similar cooperative services with the Headache Center, pediatric rehabilitation and Digestive Disease Center are underway. Pain Management is committed to providing quality comprehensive care to patients as well as continued communication with referring physicians.

Pediatric Anesthesiology

The Department of Pediatric Anesthesiology was formally established within the Division of Anesthesiology in May 2006. Members of the department are committed to the highest levels of pediatric care and support, from minor outpatient procedures to complex surgeries on newborn and pediatric patients. Over 6,700 patients were cared for in 2006 by our faculty at the main campus, including the Pediatric General and Pediatric Cardiac Operating Rooms of the Children's Hospital, the Radiology Suites, the Pediatric Cardiac Catheterization Lab, the Outpatient Surgical Center and Cole Eye Institute. Members of our department have taken leadership roles within Cleveland Clinic and the Division of Anesthesia at all levels, such as the newly elected President of the Medical Staff, Julie Niezgoda, M.D.

Our faculty provides teaching not only within Cleveland Clinic and its hospitals, but also presents at numerous meetings nationally and internationally, including the annual meetings of the American Society of Anesthesiology and the Society for Pediatric Anesthesia. Invited lectures were given by our department members in South America, the Middle East and Europe on a wide variety of topics. Many are involved in ongoing research protocols and national society programs.

New technologies are constantly being evaluated for their usefulness within our department. If practical, these are introduced to supplement the already high standard of care. Use of ultrasound for placement of both nerve blocks and intravascular catheters is now common practice and was improved with the acquisition of a newer, more powerful ultrasound console. Loran Mounir Soliman, M.D., newly named Director of the Nerve Block Program, has taken his skills with this technique and is now using ultrasound throughout the General Anesthesia Operating Rooms. Additional Near Infrared Reflectance Spectroscopy (NIRS) monitors were implemented to help optimize neurological outcomes in our complex cardiovascular and orthopaedic patients and a pediatric anesthesiology work area was created in the MRI imaging suite to manage our growing patient load.

The ACGME-approved fellowship in Pediatric Anesthesiology at Cleveland Clinic is one of the few in Ohio and the only one in Northern Ohio. Four fellows underwent additional training in this challenging and rewarding field at Cleveland Clinic during the course of the year, while supplementing our complement of Cleveland Clinic resident trainees and CRNAs. Our fellows rotated in all of our anesthetizing locations and on specialty services such as the Postoperative Pain Service.

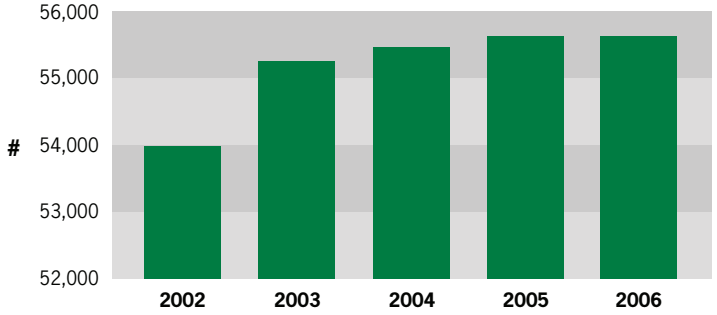
Regional Anesthesiology Practice

Cleveland Clinic's world-class patient care is not limited to the confines of its main campus, but extends into the various Cleveland Clinic hospitals and family health centers conveniently located throughout Cuyahoga and Lorain counties. This strategic positioning of facilities gives our patients the ability to receive the best care possible, closer to home.

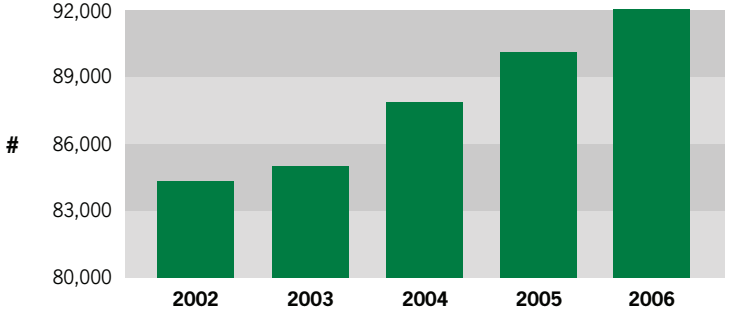
The Regional Anesthesiology Practice is devoted to putting patients first and providing outstanding care. Our current locations are Beachwood Family Health and Ambulatory Surgery Center, Euclid Hospital, Hillcrest Hospital, Huron Hospital, Lorain Family Health and Ambulatory Surgery Center, Lutheran Hospital, Marymount Hospital and Strongsville Family Health and Ambulatory Surgery Center. A devoted staff of 62 anesthesiologists and 66 anesthetists provides over 55,000 anesthetics annually. Twenty-four hour obstetric coverage is provided by our highly trained staff at Hillcrest, Huron and Marymount hospitals. Obstetric anesthesiology training is provided to Cleveland Clinic residents by staff at Hillcrest Hospital.

The Regional Anesthesia Practice has demonstrated steady growth over the past five years in both case volume and hours.

Total Anesthesia Cases



Total Anesthesia Hours



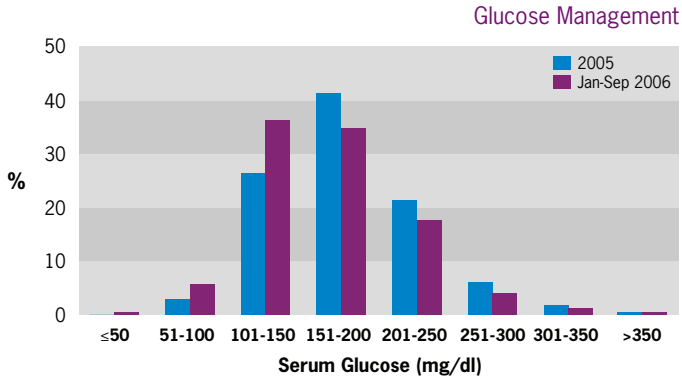
Quality & Outcome Measures

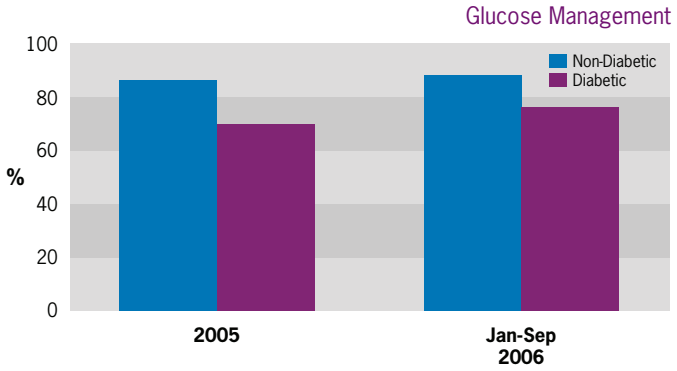
Cardiothoracic Anesthesiology

Glucose Management

The degree of body stress associated with major surgery is reflected by perioperative serum glucose levels. It has been reported perioperative control of glucose to near normal levels is associated with improved outcomes in all patients, particularly in diabetics. Now over 98% of our cardiac surgery patients receive continuous, intraoperative insulin infusions to achieve this goal. The initial ICU glucose level reflects success of intraoperative management and facilitates tighter postoperative control.

The first graph illustrates increased success in the first nine months of 2006 compared to 2005 in both diabetic and nondiabetic surgical patients. The second graph illustrates glucose levels fall into a tighter, more desirable range for diabetic patients. There has been a significant reduction in major cardiac morbidity between 2005 and 2006 (incidence of 4.5% vs. 1.9%, p= 0.011).

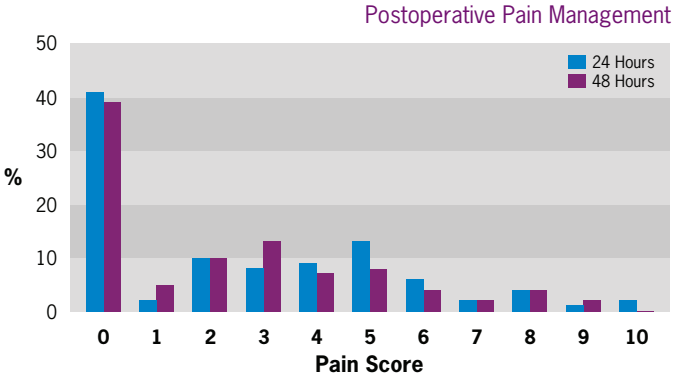




Data Source: Cardiothoracic Anesthesia Patient Registry

Open Thoracotomy Postoperative Pain Management

Unless contraindicated, it is our practice to utilize epidural analgesia to suppress the postoperative pain associated with open thoracotomy lung surgery patients. A group of these patients was surveyed for the initial 48 hours following surgery; it was found over 40% were pain free (pain score of 0), while 63% had either mild or no pain (pain score of 3 or less) at 24 hours.

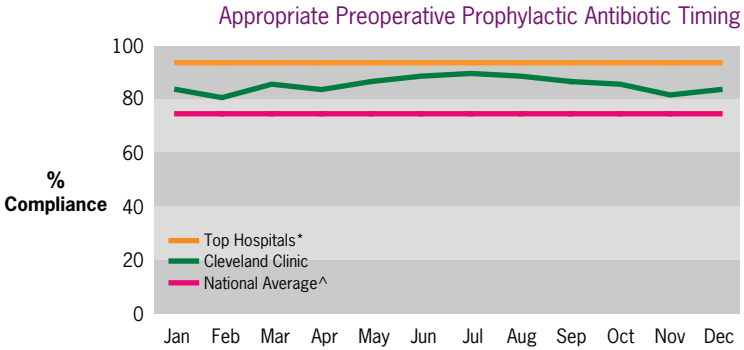


Data Source: Cardiothoracic Anesthesia Patient Registry

General Anesthesiology

Surgical Infection Prevention

Surgical site infections contribute to surgical morbidity and mortality in all specialties. Timely administration of antibiotics prior to surgery in appropriate patients has been shown to reduce surgical site infections. A multidisciplinary team, involving Surgery, Infectious Disease, Anesthesia, Nursing and Quality, work to ensure patients receive antibiotics in a timely fashion. Data collected show our successful results:



Source: United States Department of Health and Human Services, Hospital Compare Most current reported discharges April 2005 to March 2006.

*"Top Hospitals" represent the top 10% of reporting hospitals nationwide.

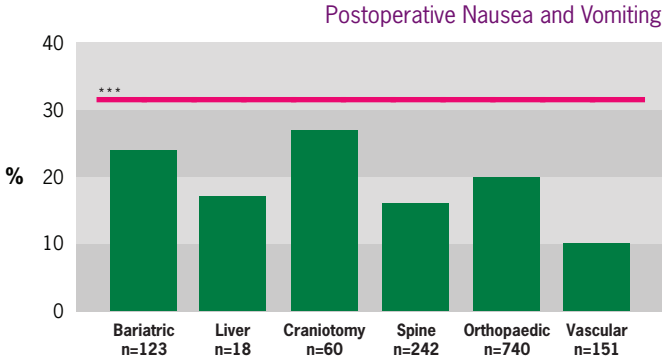
^National average of all reporting hospitals in the United States.

Postoperative Nausea & Vomiting

Postoperative patient experience data are collected on the second postoperative day via direct interview by clinical personnel using the Iowa Satisfaction with Anesthesia Survey for six surgery subsets: major joint replacement, major vascular surgery, bariatric surgery, liver transplantation or resection, craniotomy and spine surgery. Some patients may not be interviewed (*e.g.*, those admitted to an ICU). Responses are available for over 1,300 patients from the inception of the program in mid-May 2006 through year-end 2006.

The response set to the question "I threw up or felt like throwing up" includes six choices: disagree very much, disagree moderately, disagree slightly, agree slightly, agree moderately, and agree very much. The first two responses are regarded as favorable.

Staff anesthesiologists manage postoperative nausea and vomiting both in the intraoperative period and in the immediate postoperative period in the Post-Anesthesia Care Unit.

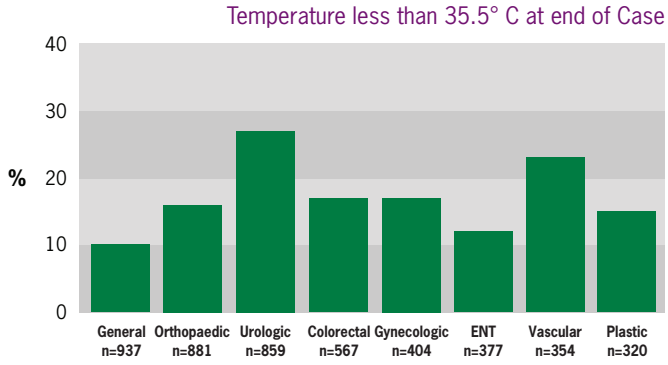


Data source: Perioperative Health Documentation System (PHDS)

***Benchmark: Apfel C, et al. A factorial trial of six interventions for the prevention of postoperative nausea and vomiting. *N Engl J Med* 2004; 350: 2441-2451.

Temperature at End of Case

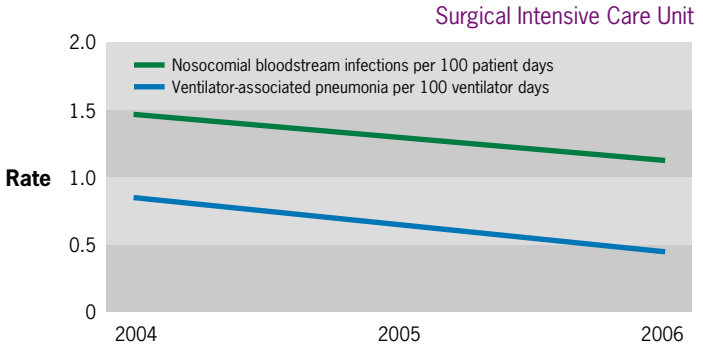
Normothermia is considered one of the potential future pay-for-performance measures for anesthesiologists. It is associated with lower infection rates, less bleeding and lower risk for ischemic cardiovascular events. The Department, therefore, is reporting on patient temperature at the end of the case as this represents the most appropriate measure of the outcome of intraoperative efforts to establish temperature homeostasis.



Data source: Anesthesia Record Keeping System (ARKS)

Outcomes Measures in the Surgical Intensive Care Unit

Ventilator-associated pneumonia and nosocomial bloodstream infections are widely considered likely indicators for quality in the critical care environment. These indicators have been monitored for several years to document improvement in outcomes from having instituted clinical care protocols in the Surgical Intensive Care Unit.



Data source: Cleveland Clinic Infection Control

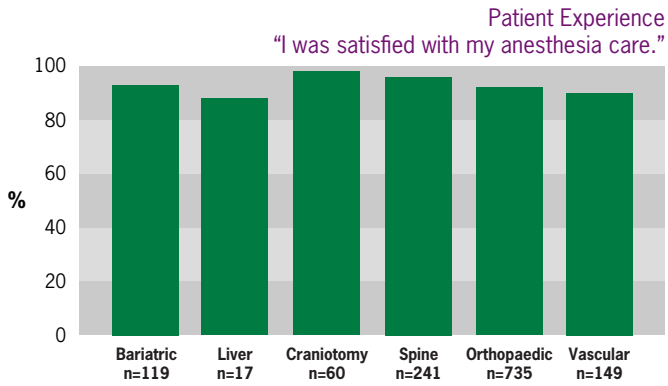
Patient Experience with Anesthesia Care

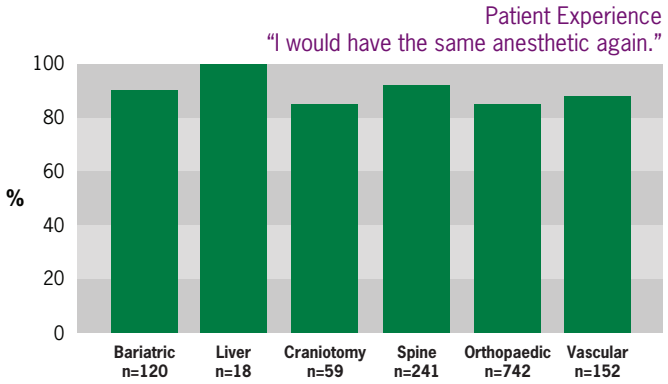
Postoperative patient experience data are collected on the second postoperative day via direct interview by clinical personnel using the Iowa Satisfaction with Anesthesia Survey for six surgery subsets: major joint replacement, major vascular surgery, bariatric surgery, liver transplantation or resection, craniotomy and spine surgery. Some patients may not be interviewed (*e.g.*, admitted to an ICU). Responses are available for over 1,300 patients from the inception of the program in mid-May 2006 through year-end 2006.

The response set includes six choices: disagree very much, disagree moderately, disagree slightly, agree slightly, agree moderately, and agree very much. The latter two responses are regarded as favorable.

Staff anesthesiologists are notified of unfavorable responses immediately after the interview via automated page so they may visit the patient and discuss their concern.

Results by surgery subset are shown for two key patient experience questions:



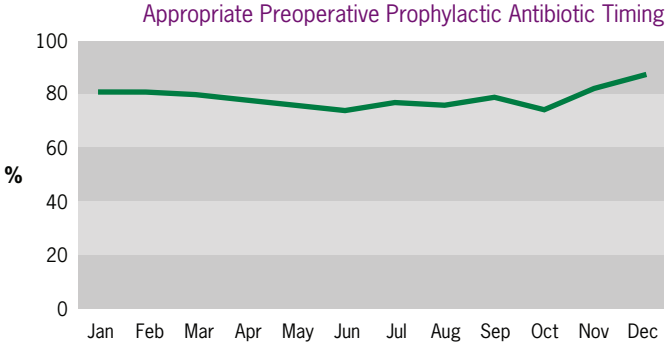


Data source: Perioperative Health Documentation System (PHDS)

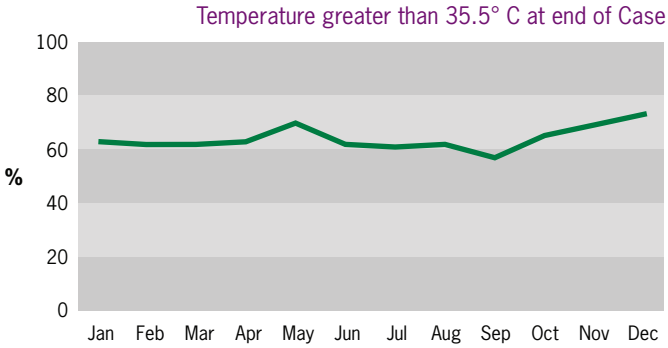
Pediatric Anesthesiology

Surgical Infection Prevention

Surgical site infections contribute to surgical morbidity and mortality in all specialties. The timely administration of antibiotics prior to surgery in appropriate patients has been shown to reduce surgical site infections. A multidisciplinary team, involving Surgery, Infectious Disease, Anesthesia, Nursing and Quality, work to ensure patients receive antibiotics in a timely fashion. The goal for anesthesia-providers is to administer antibiotics ordered by the surgeon in 60 minutes or less prior to incision time (with the exception of Vancomycin which is a two hour window prior to incision).



Data source: Anesthesia Record Keeping System (ARKS)



Data source: Anesthesia Record Keeping System (ARKS)

Measurement of end of case temperatures excludes cardiac and spine cases where hypothermia is induced by the anesthesia-provider. A case is considered normothermic if the mean of the last four to five temperature readings is >35° C.

Outcomes Research

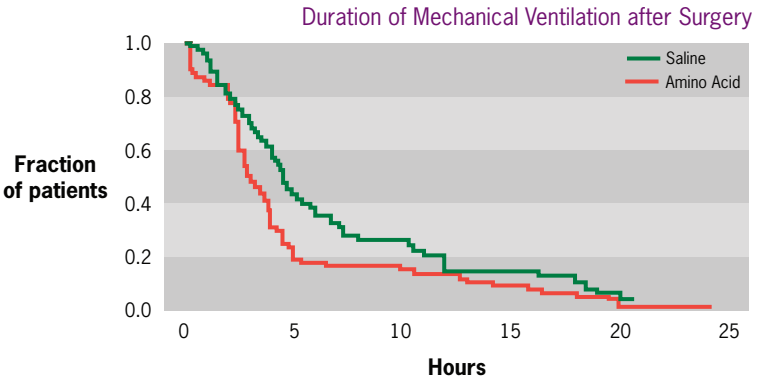
Amino Acid Infusion in Off-pump Coronary Artery Bypass Patients
Umenai T, Nakajima Y, Sessler DI, et al. Perioperative amino acid infusion improves recovery and shortens the duration of hospitalization after off-pump coronary artery bypass grafting. *Anesth Analg* 2006;103:1386-1393.

Perioperative amino acid infusion helps maintain core temperature and improves patient outcomes following gynecologic and orthopedic surgery. The goal of the study was to determine prospectively the effect of amino acid infusion on esophageal core temperature and postoperative outcomes during off-pump coronary artery bypass grafting (CABG). One hundred eighty consecutive patients undergoing primary elective or urgent off-pump CABG were randomly divided into one of two groups: intravenous amino acid infusion group (4 $kJ \cdot kg^{-1} \cdot h^{-1}$ starting 2 hours before surgery) or saline infusion group (similar period and volume of saline infusion). Esophageal core temperature at end of surgery was 35.6° C in saline

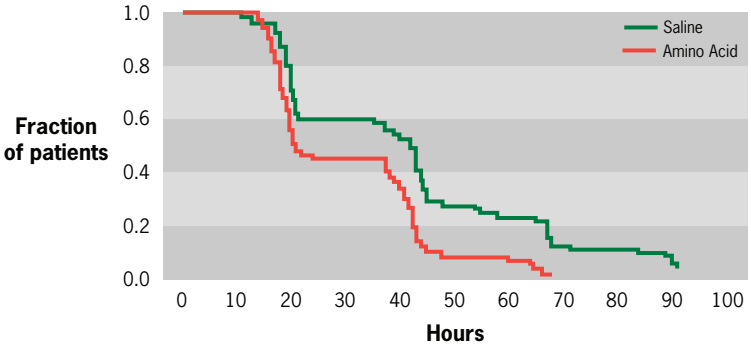
infusion group and 36.1° C in amino acid infusion group (*P*=0.01). Kaplan-Meier analysis demonstrated patients given amino acids required a significantly shorter duration of postoperative mechanical ventilation (*P*=0.01). Furthermore, intensive care unit stay and days until fit for hospital discharge were significantly shorter in patients given amino acid (*P*=0.001and *P*=0.004, respectively).

Conclusion: Perioperative amino acid infusion in patients undergoing off-pump CABG effectively minimizes intraoperative hypothermia and improves postoperative recovery.

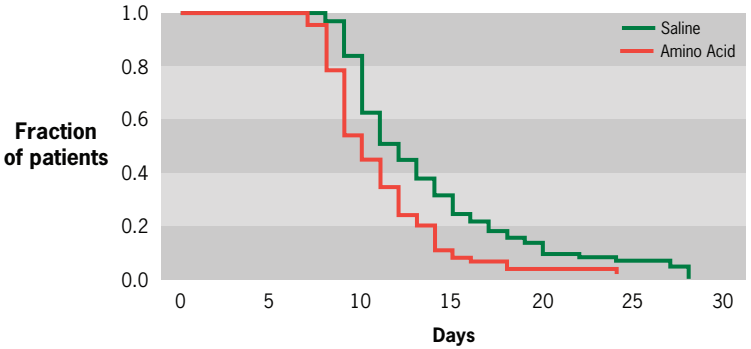
The following graphs demostrate Kaplan-Meier curves of the probability of remaining on mechanical ventilation (A), ICU stay (B), and hospitalization (C) over time comparing patients managed with amino acid infusion with those receiving saline infusion.



Duration of ICU Stay



Time until Fit for Hospital Discharge

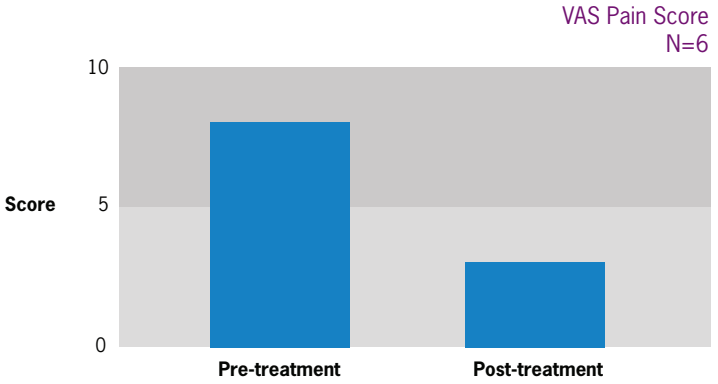


Pain Management

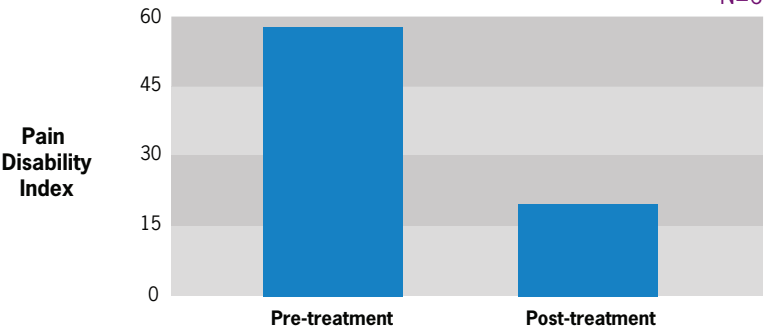
Spinal Cord Stimulation for Intractable Visceral Pelvic Pain

Kapural L, Narouze SN, Janicki TI, Mekhail N. Spinal cord stimulation is an effective treatment for the chronic intractable visceral pelvic pain. *Pain Med* 2006;7:440-443.

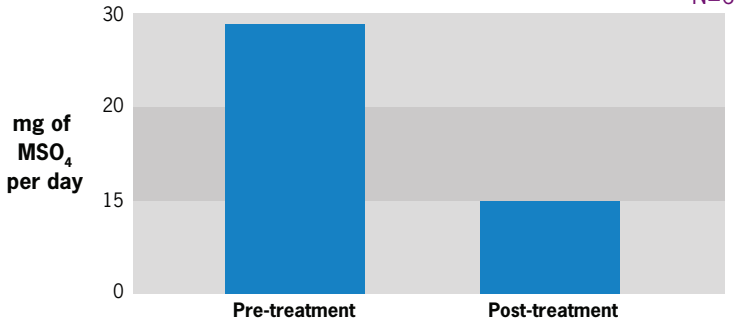
Improvement is noted in the quality of life in patients receiving spinal cord stimulation for the chronic intractable visceral pelvic pain. Pain Disability Index (PDI) is a functional outcome measure that examines disability levels in seven activities of daily living: family, recreation, occupation, social, sexual, life support and self-care activities.



PDI after Spinal Cord Stimulation
N=6



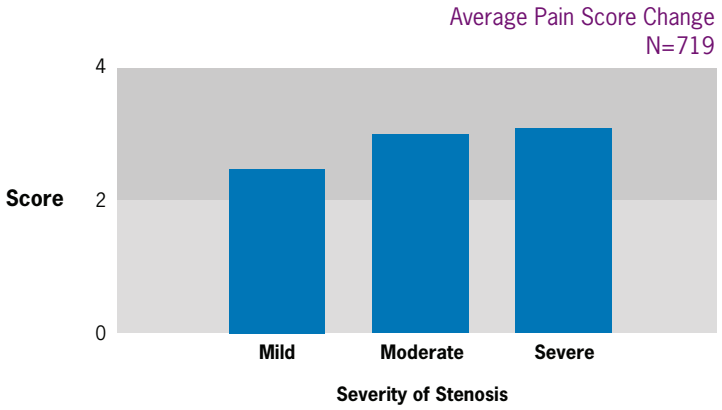
Opiate Consumption
N=6

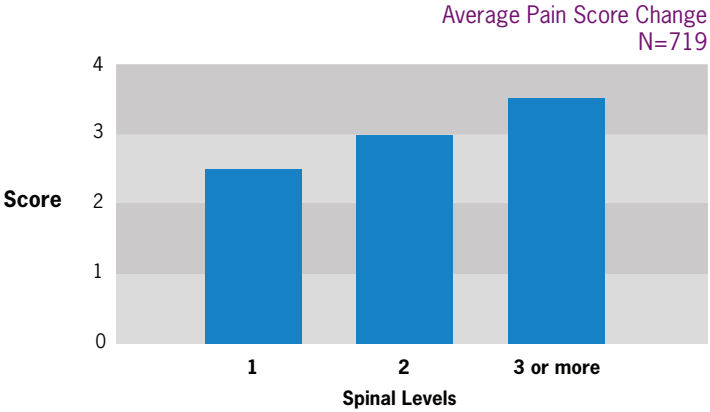


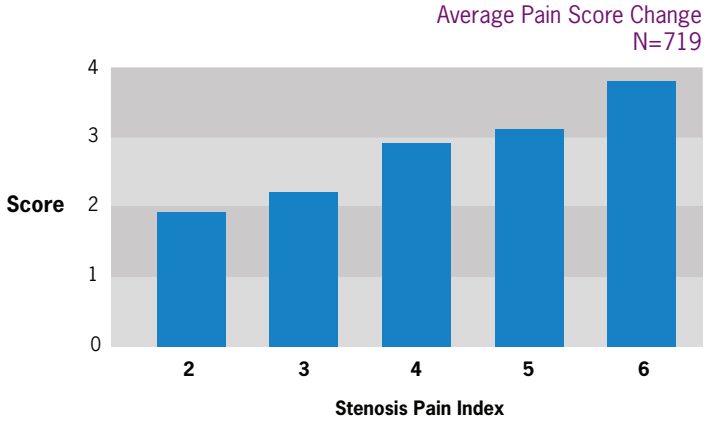
Lumbar Spinal Stenosis

Kapural L, Bena J, Mekhail N, McLain R, et al. Value of magnetic resonance imaging (MRI) in patients with painful lumbar spinal stenosis (LSS) undergoing lumbar epidural steroid injection.

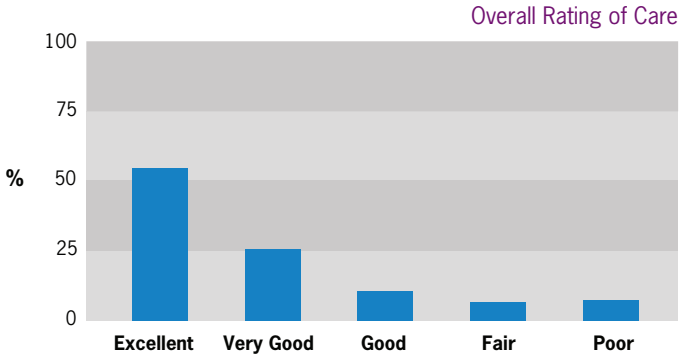
This study examined if the severity of lumbar spinal stenosis per MRI affects the outcomes of lumbar epidural steroid injection. Changes in pain scores were evaluated 8-12 weeks after a series of steroid injections. The percentage of patients who responded to the injection with pain reduction of >2 points was similar regardless of the severity of the spinal stenosis. The data suggest, however, patients with severe spinal stenosis at multiple levels (>3 segments) were less likely to benefit from epidural steroid injections.

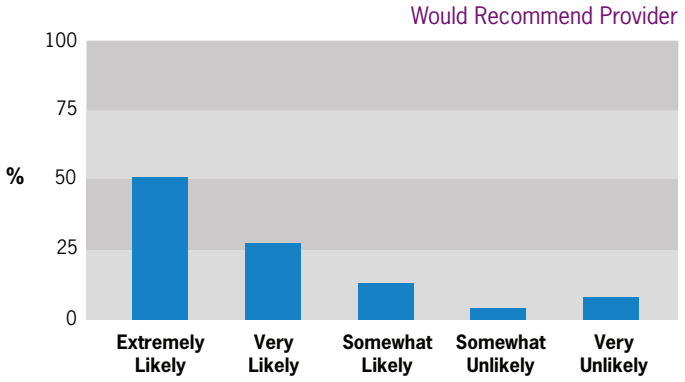



Average Pain Score Change
N=719
Score
4
3
2
1
0
1
2
3 or more
Spinal Levels


Average Pain Score Change
N=719
Score
4
3
2
1
0
2
3
4
5
6
Stenosis Pain Index

We ask our pain management patients about their experiences and satisfaction with the services provided by our staff. Although our patients are already indicating we provide excellent care, we are committed to continuous improvement.





Innovations

Cardiothoracic Anesthesiology

Recent trends in critical care emphasize patient safety, quality of care and organization of care delivery. The Cardiovascular Intensive Care Unit (CVICU) championed these evidence-based processes and has often taken a leadership role in adapting these processes to our institution and implementing the appropriate changes. Following are some of the many initiatives taken by the CVICU group.

Enhancing Communication among Caregivers, Patients and Families
Patient care is delivered by a single multidisciplinary ICU team. The team is centered on a core group of Critical Care physicians, providing 24/7 coverage of the CVICU and assisted by a group of advanced practice nurses with special training in critical care. The advanced practice nurses are unit-based (except in the Heart Transplant/ Heart Failure Unit) and play an important role in maintaining communication among the various groups of physicians participating in patient management, particularly with the cardiothoracic surgeons. They also provide feedback to referring physicians. This reorganization improved communication, eliminated duplication of effort and improved the speed of response to critical situations.

Family Support Group
A very active family support group is involved in helping families cope with the complexity of a patient's course.

CVICU Care Based on Latest Recommendations from National Organizations
CVICU manages multiple aspects of critical illness based on the latest recommendations available from organizations such as the Society of Critical Care Medicine, the American Heart Association and Institute for Healthcare Improvement (IHI), as well as on the extensive experience and research work of the critical care physicians, cardiothoracic surgeons and consultants collaborating in the CVICU. These improved processes are exemplified by the following: aggressive, goal-directed approach to septic shock, standardized approach to the management of postoperative atrial fibrillation, tight but safe glycemic control, and lung-protective ventilation strategies.

Lung-Protective Ventilation or "Low Stretch" Ventilation

Our postoperative ventilation management practice shifted to lung-protective ventilation or "low stretch" ventilation. This involves utilizing lower tidal volumes and higher positive end expiratory pressure (PEEP) to re-expand the lungs postoperatively. Research has shown that patients ventilated using these methods are at lower risk for mortality and postoperative complications.

Glycemic Control

Improvement of glycemic control has been continued across the perioperative continuum of care. Aggressive glycemic treatment protocol is initiated in the operating room with intravenous insulin and continued in the ICU. The IV insulin is then converted to a subcutaneous, long-acting insulin preparation prior to transfer out of the ICU setting and is continued on the regular nursing floors.

Early Renal Replacement Therapy

Patients showing signs of impending acute renal failure are now being treated with early renal replacement therapy in concert with recent data showing better long-term preservation of renal function.

General Anesthesiology

Peripheral Nerve Analgesia

A long-range goal is to extend our reach into the postoperative period with better information regarding patient satisfaction, pain, postoperative nausea and vomiting, malaise and other complications. Towards that objective, we recognize regional analgesia reduces postoperative pain, speeds recovery and enhances satisfaction. In 2006, a regional analgesia program was initiated featuring continuous femoral nerve analgesia for total knee replacements; regional analgesia use increased more than 50% in total knee replacement cases. In conjunction with our Perioperative Health Documentation System (PHDs) program, launched in 2006, outcomes are being measured after regional analgesia in knee replacement surgery. Preliminary analysis of data suggests reduction of pain and increased patient satisfaction.

Bariatric Surgery

The bariatric surgery program matured in 2006, warranting the creation of a clinical bariatric anesthesia group. Cleveland Clinic completed construction of two state-of-the-art surgical suites, where all instrumentation is essentially suspended off the floor, making the bariatric surgical experience optimal for the surgical team and patients. Special preparation/induction space was constructed to support bariatric surgery at a higher level as well. The collaborative design integrates the two surgical suites, the induction room and an observation room.

Perioperative Health Documentation System

For the first time, the PHDs features the integration of clinical information systems to provide data for the analysis of anesthesia-related perioperative outcomes. Intraoperative detailed data about anesthesia cases (ARKS) are combined with data from the hospital discharge system (ClinTrack) and with data from the evolving inpatient and outpatient electronic medical record at Cleveland Clinic (EpicCare).

The initial goal of this project is to electronically collect more than 80% of data to assess the perioperative health in as many as 100,000 surgical patients (40,000 on the main campus; the remainder in regional practices). Preoperative data is used to stratify risk, while postoperative health assessments include information from the traditional, immediate postoperative/predischarge hospital, along with postdischarge health outcomes and mortality up to one year, postoperatively. Routine reports will be available for operational and quality improvement purposes, while custom reporting will help support epidemiologic research.

This project achieved its first major milestone: rolling out a perioperative registry for patients in vascular surgery, orthopaedic major joint, liver transplantation, bariatric, craniotomy and spine in the Department of General Anesthesiology.

To date, PHDs maintains perioperative health information on nearly 3,000 patients in six procedure groups. Data transfers from the inpatient electronic medical record (EpiCare) and hospital discharge systems (ClinTrack) will allow outcomes information to be obtained for the entire inpatient stay. Opportunities for collaborative exchange of complementary data exist with several surgery departments.

Research and Publications

Department research activity continues to flourish. A number of important and positive developments include: 1) development of a faculty seed grant program, which affords faculty the benefits of rigorous peer review while making a guaranteed amount of resources available from department endowment funds; 2) the appointment of a Director of Research for the department to begin mentoring and supporting department faculty, improving research morale and offering critical, yet constructive analyses of projects; 3) collaboration with the new Department of Outcomes Research within our Division, which as already proved productive, with the creation of several new protocols to investigate important issues in perioperative care.

Pain Management

Infusion Technique Assists Functional Recovery and Pain Control Post-Surgery

A novel approach was introduced and studied to assist functional recovery and improve pain control after surgeries of the shoulder and knee for patients with frozen shoulder syndrome and chronic knee joint disorders after multiple knee surgeries. Infusion of local anesthetic and opiates through a tunneled epidural catheter, placed before surgery and kept for a few weeks after surgery, significantly improved range of motion and reduced pain associated with surgery. This method also reduced subsequent physical therapy for rehabilitation. Success of the techniques requires a team effort and open communication among the surgeon, pain management specialist, home care nurse, physical therapist and patient. We concluded that this technique is safe and can significantly improve clinical outcome in patients undergoing surgeries for common shoulder and knee arthropathies.

A Novel Radiofrequency System (Intervertebral Disc Biacuplasty) for the Treatment of Lumbar Discogenic Pain: Results of a Six-Month Pilot Study
Minimally invasive procedures used to heat the intervertebral disc (nucleus or annulus) in current clinical practice brought variable results when used in the treatment of discogenic pain. A six-month follow up after Intervertebral Disc Biacuplasty (IDB), a novel radiofrequency procedure, revealed significant improvements in patients' functional capacity (Oswestry and SF-36), pain scores (VAS) and opiate requirements.

Supraorbital Nerve Stimulation for the Treatment of Intractable Postherpetic Trigeminal Neuralgia
Postherpetic trigeminal neuralgia is often refractory to medical management. Peripheral nerve stimulation was used for years in the treatment of intractable neuropathic pain from peripheral nerve injury. Gasserian ganglion stimulation, however, has not been reliable in controlling trigeminal neuralgia, especially postherpetic neuralgia. We report a relatively simple, safe and effective treatment of intractable postherpetic trigeminal neuralgia with supraorbital nerve stimulation. A surgical flat "paddle" lead for the permanent implant was used to provide better current distribution, less current surges and better pain control.

Pediatric Anesthesiology

Peripheral Nerve Analgesia
The enthusiasm for regional anesthesia expanded to involve our pediatric patients. Children's pain, for decades, was underestimated and scarcely approached by most physicians due to unfamiliarity with the pediatric physiology and anatomy. Our pediatric anesthesia group took the challenge a few years earlier to manage the acute pain service for the children's hospital. In the last year, peripheral nerve analgesia became an essential tool in our arsenal for managing acute pediatric pain.

Peripheral nerve catheters proved their superior analgesic quality for our pediatric patients, allowing them to recover pain-free after their surgeries with minimal side effects. The use of this technique was expanded to involve our pediatric chronic pain patients, which allowed them prolonged pain control throughout aggressive rehabilitation.

The pediatric anesthesia group also adopted state-of-the-art technology for peripheral nerve analgesia, an ultrasound-guided technique. Because of direct visualization of anatomic structures using this technology, successful blocks using minimal local anesthetics have been possible in the smallest of infants. Another benefit includes fewer complications.

Regional Anesthesiology Practice

Peripheral Nerve Analgesia

The use of regional anesthesia has been demonstrated to improve postoperative pain relief, decrease nausea and vomiting and allow for earlier discharge, particularly in the outpatient setting. Hillcrest Hospital established a successful outpatient program in peripheral nerve blockade over a nine-year period. Recently, we experienced a great increase in both the type and number of regional blocks. Patients and surgeons demand peripheral nerve blocks as an alternative to general anesthesia.

Highlighted innovations in outpatient regional anesthesia, which allow for quick operating room turnover and immediate patient discharge from the hospital, include: 1) the addition of steroids to local anesthetic for shoulder surgery, and 2) nerve stimulator-guided paravertebral block for inguinal hernia surgery.

The addition of steroids to local anesthesia increased the length of an anesthetic block to approximately 24 hours. Historically, patients would spend one day in the hospital following shoulder surgery as a result of intractable pain; the interscalene block used for shoulder surgery without steroids lasts only 12 hours. Shoulder surgery can be done as an outpatient at Hillcrest Hospital using an interscalene block with the addition of steroids. Patients bypass recovery room and are discharged shortly thereafter. This technique improves patient lives, provides tremendous cost savings and frees up hospital beds for other patients.

The nerve stimulator has been an important tool in peripheral nerve blockade, because it improves the reliability of the block for surgical anesthesia. At Hillcrest Hospital, inguinal hernia surgery is performed routinely with a paravertebral block and sedation using a nerve stimulator for guidance. Our experience of placing over 2,000 paravertebral blocks using a nerve stimulator is unsurpassed in the country. Patients bypass recovery room and are discharged comfortably from the hospital shortly after surgery is completed. Patients are encouraged to ambulate much earlier, because they are not experiencing the moderate to severe pain typically associated with the procedure.

New Knowledge

Cardiothoracic Anesthesiology

Scientific Manuscripts

Atik FA, Navia JL, Krishnamurthi V, et al. Solitary massive right ventricular metastasis of renal cell carcinoma without inferior vena cava or right atrium involvement. *J Card Surg* 2006;21:304-306.

Cywinski JB, Koch CG, Krajewski LP, Smedira N, Li L, Starr NJ. Increased risk associated with combined carotid endarterectomy and coronary artery bypass graft surgery: a propensity-matched comparison with isolated coronary artery bypass graft surgery. *J Cardiothorac Vasc Anesth* 2006;20:796-802.

Duncan AI, Lin J, Koch CG, et al. The impact of gender on in-hospital mortality and morbidity after isolated aortic valve replacement. *Anesth Analg* 2006;103:800-808.

Hix JK, Thakar CV, Katz EM, et al. Effect of off-pump coronary artery bypass graft surgery on postoperative acute kidney injury and mortality. *Crit Care Med* 2006;34:2979-2983.

Insler SR, Sessler DI. Perioperative thermoregulation and temperature monitoring. *Anesthesiol Clin North America* 2006;24:823-837.

Knowles TP, Mullin RA, Hunter JA, Douce FH. Effects of syringe material, sample storage time, and temperature on blood gases and oxygen saturation in arterialized human blood samples. *Respir Care* 2006;51:732-736.

Koch CG, Khandwala F, Li L, Estafanous FG, Loop FD, Blackstone EH. Persistent effect of red cell transfusion on health-related quality of life after cardiac surgery. *Ann Thorac Surg* 2006;82:13-20.

Koch CG, Li L, Van Wagoner DR, et al. Red cell transfusion is associated with an increased risk for postoperative atrial fibrillation. *Ann Thorac Surg* 2006;82:1747-1756.

Koch CG, Li L, Duncan AI, et al. Toward an accurate assessment of the adverse effects of packed red blood cell transfusions in cardiac surgery. *Crit Care Med* 2006;34:3068-3069.

Koch CG. Literature review. *J Cardiothorac Vasc Anesth* 2006;20:121-123.

Koch CG, Li L, Duncan AI, et al. Transfusion in coronary artery bypass grafting is associated with reduced long-term survival. *Ann Thorac Surg* 2006;81:1650-1657.

Koch CG, Li L, Duncan AI, et al. Morbidity and mortality risk associated with red blood cell and blood-component transfusion in isolated coronary artery bypass grafting. *Crit Care Med* 2006;34:1608-1616.

Kongsaerepong V, Shiota M, Gillinov AM, et al. Echocardiographic predictors of successful versus unsuccessful mitral valve repair in ischemic mitral regurgitation. *Am J Cardiol* 2006;98:504-508.

Manlapaz M, Alfirevic A, Koch C. Anatomy of mitral valve. In: E-Echocardiography [book on CD-ROM]. Lincoln, Neb: JOS Interactive, 2006.

Mathew JP, Glas K, Troianos CA, et al. ASE/SCA recommendations and guidelines for continuous quality improvement in perioperative echocardiography. *Anesth Analg* 2006;103:1416-1425.

Mathew JP, Glas K, Troianos CA, et al. American Society of Echocardiography/ Society of Cardiovascular Anesthesiologists recommendations and guidelines for continuous quality improvement in perioperative echocardiography. *J Am Soc Echocardiogr* 2006;19:1303-1313.

Pitas G, Laurenzana EM, Williams DK, Owens SM, Gentry WB. Anti-phencyclidine monoclonal antibody binding capacity is not the only determinant of effectiveness, disproving the concept that antibody capacity is easily surmounted. *Drug Metab Dispos* 2006;34:906-912.

Takla G, Petre JH, Doyle DJ, Horibe M, Gopakumaran B. The problem of artifacts in patient monitor data during surgery: a clinical and methodological review. *Anesth Analg* 2006;103:1196-1204.

Walts PA, Murthy SC, Arroliga AC, et al. Tracheostomy after cardiovascular surgery: an assessment of long-term outcome. *J Thorac Cardiovasc Surg* 2006;131:830-837.

Book Chapters 2006

Higgins TL, Yared JP. Postoperative respiratory care. In: Kaplan JA, ed. Kaplan's Cardiac Anesthesia. 5th ed. Philadelphia:Elsevier Saunders; 2006:1087-1102.

Johnson B, Adi A, Licina MG, et al. Cardiac physiology. In: Kaplan JA, ed. Kaplan's Cardiac Anesthesia. 5th ed. Philadelphia: Elsevier Saunders; 2006:71-89.

Patel D, Scholten MF, Savage R, Reddy V. The future of image-guided therapies in interventional electrophysiology. In: Natale A, ed. Intracardiac Echocardiography in Interventional Electrophysiology. Abingdon [U.K.]: Informa Healthcare; 2006: 145-152.

General Anesthesiology

Scientific Manuscripts

Avitsian R, Abdelmalak B, Saad S, Xu M, O'Hara J, Jr. Upper extremity arteriovenous fistula does not affect pulse oximetry readings. *Nephrology* 2006;11:410-412.

Avitsian R, Doyle DJ, Helfand R, Zura A, Farag E. Successful reintubation after cervical spine exposure using an Aintree intubation catheter and a Laryngeal Mask Airway. *J Clin Anesth* 2006;18:224-5.

Barsoum WK, Helfand R, Krebs V, Whinney C. Managing perioperative risk in the hip fracture patient. *Cleve Clin J Med* 2006;73(Suppl 1):S46-50.

Borkowski RG. Ambulatory anesthesia: preventing perioperative and postoperative complications. *Cleve Clin J Med* 2006;73(Suppl 1):S57-61.

Chand B, Gugliotti D, Schauer P, Steckner K. Perioperative management of the bariatric surgery patient: focus on cardiac and anesthesia considerations. *Cleve Clin J Med* 2006;73(Suppl 1):S51-6.

Cywinski JB, Koch CG, Krajewski LP, Smedira N, Li L, Starr NJ. Increased risk associated with combined carotid endarterectomy and coronary artery bypass graft surgery: a propensity-matched comparison with isolated coronary artery bypass graft surgery. *J Cardiothorac Vasc Anesth* 2006;20:796-802.

Cywinski JB, Parker BM, Clair D. Left ventricle perforation during endovascular repair of an infrarenal aortic aneurysm. *J Cardiothorac Vasc Anesth* 2006;20:247-50.

Deogaonkar A, Deogaonkar M, Lee JY, Ebrahim Z, Schubert A. Propofol-induced dyskinesias controlled with dexmedetomidine during deep brain stimulation surgery. *Anesthesiology* 2006;104:1337-1339.

Dorotta I, Staszak J, Takla A, Tetzlaff JE. Teaching and evaluating professionalism for anesthesiology residents. *J Clin Anesth* 2006;18:148-160.

Dua S, Maurtua MA, Cywinski JB, Deogaonkar A, Waters JH, Dolak JA. Anesthetic management for emergency cesarean section in a patient with severe valvular disease and preeclampsia. *Int J Obstet Anesth* 2006;15:250-253.

Elkassabany N, Tetzlaff JE, Argalious M. Anesthetic management of a patient with stiff person syndrome. *J Clin Anesth* 2006;18:218-220.

Farag E, Chelune GJ, Schubert A, Mascha EJ. Is depth of anesthesia, as assessed by the Bispectral Index, related to postoperative cognitive dysfunction and recovery? *Anesth Analg* 2006;103:633-640.

Farag E, Chahlavi A, Argalious M, Ebrahim Z, Hill R, Bourdakos D, Woo H. Using dexmedetomidine to manage patients with cocaine and opioid withdrawal, who are undergoing cerebral angioplasty for cerebral vasospasm. *Anesth Analg* 2006;103:1618-1620.

Farag E, Doyle DJ. Vision loss after spine surgery: a new hypothesis. *Can J Anaesth* 2006;53:420.

Friedman AD, Maurer WG, Byrd MC, Cook JR, Lorenz RR. A cytomegalovirus-associated mass presenting with laryngeal obstruction. *Arch Otolaryngol Head Neck Surg* 2006;132:1375-1378.

Franklin P, Rosenbaum R, Cary MP, Roizen MF: Using sequential email messages to promote health behaviors: evidence of feasibility and reach in a worksite sample. *J Med Internet Res* 2006;8:e3.

Hayek SM, Ritchey RM, Sessler D, Helfand R, Samuel S, Xu M, Beven M. Bourdakos D, Barsoum W, Brooks P. Continuous femoral nerve analgesia after unilateral total knee arthroplasty: stimulating versus nonstimulating catheters. *Anesth Analg* 2006;103:1565-1570.

Jahan A. Septic shock in the postoperative patient: three important management decisions. *Cleve Clin J Med* 2006;73 (Suppl 1):S67-71.

Krebs VE, Higuera C, Barsoum WK, Helfand R. Blood management in joint replacement surgery: what's in and what's out. *Orthopedics* 2006;29:801-803.

Maurer WG, Hebert CJ. Quality measurement: who is measuring outcomes and what are patients being told? *Cleve Clin J Med* 2006;73(Suppl 1):S30-35.

Parker BM. Anesthetics and anesthesia techniques: impacts on perioperative management and postoperative outcomes. *Cleve Clin J Med* 2006;73(Suppl 1): S13-17.

Quraishi SA, Orkin FK, Roizen MF. The anesthesia preoperative assessment: an opportunity for smoking cessation intervention. *J Clin Anesth* 2006;18:635-640.

Roizen MF. Are we keeping the secrets to ourselves, or just adopting ideas faster? or, Is there a second residency in your future? *J Clin Anesth* 2006;18:403-404.

Roizen MF. Deadly errors in the hospital can be avoided: a renowned doctor shares his secrets. *Bottom Line/Health* 2006;20:7-9.

Roizen, MF: The surgical burden: how to prevent a crisis in perioperative medicine. *Cleve Clin J Med* 2006; 73(Suppl 1):S8-12.

Schubert A, Deogaonkar A, Lotto M, Niezgoda J, Luciano M. Anesthesia for minimally invasive cranial and spinal surgery. *J Neurosurg Anesthesiol* 2006;18:47-56.

Schubert A. Clinical Forum: A great venue for adult learning. *ASA Newsl* 2006;20:25-27.

Schubert A, Deogaonkar A, Drummond JC. Precordial Doppler probe placement for optimal detection of venous air embolism during craniotomy. *Anesth Analg* 2006;102:1543-1547.

Takla G, Petre JH, Doyle DJ, Horibe M, Gopakumaran B. The problem of artifacts in patient monitor data during surgery: a clinical and methodological review. *Anesth Analg* 2006;103:1196-1204.

Tetzlaff J. Filling the Chairs at SAACAAPD Meeting. *ASA Newsl* 2006;70:21.

Zura A, Doyle DJ, Avitsian R, DeUngria M. More on intubation using the Aintree catheter. *Anesth Analg* 2006;103:785.

Books and Book Chapters

Barth CD, Ebert TJ. Autonomic nervous system. In: Hemmings HC Jr., Hopkins PM, eds. Foundations of Anesthesia: Basic Sciences for Clinical Practice. 2nd ed. Philadelphia: Mosby Elsevier; 2006:403-417.

Donlon JV Jr., Doyle DJ, Feldman MA. Anesthesia for eye, ear, nose, and throat surgery. In: Miller RD, ed. Miller's Anesthesia. 6th ed. Philadelphia: Elsevier Churchill Livingstone; 2006:2527-2555.

Johnson B, Adi A, Licina MG, Hillel Z, Thys DM, Hines RL, Kaplan JA. Cardiac physiology. In: Kaplan JA, ed. Kaplan's Cardiac Anesthesia. 5th ed. Philadelphia: Elsevier Saunders; 2006:71-89.

O'Hara JF Jr., Cywinski JB, Monk TJ. The renal system and anesthesia for urologic surgery. In: Barash PG, Cullen BF, Stoelting RK, eds. Clinical Anesthesia. 5th ed. Philadelphia: Lippincott Williams & Wilkins; 2006:1013-1039

Roizen MF, Enany NM. Diseases of the endocrine system. In: Fleisher LA (ed.) Anesthesia and Uncommon Diseases. 5th ed. Philadelphia: Saunders Elsevier, 2006:413-454.

Roizen MF, Ellis J, Mantha S, Foss J. Perioperative anesthetic considerations in noncardiac surgery for those at high risk of cardiovascular disease. In: Topol EJ, ed. Textbook of Cardiovascular Medicine. 3rd ed. Philadelphia: Lippincott Williams & Wilkins, 2006:721-735.

Tetzlaff JE. Skin and bone disorders. In: Fleisher LA, ed. Anesthesia and Uncommon Diseases. 5th ed. Philadelphia: Saunders Elsevier; 2006:327-357.

Outcomes Research

Scientific Manuscripts

Adam F, Menigaux C, Sessler DI, Chauvin M. A single preoperative dose of gabapentin (800 milligrams) does not augment postoperative analgesia in patients given interscalene brachial plexus blocks for arthroscopic shoulder surgery. *Anesth Analg* 2006;103:1278-82.

Akca O, Sessler DI, Delong D, Keijner R, Ganzel B, Doufas AG. Tissue oxygenation response to mild hypercapnia during cardiopulmonary bypass with constant pump output. *Br J Anaesth* 2006;96:708-714.

Bauhofer A, Lorenz W, Koller M, Menke H, Sessler DI, Sitter H, Celik I, Nies C, Wulf H, Torossian A. Evaluation of the McPeek postoperative outcome score in three trials. Langenbecks *Arch Surg* 2006;391:418-427.

Evron S, Muzikant G, Rigini N, Khazin V, Sessler DI, Sadan O, Ezri T. Patient-controlled epidural analgesia: the role of epidural fentanyl in peripartum urinary retention. *Int J Obstet Anesth* 2006;15:206-211.

Exadaktylos AK, Buggy DJ, Moriarty DC, Mascha E, Sessler DI. Can anesthetic technique for primary breast cancer surgery affect recurrence or metastasis? *Anesthesiology* 2006;4:660-664.

Fleischmann E, Herbst F, Kugener A, Kabon B, Niedermayr M, Sessler DI, Kurz A. Mild hypercapnia increases subcutaneous and volonic oxygen tension in patients given 80% inspired oxygen during abdominal surgery. *Anesthesiology* 2006;104:944-949.

Hager H, Reddy D, Mandadi G, Pulley D, Eagon JC, Sessler DI, Kurz A: Hypercapnia improves tissue oxygenation in morbidly obese surgical patients. *Anesth Analg* 2006;103:677-81.

Hayek SM, Ritchey RM, Sessler D, Helfand R, Samuel S, Xu M, Beven M, Bourdakos D, Barsoum W, Brooks P. Continuous femoral nerve analgesia after unilateral total knee arthroplasty: stimulating versus nonstimulating catheters. *Anesth Analg* 2006;103:1565-70.

Ilfeld BM, Vandenborne K, Duncan PW, Sessler DI, Enneking FK, Shuster JJ, Theriaque DW, Chmielewski TL, Spadoni EH, Wright TW. Ambulatory continuous interscalene nerve blocks decrease the time to discharge readiness after total shoulder arthroplasty: a randomized, triple-masked, placebo-controlled study. *Anesthesiology* 2006;105:999-1007.

Insler SR, Sessler DI. Perioperative thermoregulation and temperature monitoring. *Anesthesiology Clin* 2006;24:823-837.

Komatsu R, Orhan-Sungur M, In J, Podranski T, Bouillon T, Lauber R, Rohrbach S, Sessler D. Ondansetron does not reduce the shivering threshold in healthy volunteers. *Br J Anaesth* 2006;96:732-737.

Lenhardt R, Sessler DI. Estimation of mean body temperature from mean skin and core temperature. *Anesthesiology* 2006;105:1117-1121.

Liem EB, Hollensead SC, Joiner TV, Sessler DI. Women with red hair report a slightly increased rate of bruising but have normal coagulation tests. *Anesth Analg* 2006;102:313-8.

Mizobe T, Nakajima Y, Ueno H, Sessler DI. Fructose administration increases intraoperative core temperature by augmenting both metabolic rate and the vasoconstriction threshold. *Anesthesiology* 2006;104:1124-1130.

Sessler DI. Non-pharmacologic prevention of surgical wound infection. *Anesthesiology Clin* 2006;24:279-297.

Tokunaga D, Hase H, Mikami Y, Hojo T, Ikoma K, Hatta Y, Ishida M, Sessler DI, Mizobe T, Kubo T. Atlantoaxial subluxation in different intraoperative head positions in patients with rheumatoid arthritis. *Anesthesiology* 2006;104:675-679.

Umenai T, Nakajima Y, Sessler DI, Taniguchi S, Yaku H, Mizobe T. Perioperative amino acid infusion improves recovery and shortens the duration of hospitalization after off-pump coronary artery bypass grafting. *Anesth Analg* 2006;103:1386-93.

Pain Management

Scientific Manuscripts

Biswas A, Miller A, Oya-Ito T, Santhoshkumar P, Bhat M, Nagaraj RH. Effect of site-directed mutagenesis of methylglyoxal modifiable arginine residues on the structure and chaperone function of human A-crystallin. *Biochem* 2006;45:4569-4577.

Hayek S, Paige B, Girgis G, Kapural L, Fattouh M, Xu M, Stanton-Hicks M, Mekhail N. Tunneled epidural catheter infections in non-cancer pain: Increased risk in patients with neuropathic pain/complex regional pain syndrome. *Clin J Pain* 2006;22:82-89.

Kapural L, Mekhail N, Kapural M, Hicks D. Histological and temperature distribution studies of the novel transdiscal heating system in degenerated and non-degenerated human cadaver lumbar discs. *ASA Newsl* 2006.

Miller AG, Smith DG, Bhat M, Nagaraj RH. Glyoxalase I is critical for human retinal capillary pericyte survival under hyperglycemic conditions. *J BiolChem* 2006;281:11864-11871.

Narouze S. Epidural steroid injections after epidurography may prevent otherwise devastating complications. *Anesth Analg* 2006;102:1585.

Narouze S, Casanova J, Farrago E, Tuzla J. Inadvertent dural puncture during attempted thoracic epidural catheter placement complicated by cerebral and spinal subdural hematoma. *J Clin Anesth* 2006;18:132-4.

Narouze S. Is it time to perform all thoracic epidural placements under fluoroscopy? *Anesth Analg* 2006;102:1585.

Narouze S. Ultrasound-guided cervical periradicular injection: Cautious optimism. *Reg Anesth Pain Med* 2006;31:88.

Narouze SN, Casanova J, El-Jaberi M, Farag E, Tetzlaff JE. Inadvertent dural puncture during attempted thoracic epidural catheter placement complicated by cerebral and spinal subdural hematoma. *J Clin Anesth* 2006;18:132-134.

Ritchey RM. Optimizing postoperative pain management. *Cleve Clin J Med* 2006;73(Suppl 1):S72-76.

Rosenow J, Stanton-Hicks M, Rezai A, Henderson J. Failure modes of spinal cord stimulation hardware. *J Neurosurg Spine* 2006;5:183-190.

Stanton-Hicks M. Complex regional pain syndrome: manifestations and the role of neurostimulation in its management. *J Pain Symptom Manage* 2006;31(Suppl 4):S20-24.

Vallajo R, Benjamin R, Floyd B, Casto JM, Joseph NJ, Mekhail N. Percutaneous cement injection into a created cavity for the treatment of vertebral body fracture: Preliminary 110 results of a new vertebroplasty technique. *Clin J Pain* 2006;22:182-190.

Book Chapters

Derby R, Linetsky F, Miguel R, Saberski L, Stanton-Hicks M. Pain management with regenerative injection therapy (RIT). In: Bowell MV, Cole BE, eds. Weiner's Pain Management: A Practical Guide for Clinicians, 7th ed. Boca Raton, Fla: CRC Taylor & Francis Press; 2006:939-965.

Narouze S. Medical management of chronic shoulder pain. In: Iannotti J, Williams G, eds. Disorders of the Shoulder: Diagnosis and Management. 2nd ed. Philadelphia, Pa: Lippincott Williams & Wilkins; 2006;1319-1346.

Samuel S, Hayek S, Stanton-Hicks M. Interventional procedures for pain control. In: Von Roenn JH, Paice J, Preodor M, eds. Current Diagnosis and Treatment of Pain. New York, NY: McGraw-Hill; 2006:38-49.

Stanton-Hicks M. Pain and vasomotor disturbances. In: Creager M, Dzau V, Loscale J, eds. Vascular Medicine: A Companion to Braunwald's Heart Disease. Philadelphia, Pa: W.B. Saunders; 2006:729-741.

Pediatric Anesthesiology

Brown TA, Mossad E, Motta P. Cardiac arrest at induction of anesthesia in a child with undiagnosed right-ventricular dependent coronary circulation: a case report. *Paediatr Anaesth* 2006;16:1179-1183.

Joshi RK, Motta P, Horibe M, Mossad E. Monitoring cerebral oxygenation in a pediatric patient undergoing surgery for vascular ring. *Paediatr Anaesth* 2006;16:178-181.

Motta P, Mossad E. Reply [Combination of low-dose phenoxybenzamine and sodium nitroprusside in children undergoing cardiac surgery]. *J Cardiothor Vasc Anesth* 2006;20:292.

Soliman LM, Mossad EB. Thoracic epidural catheter in the management of a child with an anterior mediastinal mass: a case report and literature review. *Paediatr Anaesth* 2006;16:200-205.

Simmons,M.N.; Ponsky,L.E.; Niezgoda,J.; O'Hara,J.; Ross,J.H. Shock-wave lithotripsy of renal stones situated adjacent to electronic nerve stimulators *J Ped Urol* 2006;2:49-51

Regional Anesthesiology Practice

Cummings KC and Dolak JA. Case report: Epidural abscess in a parturient with pruritic urticarial papules and plaques of pregnancy (PUPPP). *Can J Anesth* 2006;53:1010-1014.

Staff Listing | Chairman

Anesthesiology, Critical Care Medicine and Comprehensive Pain Management

Michael Roizen, M.D.
Chairman, Anesthesiology, Critical Care Medicine and Comprehensive Pain Management

Appointed: 2005

Medical School: University of California – San Francisco School of Medicine, San Francisco, CA

Specialty Training: Fellowship – National Institutes of Health, Bethesda, MD; Internship – Beth Israel Hospital, Boston, MA
Residency – Beth Israel Deaconess Medical Center, Boston, MA
Residency – National Institutes of Health, Bethesda, MD
Residency – University of California, Moffitt Hospital, San Francisco, CA

Other Education: A.B. – Williams College, Williamstown, MA

Specialty Interests: Preoperative evaluation, Perioperative outcome, Prevention of Age-related disease, Outcomes Research

Vice-Chairman, Education
John E. Tetzlaff, M.D.

Division Quality Review Officer
Brian M. Parker, M.D.

Division Administrative Director
Nabil F. Gabriel, MBA

Staff Listing | Chairman

Cardiothoracic Anesthesiology

Norman J. Starr, M.D.
Chairman, Cardiothoracic Anesthesiology

Appointed: 1979

Medical School: Indiana University School of Medicine, Indianapolis, IN

Specialty Training: Internship – Latter-Day Saints Hospital, Salt Lake City, UT; Residency – New York Presbyterian Hospital, Columbia Presbyterian Campus, New York, NY

Other Education: A.B. – Wabash College, Crawfordsville, IN

Specialty Interests: Cardiothoracic anesthesiology, surgery outcomes research, risk stratification, quality of service

Staff Listing

Chairman
Norman J. Starr, M.D.

Quality Review Officer
John Apostolakis, M.D.

Professional Staff
Ahmad M. Adi, M.D.
Andrej Alfirevic, M.D.
Pierre deVilliers, M.D.
Andra E. Duncan, M.D.
Colleen Koch, M.D.
Michael Licina, M.D.
Pablo Motta, M.D.*
Dominique Prud'Homme, M.D.
Grzegorz Pitas, M.D.
Robert Savage, M.D.
David Vener, M.D.*
Lee Wallace, M.D.

*Joint Appointments with the Department of Pediatric Anesthesiology

Section of General Thoracic Anesthesiology
Erik Kraenzler, M.D., Section Head

Section of Critical Care Medicine
Jean-Pierre Yared, M.D., Section Head
C. Allen Bashour, M.D.
M. Gregory Bourdakos, M.D.
Gohar Dar, M.D.
Maria Gota, M.D.
Steven Insler, D.O.
Michael O'Connor, D.O.

Clinical Fellows
Henry Barcino, M.D.
Rajeev Garg, M.D.
Christos Kessaris, M.D.
Pushpa Koyyalamudi, M.D.
Yoalveth Losada, M.D.
Tory Mcgrath, M.D.
Mohini Rao, M.D.
Michel Rheault, M.D.
Shiva Murthy Sale, M.D.
Winston Thomas, M.D.
Zoard Vasarhelyi, M.D.
John Vullo, M.D.
Adejare Windokun, M.D.

Staff Listing | Chairman

General Anesthesiology

Armin Schubert, M.D., M.B.A.
Chairman, General Anesthesiology

Appointed: 1988

Medical School: Columbia University College of Physicians & Surgeons, New York, NY

Specialty Training: Fellowship – University of California – San Diego School of Medicine, La Jolla, CA; Internship – National Naval Medical Center, Bethesda, MD; Residency – National Naval Medical Center, Bethesda, MD

Other Education: B.S. – Yale University, New Haven, CT

Specialty Interests: Neuroanesthesia, blood substitutes, electrophysiologic monitoring, anesthesia recovery, education in anesthesia

Staff Listing

Chairman
Armin Schubert, M.D., M.B.A

Vice-Chairman,
Professional Development
Brian M. Parker, M.D.

Vice-Chairman, Operations
Zeyd Ebrahim, M.D.

Quality Review Officer
J. Michael de Ungria, M.D.

Section Leadership
Brian M. Parker, M.D.
Head, Section of Anesthesia for General Surgery & Liver Transplantation, and Acute Perioperative Care

Raymond Borkowski, M.D.
Medical Director, Preoperative Anesthesia Consultation & Evaluation Clinic

Marc Feldman, M.D., M.H.A.
Head, Section of Anesthesia for the Cole Eye Institute

Robert Helfand, M.D.
Head, Section of Anesthesia for Orthopaedic Surgery; Medical Director, Autotransfusion Service

Brenda Lewis, D.O.
Head, Section of Anesthesia for Colorectal Surgery: Compliance Officer

Michelle Lotto, M.D.
Head, Section of Anesthesia for Neurologic and Spine Surgery

Theodore Marks, M.D., Ph.D.
Head, Section of Anesthesia for Vascular Surgery

Walter Maurer, M.D.
Head, Section of Anesthesia for Ambulatory Surgery

Jerome O'Hara, M.D.
Head, Section of Anesthesia for Urology and Gynecologic Surgery

Marc Popovich, M.D.
Director, Surgical Intensive Care Unit

Michael Ritchey, M.D.
Director, Regional Pain Anesthesia Service

Karen Steckner, M.D.
Head, Section of Anesthesia for Minimally Invasive Surgery

Andrew Zura, M.D.
Head, Section of Anesthesia for Ear, Nose & Throat Surgery

Professional Staff

Basem Abdelmalak, M.D.
Maged Argalious, M.D.
Rafi Avitsian, M.D.
Christofer Barth, M.D.
Matvey Bobylev, M.D.
Demetrios Bourdakos, M.D.
Thomas Bralliar, M.D.
Susan Cymbor, M.D.
Jacek Cywinski, M.D.
Michael deUngria, M.D.
John Doyle, M.D., Ph.D.
Shahpour Esfandiari, M.D.
Ehab Farag, M.D.
Brian Fitzsimons, M.D.
Joseph Foss, M.D.
Ursula Galway, M.D.
Alexandru Gottlieb, M.D.
Maria Inton-Santos, M.D.
Samuel Irefin, M.D.
Ali Jahan, M.D.
Brian Johnson, M.D.
Reem Khatib, M.D.

Tatyana Kopyeva, M.D.
Jia Lin, M.D., Ph.D.
Mariel Manlapaz, M.D.
Edward Mascha, Ph.D.
Piyush Mathur, M.D.
Marco Maurtua, M.D.
Loran Mounir Soliman, M.D.
Douglas Naylor, M.D.
M. Ramachandran, M.D.
Stacy Ritzman, M.D.
Michael Roizen, M.D.
J. Victor Ryckman, M.D.
Vivek Sabharwal, M.D.
Peter Schoenwald, M.D.
Daniel Sessler, M.D.
Michael Smith, M.D., M.S.Ed.
Sara Spagnuolo, M.D.
Mihaela Tecuta, M.D.
John Tetzlaff, M.D.
Solur Udayashankar, M.D.
Gloria Walters, M.D.

Clinical Fellows
Claudine Pritchard, M.D.

Staff Listing | Chairman

Outcomes Research

Daniel Sessler, M.D.
Chairman, Outcomes Research

Appointed: 2005

Medical School: Columbia University College of Physicians & Surgeons, New York, NY

Specialty Training: Internship – University of California, Los Angeles Medical Center, Los Angeles CA; Residency - University of California, Los Angeles Medical Center, Los Angeles CA; Residency – University of California, Los Angeles Medical Center, Westwood, CA

Other Education: University of California – Berkeley, Berkeley, CA

Specialty Interests: Outcomes research

Staff Listing

Chairman
Daniel Sessler, M.D.

Vice-Chairperson
Andrea Kurz, M.D.

Professional Staff
Basem B. Abdelmalak, M.D.
Adrian O. Alvarez, M.D., Ph.D.
Mohamed H. Bakri, M.D., Ph.D.
Endrit Bala, M.D.
Allen Bashour, M.D.
Kenneth Cummings, III, M.D.
Andra Duncan, M.D.
Ehab S.A. Farag, M.D.
Marc A. Feldman, M.D.
Steven R. Insler, D.O.
Colleen G. Koch, M.D.
Javad D. Manshadi, M.D.
Edward J. Mascha, Ph.D.
Hassan Nagem, M.D.
Jean-Pierre Yared, M.D.

Research Fellows
Ramatia Mahboobi, M.D.
Ankit Maheshwari, M.B.B.S.

Staff Listing | Chairman

Pain Management

Nagy Mekhail, M.D., Ph.D.
Chairman, Pain Management Center

Appointed: 1992

Medical School: Ain Shams University Faculty of Medicine, Cairo, Egypt

Specialty Training: Fellowship – Cleveland Clinic, Cleveland, OH; Internship – Ain Shams University Hospitals, Cairo, Egypt; Internship – Cleveland Clinic, Cleveland, OH; Residency – Ain Shams University Hospitals, Cairo, Egypt; Residency – Cleveland Clinic, Cleveland, OH

Other Education: M.S. – Ain Shams University, Cairo, Egypt; Ph.D. – Ain Shams University, Cairo, Egypt

Specialty Interests: Pain management, neuroanesthesiology and research

Staff Listing

Chairman
Nagy Mekhail, M.D. – Main Campus

Quality Review Officer
Teresa Dews, M.D. – Main Campus/
Hillcrest

Professional Staff
Ayman H. Basali, M.D.
Main Campus/Lorain

Philippe Berenger, M.D.
Main Campus

Jeffrey Biro, M.D.
Main Campus/Twinsburg

Emad Daoud, M.D., Ph.D.
Lutheran/Westlake

Jianguo Cheng, M.D.
Main Campus

Kenneth Grimm, D.O.
Strongsville/Lorain

Leonardo Kapural, M.D.
Main Campus

Riad Laham, M.D.
Hillcrest

Jill Mushkat, Ph.D.
Euclid/Hillcrest/
South Pointe/Strongsville

Samer Narouze, M.D.
Main Campus

Nilesh Patel, M.D.
Main Campus

Timothy Rhudy, M.S., L.Ac.
Acupuncturist – Main Campus

Michael Ritchey, M.D.
Main Campus

Pasha Saeed, M.D.
Main Campus

Sherif Salama, M.D.
Beachwood/South Pointe

Samuel Samuel, M.D.
Euclid/Marymount

Hong Shen, M.D.
Hillcrest/Lutheran

Michael Stanton-Hicks, M.D.
Main Campus

William Welches, D.O., Ph.D.
Euclid/South Pointe

Sameh Yonan, M.D.
Main Campus

Research Staff
Manju Bhat, Ph.D.
Qing Liu, Ph.D.

Staff Listing | Interim Chair

Pediatric Anesthesiology

Julie Niezgoda, M.D.
Interim Chair, Pediatric Anesthesiology

Appointed: 1995

Medical School: The Ohio State University College of Medicine and Public Health, Columbus, OH

Specialty Training: Fellowship – Children's Hospital of Pittsburgh, Pittsburgh, PA; Internship – Case Western Reserve University Affiliated Hospitals, Cleveland, OH; Residency – University Hospitals of Cleveland, Cleveland, OH

Other Education: B.S. – The Ohio State University, Columbus, OH

Specialty Interests: Pediatric anesthesia, pediatric critical care

Staff Listing

Interim Chair
Julie Niezgoda, M.D.

Vice-Chairman
Emad Mossad, M.D.*

Quality Review Officer
Glenn DeBoer, M.D.

Professional Staff
Wai Sung, M.D.
Kathleen Rosen, M.D.
Loran Mounir-Soliman, M.D.
Glenn DeBoer, M.D.
Santosh Kalhan, M.D.
Sara Lozano, M.D.
Dorothea Markakis, M.D.
Pablo Motta, M.D.*
Judith Van Antwerp, M.D.
David Vener, M.D.*
George Youssef, M.D.
Marco Maurtua, M.D.+

* Joint Appointment with the
Department of Cardiothoracic Anesthesia

+ Joint Appointment with the
Department of General Anesthesia

Staff Listing | Chairman

Regional Anesthesiology Practice

Alan G. Kuhel, M.D.
Chairman, Regional Anesthesiology Practice

Appointed: 1997

Medical School: Wayne State University School of Medicine Detroit, MI

Specialty Training: Internship – The George Washington University Medical Center Washington, DC; Residency – The George Washington University Medical Center Washington, DC

Other Education: B.S., University of Michigan, Ann Arbor, MI

Specialty Interests: Ambulatory anesthesia and surgery center management, Operating room efficiency, management, and theory

Staff Listing

Chairman
Alan G. Kuhel, M.D.

Quality Review Officer
Jay Weller, M.D., C.P.E

Beachwood ASC Anesthesia Staff
Sawsan Alhaddad, M.D.
Judith Haas, M.D.
Vinod Joshi, M.D.
Douglas Mayers, M.D., Ph.D.
(Medical Director)

Euclid Hospital Anesthesia Staff
Mimi Khin, M.D.
Kathy Koznek, M.D.
Martin Laskey, M.D.
Daniel Napierkowski, M.D.
(Medical Director)
Alireza Navadeh, M.D.

Hillcrest Hospital Anesthesia Staff
Sabri Barsoum, M.D.
Adel R. Bishai, M.D.
Liwanag Calibag, M.D.
Khaled Chaouki, M.D.
Kenneth Cummings III, M.D.
Martin Grady, M.D.
Brenda Greene, M.D.
Manal Hassan, M.D.
Mark Krantz, M.D.
Alan G. Kuhel, M.D. (Medical Director)
Riad Laham, M.D.
Morris Mandel, M.D.
Sreelatha Nandigam, M.D., Ph.D.
Vivian Naser, M.D.
Irina Pashkovskaya, M.D.
John Pineda, M.D.
James Prata, M.D.
Theodore Somanader, M.D.
Ihab Toma, M.D.
Jay Weller, M.D., C.P.E.

Huron Hospital Anesthesia Staff
Charanjit Bahniwal, M.D.
Hinda Abramoff, D.O. (Medical Director)
Bechara Hatoum, M.D.
Tikon Kim, M.D.
KeSuk Lee, M.D.
Amina Mohideen, M.D.
Deeraj Nagpal, M.D.
Coveda Stewart, M.D.
Carleton Wu, M.D.

Lorain ASC Anesthesia Staff
Briccio Celerio, M.D.
Cherine El-Dabh, M.D. (Medical Director)
Robert T. Wilden, M.D.

Lutheran Hospital Anesthesia Staff
Ruben Agra, M.D.
Benigno Aldana, M.D.
Luke Cheriyan, M.D.
Emad Daoud, M.D., Ph.D.
(Medical Director)
Paul Gray, D.O.
Bashar Jouma, M.D.
Manjula Mistry, M.D.

Marymount Hospital Anesthesia Staff
Adil Alhaddad, M.D.
Marguerite Group, M.D.
Deepak Gupta, M.D.
Dina Hanna, M.D.
Yulia Maly, M.D.
Mathew Manadan, M.D.
Joy Roth, M.D.
Eric Rothfusz, M.D. (Medical Director)
Kalpana Varma, M.D.
Paul Youngstrom, M.D.
Sue Wu, M.D.
Strongsville ASC Anesthesia Staff
Antonio Cooper, M.D.
Catherine Yamat, M.D.
Roderick Yamat, M.D. (Medical Director)

Strongsville ASC Anesthesia Staff
Antonio Cooper, M.D.
Catherine Yamat, M.D.
Roderick Yamat, M.D. (Medical Director)

Locations

Cardiothoracic Anesthesiology

Cleveland Clinic Main Campus
9500 Euclid Avenue
Cleveland, OH 44195
216.444.2200

General Anesthesiology

Cleveland Clinic Main Campus
9500 Euclid Avenue
Cleveland, OH 44195
216.444.2200

Lakewood Anesthesia
Critical Care Medicine
14519 Detroit Avenue
Lakewood, OH 44107
216.521.4200

Pain Management

Main Campus
W.O. Walker Building, Desk C25
10524 Euclid Avenue
Cleveland, OH 44106
216.445.7370

Beachwood
Pain Management Center
26900 Cedar Road
Beachwood, OH 44122
216.839.3000

Euclid
Pain Management Center
18901 Lake Shore Boulevard
Euclid, OH 44119
216.692.7543

Hillcrest
Pain Management Center
6803 Mayfield Road, Suite 200
Mayfield Heights, OH 44124
888.655.2425

Lorain
Pain Management Center
5700 Cooper Foster Park Road
Lorain, OH 44053
440.204.7400

Lutheran
Pain Management Center
1730 West 25th Street
Cleveland, OH 44113
216.363.2023

Marymount
Pain Management Center
12000 McCracken Road, Suite 375
Garfield Heights, OH 44125
216.587.8830

Solon Family Health Center
Pain Management Center
29800 Bainbridge Road
Solon, OH 44139
440.519.6925

South Pointe
Pain Management Center
4110 Warrensville Center Road
Warrensville Heights, OH 44122
216.491.7338

Strongsville
Pain Management Center
16761 SouthPark Center
Strongsville, OH 44136
440.878.2500

Twinsburg
Pain Management Center
2365 Edison Boulevard, Suite 500
Twinsburg, OH 44087
330.425.2266

Westlake Medical Campus-Columbia Rd.
Pain Management Center
805 Columbia Road, Suite 105
Westlake, OH 44145
440.835.8233

Pediatric Anesthesiology
Cleveland Clinic Main Campus
9500 Euclid Avenue
Cleveland, OH 44195
216.444.2200

Regional Anesthesiology Practice

Beachwood Anesthesia
26900 Cedar Road
Beachwood, OH 44122
216.839.3500

Euclid Anesthesia
18901 Lake Shore Boulevard
Euclid, OH 44119
216.531.9000

Hillcrest Anesthesia
6780 Mayfield Road
Mayfield Heights, OH 44124
440.312.4500

Huron Anesthesia
13951 Terrace Road
East Cleveland, OH 44112
216.761.3300

Lorain Anesthesia
5700 Cooper Foster Park Road
Lorain, OH 44053
440.204.7400

Lutheran Anesthesia
1730 W. 25th Street
Cleveland, OH 44113
216.696.4300

Marymount Hospital Anesthesia
12300 McCracken Road
Garfield Heights, OH 44125
216.581.0500

Marymount ASC Anesthesia
5555 Transportation Blvd.
Garfield Heights, OH 44125
216.518.3200

Strongsville Anesthesia
16761 SouthPark Center
Strongsville, OH 44136
440.878.3400

Cleveland Clinic Overview

Cleveland Clinic, founded in 1921, is a not-for-profit academic medical center that integrates clinical and hospital care with research and education. Today, 1,700 Cleveland Clinic physicians and scientists practice in 120 medical specialties and subspecialties.

Cleveland Clinic's main campus, with 41 buildings on 130 acres in Cleveland, Ohio, includes a 1,000-bed hospital, outpatient clinic, subspecialty centers and supporting labs and facilities. Cleveland Clinic also operates 13 family health centers, eight community hospitals, two affiliate hospitals, and a medical facility in Weston, Florida.

At the Cleveland Clinic Lerner Research Institute, hundreds of principal investigators, project scientists, research associates and postdoctoral fellows are involved in laboratory-based research. Total annual research expenditures exceed $150 million from federal agencies, non-federal societies and associations, and endowment funds. In an effort to bring research from bench to bedside, Cleveland Clinic physicians are involved in more than 2,400 clinical studies at any given time.

In September 2004, Cleveland Clinic Lerner College of Medicine of Case Western Reserve University opened and will graduate its first 32 students as physician-scientists in 2009.

For more details about Cleveland Clinic, visit clevelandclinic.org

Online Services

eCleveland Clinic

eCleveland Clinic uses state-of-the-art digital information systems to offer several services, including remote second opinions through a secure Web site to patients around the world; personalized medical record access for patients; patient treatment progress access for referring physicians (see below); and imaging interpretations by the Department of eRadiology's subspecialty trained academic radiologists. For more information, please visit eclevelandclinic.org.

DrConnect

Online Access to Your Patient's Treatment Progress

Whether you are referring from near or far, our new eCleveland Clinic service, Dr**Connect**, can streamline communication from Cleveland Clinic physicians to your office. This new online tool offers you secure access to your patient's treatment progress at Cleveland Clinic. With one-click convenience, you can track your patient's care using the secure Dr**Connect** Web site. To establish a Dr**Connect** account, visit eclevelandclinic.org or e-mail drconnect@ccf.org.

MyConsult

My**Consult** Remote Second Medical Opinion is a secure, online service providing specialist consultations and remote second medical opinions for more than 600 life-threatening and life-altering diagnoses. My**Consult** remote second medical opinion service allows you to gather information from nationally recognized specialists without the time and expense of travel. For more information, visit eclevelandclinic.org/myconsult, e-mail eclevelandclinic@ccf.org or call 800.223.2273, ext 43223.

Cleveland Clinic Contact Numbers

How to Refer Patients
24/7 Hospital Transfers or Physician Consults
800.553.5056

General Information
216.444.2200

Hospital Patient Information
216.444.2000

Patient Appointments
216.444.2273 or 800.223.2273

Medical Concierge
Complimentary assistance for out-of-state patients and families
800.223.2273, ext. 55580, or email: medicalconcierge@ccf.org

International Center
Complimentary assistance for international patients and families
216.444.6404 or visit www.clevelandclinic.org/ic

Cleveland Clinic in Florida
866.293.7866

www.clevelandclinic.org

Cleveland Clinic is determined to exceed the expectations of patients, families and referring physicians. In light of this goal, we are committed to providing accurate and timely information about our patient care. Through participation in national initiatives, we support transparent public reporting of healthcare quality data and participate in the following public reporting initiatives:

- Joint Commission Performance Measurement Initiative (www.qualitycheck.org)
- Centers for Medicare and Medicaid (CMS) Hospital Compare (www.hospitalcompare.hhs.gov)
- Leapfrog Group (www.leapfroggroup.org)
- Ohio Department of Health Service Reporting (www.odh.state.oh.us)

In addition, this publication was produced to assist patients and referring physicians in making informed decisions. To that end, information about care and services is provided, with a focus on outcomes of care. For more information, please visit the Cleveland Clinic Quality Web site at clevelandclinic.org/quality.

Cleveland Clinic

9500 Euclid Avenue, Cleveland, OH 44195

Cleveland Clinic is a not-for-profit multispecialty academic medical center. Founded in 1921, it is dedicated to providing quality specialized care and includes an outpatient clinic, a hospital with more than 1,000 staffed beds, an education division and a research institute.

Cover photograph by Stephen Travarca