Curriculum Vitae

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Education

1986	B.A. in Biochemistry from University of California, Berkeley, CA
1991	Ph.D. in Biochemistry and Molecular Biology from The University of Chicago, Chicago, IL
1994	M.D. from The University of Chicago, Pritzker School of Medicine, Chicago, IL

Training

03/2006	Training in Levinson Course in Healthcare Leadership from Levinson Institute, Boston, MA
01/2011	Training in Program for Chiefs of Clinical Services from Harvard School of Public Health, Boston, MA
1994 - 1995	Internship in Medicine from The University of Chicago Hospitals, Chicago, IL
1995 - 1998	Residency in Anesthesia and Critical Care from Massachusetts General Hospital, Boston, MA
1997 - 2001	Fellowship in Mechanisms of General Anesthesia from Massachusetts General Hospital, Boston, MA

Licensure and Certification

1998 - Present	License, State of Massachusetts United States
1998 - Present	License, Federal DEA Registration
1998 - 2010	Massechusetts General Hospital, Special privileges for Lung Transplantation Anesthesia
1999 - Present	Certification, American Board of Anesthesiology
2008 - Present	Certification, ACLS United States
2010 - Present	License, State of Tennessee United States

Academic Appointments

1998 - 2004	Instructor in Anesthesia, Harvard Medical School (Boston, Massachusetts)
2000 - 2007	Adjunct Professor, Department of Psychology, Suffolk University (Boston, Massachusetts)
2004 - 2007	Assistant Professor of Anaesthesia, Harvard Medical School (Boston, Massachusetts)
2007 - 2010	Associate Professor of Anaesthesia, Harvard Medical School (Boston, Massachusetts)
04/2010 - Present	Professor of Anesthesiology, Vanderbilt University (Nashville, Tennessee)
04/2010 - Present	Professor of Surgery, Vanderbilt University (Nashville, Tennessee)
04/2010 - Present	Professor of Biomedical Informatics, Vanderbilt University (Nashville, Tennessee)
04/2010 - Present	Chair of the Department of Anesthesiology, Vanderbilt University (Nashville, Tennessee)

Hospital Appointments

1998 - 2007	Assistant in Anesthesia, Department of Anesthesia and Critical Care, Massachusetts General

	Hospital (Boston, Massachusetts)
2002 - 2002	Anesthesia Staff Administrator, Main Operating Room, Massachusetts General Hospital (Boston, Massachusetts)
2002 - 2010	Co-Program Leader, CIMIT OR of the Future Project, Massachusetts General Hospital (Boston, Massachusetts)
2002 - 2010	Physician Director for Anesthesia Engineering, Technical Support & Supply, Department of Anesthesia and Critical Care, Massachusetts General Hospital (Boston, Massachusetts)
2002 - 2002	Team Leader, Liver Transplantation Anesthesia (Rotating), Massachusetts General Hospital (Boston, Massachusetts)
2004 - 2010	Team Leader, Liver Transplantation Anesthesia, Massachusetts General Hospital (Boston, Massachusetts)
2007 - 2010	Assistant Anesthetist, Department of Anesthesia and Critical Care, Massachusetts General Hospital (Boston, Massachusetts)
2010 - Present	Anesthesiologist in Chief, Vanderbilt University Hospital (Nashville, Tennessee)

Other Work Experience

1997 - 1999	Medical Locum Tenens Physician, Shriners Burns Institute, Shriners Burns Institute (Boston, Massachusetts)

Professional Organizations

1994	American Medical Association
1994	International Anesthesia Research Society
1995	American Society of Anesthesiologists
1995 - 2010	Massachusetts Medical Society
1995 - 2010	Massachusetts Society of Anesthesiologists
2001 - 2004	American Society of Regional Anesthesia and Pain Medicine
2001 - 2004	Society for Education in Anesthesia
2005	Healthcare Information and Management Systems Society
2006	Association of University Anesthesiologists (elected membership)
2010	Tennessee Society of Anesthesiologists
2010	Society of Academic Anesthesiology Associations

Professional Activities

Intramural

2010 - Present	Executive Faculty Committee, VUMC School OF Medicine, Member
2010 - Present	Perioperative Executive Committee, VUMC, Member
2010 - Present	Clinical Enterprise Group, VUMC, Member
2010 - Present	Vanderbilt Medical Group Executive Committee, Vanderbilt Medical Group, Member
2010 - Present	Medical Center Medical Board, VUMC, Member
2010 - Present	Executive Medical Center Medical Board, VUMC, Member
2010 - Present	Curriculum 2.0 Project, Work Group 3: Organizing Framework and Learning approach Strategies for the Foundations Year , VUMC School of Medicine, Team Leader
2010 - 2013	Pain Advisory Group, Vanderbilt Medical Group, Member
2011 - Present	Chair Search Committee: Department of Biomedical Informatics, VUMC School of Medicine, Member
2011 - Present	Chair Search Committee: Department of Physical Medicine & Rehabilitation, VUMC School of Medicine, Member
2011 - Present	Dean Search Committee, Vanderbilt University School of Engineering, Member
2011 - 2012	Executive Committee of the Executive Faculty, VUMC School of Medicine, Member
2011 - 2012	Chair Search Committee: Department of Radiology & Radiologic Sciences, Radiology and Radiological Sciences, Chair
2012 - Present	Undergraduate Medical Education Committee, Medical Education :ADMINISTRATION, Member

2012 - Present	Vanderbilt Medical Group Finance Committee, Vanderbilt Medical Group, Member
2013 - 2014	Vanderbilt Medical Group Finance Committee, Vanderbilt Medical Group, Chair

Extramural

1995 - 1999	Clinical Practices and Patient Safety Committee, Massachusetts General Hospital, Member
1996 - 1999	Residency Recruiting Committee, Massachusetts General Hospital, Member
2002 - 2007	CIMIT OR of the Future Executive Committee, Massachusetts General Hospital, Member
2002 - 2010	Clinical Practices and Patient Safety Committee, Massachusetts General Hospital, Co-Chair
2002 - 2006	Resident Clinical Competency Committee, Massachusetts General Hospital, Member
2002 - 2004	Anesthesia Team Leaders Committee, Massachusetts General Hospital, Member
2002 - 2005	Operating Room of the Future Project, Telemedicine and Advanced Technology Research Center, United States Army Research and Materiel Command, Member
2003 - 2010	Needle Stick Reduction Task Force, Massachusetts General Hospital, Member
2003 - 2010	Bedside Technology Task Force, Massachusetts General Hospital, Member
2003 - 2007	Surgical Clinical Performance Management Team- Efficiency Task Force, Massachusetts General Hospital, Member
2003 - 2004	Novation Anesthesia Council, Novation Anesthesia Council, Member
2004 - 2010	Anesthesia Team Leaders Committee, Massachusetts General Hospital, Co-Chair
2004 - 2010	Liver Transplantation Candidacy Evaluation Committee, Member
2004 - 2010	Finance Committee, Massachusetts General Hospital, Member
2005 - 2010	Digital Imaging and Communications in Medicine (DICOM) Workgroup, 24 □ Surgical DICOM□ , Member
2005 - Present	Ad-hoc Reviewer for Surgical Innovation
2005 - Present	Editorial Board for International Journal of Computer Assisted Radiology and Surgery
2006 - 2010	Auto ID Applications Committee, Massachusetts General Hospital, Member
2006 - 2011	Anesthesiology
2006 - 2010	Anesthesia & Analgesia
2007 - 2008	Subcommittee on Patient Safety and Practice Management, American Society of Anesthesiologists, Member
2007 - 2008	Practice Advisory Committee, "Practice Advosory on Anesthetic Care for Magnetic Resonance Imaging", American Society of Anesthesiologists, Member
2007 - 2009	Committee on Performance and Outcomes Measurement, American Society of Anesthesiologists, Member
2007 - Present	CARS (Computer Assisted Radiology and Surgery), Computer Assisted Radiology and Surgery, Program Committee Member, Assist in soliciting & reviewing papers in the computer assisted radiology or computer assisted surgery field
2007 - 2011	Associate Editor for Anesthesia and Analgesia
2007 - Present	Ad-hoc Reviewer for International Journal of Healthcare Technology & Management
2008 - 2010	Credentialing Committee, Anesthesiology, Chair
2008 - Present	Subcommitee on Practice Managemnent, American Society of Anesthesiologists
2009 - 2010	Council for Technology Adoption and Innovative Process Promotion, Massachusetts General Hospital, Member
2009 - 2009	Ad-hoc Reviewer for Liver Transplantation
2009 - 2009	Ad-hoc Reviewer for Journal of Clinical Anesthesia
2014 - 2017	MPOG (Multicenter Perioperative Outcomes Group), MPOG (Multicenter Perioperative Outcomes Group), Executive Board Committee Member

Teaching Activities

N/A	
1988 - 1988	Basic Biochemistry, Teaching Assistant, The University of Chicago, Three 1-hour sessions per week for 10 weeks
1988 - 1988	Biochemistry of the Cell, Teaching Assistant, The University of Chicago, Three 1-hour sessions per week for 10 weeks
1989 - 1989	The Origin of Life, Teaching and Laboratory Assistant, The University of Chicago, Laboratory

	tutoring and pre-exam reviews for 10 weeks
1989 - 1989	Protein Biochemistry, Teaching Assistant, The University of Chicago, Two 1.5-hour sessions per week for 10 weeks
1989 - 1990	Nucleic Acid Biochemistry, Teaching Assistant, The University of Chicago, Three 1-hour sessions per week for 10 weeks, and review sessions
1990 - 1990	The Origin of Life, Teaching Laboratory Assistant, The University of Chicago, Primary lecturing, laboratory tutoring and pre-exam reviews for 10 weeks
1990 - 1991	Basic Biochemistry for Undergraduates, Laboratory and Teaching Assistant, The University of Chicago, Ten (10) weeks; Pre-lab lectures, lab tutoring, pre-exam reviews, and writing and grading exams
1993 - 1993	Clinical Pathophysiology, Teaching and Laboratory Assistant, The University of Chicago, Three (3) hours per day, 3 days per week for 20 weeks, with an additional 4 hours per week of lab time; tutoring
1993 - 1993	Physical Diagnosis, Tutor, The University of Chicago, Primary teaching weekly for 10 weeks
1998 - 2001	Thoracic Anesthesia Conference, Lecturer, Harvard Medical School, Ten lectures per year
1999 - 2001	MGH Anesthesia Elective Core Lectures, Lecturer & Tutor, Harvard Medical School, Monthly lecture: "Anesthetic Management of the Trauma Patient"; 1:1 education and training in the OR
1999 - 2002	MGH Mock Oral Boards, Examiner, Harvard Medical School, Full day, once per year
2000 - 2008	Graduate Psychopharmacology, Course Director and Sole Lecturer, Suffolk University, Boston Massachusetts
2000 - 2010	MGH Anesthesia Residency Core Curriculum: Airway Management, Lecturer & Section Head, Harvard Medical School, I developed four lectures: □ Introduction to Airway Anatomy□ , □ Routine Management of the Airway□ , □ Advanced Airway Management Techniques□ and □ Airway Emergencies□ . The course also includes a hands-on workshop co-developed with a resident.
2001 - 2010	MGH Anesthesia Residency Core Curriculum: Pharmacology, Lecturer, Harvard Medical School, □ Pharmacology of Intravenous Anesthetics□ . Repeats Annually.
2002 - 2004	MGH Regional Anesthesia Core Curriculum, Lecturer, Harvard Medical School, □ General Considerations for Peripheral Nerve Blocks□ . Repeated monthly.
2002 - 2010	MGH CA2/3 Lecture Series, Lecturer, Harvard Medical School, □ Bronchoscopic Positioning of Airway Devices□ and □ Management of the Difficult or Emergency Airway: A Critical Evaluation of the Evidence□ , alternating annually.
2003 - 2004	ABA Written Board Exam Review Course: Electrical Systems and Safety in the OR, Lecturer
2003 - 2004	Anesthesia for Thoracic Surgery, Lecturer
2005 - 2006	Creating the Perioperative Environment of the Future: Vision 2010: Towards Better and More Effective OR Care: Perioperative Systems Design, Lecturer, Boston, MA
2005 - 2006	Creating the Perioperative Environment of the Future: Vision 2010: Safety in the Perioperative Environment: Creating a Zone of Safety, Lecturer, Boston, MA
2007 - 2007	Fifth Annual Anesthesia Update and Workshops: Anesthesia Information Management Systems and Decision Support: Opportunities and Test Cases, Lecturer, Coconut Grove, FL
2007 - 2007	36th Annual Anesthesia Review & Update: Liver Transplantation for All of Us, Lecturer, Boston, MA
2007 - 2007	Office Based Anesthesia: Update: Operating Room of the Future: Hospital Goes to the Office, Lecturer, Boston, MA
2009 - 2009	HST-211, Lecturer, Harvard Medical School, Boston, MA
2009 - 2009	HST-150 Clinical Pharmacology in the Operating Room, Group Tutor, Harvard Medical School, Boston, MA
2009 - 2009	38th Annual Anesthesia Review & Update: Lung Isolation, Lecturer, Harvard Medical School, Boston, MA, Single Lecture Presentation
2010 - 2010	39th Annual Anesthesia Review & Update: Utilization of Electronic Anesthesia Data to Satisfy the Joint Commission Requirements for Ongoing Professional Performance Evaluation, Organizer/Lecturer, Harvard Medical School, Boston, MA, Panel Title: □ OR of the Future□ Panel Organizer / Single Invited Lecture Presentation
08/2010 - 2010	MGT-459W-01/IDIS-5252-06: Health Care Quality Improvement: What Is Quality, Can It Be Improved, And Why Do We Care?, Inaugural Lecturer, 1-hour lecture
09/2010 - 2010	Department of Anesthesiology, VUSM: B.H. Robbins Scholar Seminar: Research Problems that Have Been Bugging Me This Year, Lecturer, 1-hour lecture
2011 - 2011	13th Annual Challenges for Clinicians: Management of the Difficult or Emergency Airway: A Critical Evaluation of the Evidence, Lecturer, The University of Chicago Center for Continuing Medical Education, St. John, USVI, Lecture Presentations

2011 - 2011	13th Annual Challenges for Clinicians: OPPE / FPPE / OMG: How to Develop Credentialing Systems to Meet Joint Commission Requirements, Lecturer, The University of Chicago Center for Continuing Medical Education, St. John, USVI, Lecture Presentations
08/2011 - 2011	What is Quality, Can It Be Improved, And Why Do We Care?, Inaugural Lecturer, Vanderbilt University Medical Center, 1-Hour Lecture

Research Supervision / Mentorship

1999 - 2000	Radha Arunkumar, M.B. Anderson Cancer Center, Current Position: Assistant Professor of Anesthesia, M. D.. (Resident, Clinical)
1999 - 2002	Christopher Walters, M.D. Private Practice. (Resident, Clinical)
1999 - 2003	Steven McIntyre, M.D. Heartland Regional Medical Center, Current Position: Staff Anesthesiologist. (Resident, Clinical)
2000 - 2002	Thomas Huesers, M.E. Eastern Maine Medical Center, Current Position: Staff Anesthesiologist. (Resident, Clinical)
2000 - 2003	Howard Roselinsky, M.D. Private Practice. (Resident, Clinical)
2000 - 2007	Paige K. Curran, M.A. Current Position: Supervisor. (Post-doc Fellow, Research)
2001 - 2003	Jennifer Turek, Ph.D. Current Position: Supervisor. (Post-doc Fellow, Research)
2002 - 2002	Jasmin Field, M.D. Current Position: Tutor. (Resident, Clinical)
2002 - 2003	Hanief Abrahams, M.D. Current Position: Tutor. (Resident, Clinical)
2002 - 2005	James Helstrom, M.D. Current Position: Tutor. (Resident, Clinical)
2003 - 2003	Tzuhou □ Harry□ Wu, M.D. Current Position: Tutor. (Resident, Clinical)
2003 - 2005	Tim Canty, M.D. Current Position: Mentor. (Resident, Clinical)
2004 - 2006	Andreas R. Seim, Ph.D. Current Position: Supervisor. (Post-doc Fellow, Research)
2004 - 2007	Amy Lu, M.P.H. Current Position: Tutor. (Resident, Clinical)
2004 - 2010	Mark A. Meyer, M.P.H. Current Position: Supervisor. (Post-doc Fellow, General Mentorship)
2005 - 2007	Tor Schoenmeyr, Ph.D. Published 1 manuscript together, Current Position: Private Industry. (Post-doc Fellow, Research)
2005 - 2008	Cosmin Gauran, M.D. Massachusetts General Hospital, Current Position: Assistant Professor of Anaesthesia, Harvard Medical School. (Resident, Clinical)
2006 - 2006	George Mashour, M.D., Ph.D. Published 2 manuscripts together, Current Position: Associate Professor of Anesthesia, University of Michigan. (Post-doc Fellow, Research)
2007 - 2007	Michael Shaughnessy, M.D. Current Position: Resident in Anesthesia. (Resident, Clinical)
2007 - 2010	Jesse M. Ehrenfeld, M.D., M.P.H. Vanderbilt University School of Medicine, Current Position: Assistant Professor of Anesthesiology. (Post-doc Fellow, Research)
2008 - 2008	Vanessa Henke MGH Department of Anesthesia, Crit Care & Pain Medicine, Current Position: Resident in Anesthesia. (Resident, Clinical)
2008 - 2009	Victoria Forbes (Graduate Student, Research)
2008 - 2009	Sha-Har Admoni Albert Einstein School of Medicine, Current Position: MS3. (Medical Student, Research)
2009 - 2009	David Pallila, M.D. MGH Department of Anesthesia, Crit Care & Pain Medicine, Current Position: Resident in Anethesia. (Resident, Clinical)
2009 - 2009	Jordan Newmark, M.D. Stanford University School of Medicine, Current Position: Clinical Instructor of Anesthesia, Perioperative & Pain Medicine. (Medical Student, General Mentorship)
2009 - 2009	Jennifer Chatburn, M.D. Private Practice, Current Position: Anesthesiologist. (Medical Student, General Mentorship)
2009 - 2010	Naomi Shin, B.A. University of Massachusetts School of Medicine, Current Position: MS4. (Medical Student, Clinical)
2009 - 2010	Jordan Taylor University of Vermont School of Medicine, Current Position: MS1. (Medical Student, Research)
2010 - Present	Jesse Ehrenfeld, M.D., M.P.H. Current Position: Assistant Professor of Anesthesiology, Vanderbilt University. (Faculty, General Mentorship)
2010 - Present	Brian Rothman, M.D. Current Position: Assistant Professor of Anesthesiology,Vanderbilt University. (Faculty, General Mentorship)
2011 - Present	Loren Hemachandra, M.D., J.D. Vanderbilt University Medical Center, Current Position: Assistant Professor of Anesthesiology. (Faculty, General Mentorship)
2011 - Present	Daniel Roke, M.D. Current Position: Assistant Professor of Anesthesiology, Vanderbilt University. (Faculty, General Mentorship)

2011 - Present	Katherine Dobie, M.D.C.M. Vanderbilt University School of Medicine, Current Position: Assistant Professor of Anesthesiology, Chief of Ambulatory Anesthesiology. (Faculty, General Mentorship)
2011 - Present	Vikram Tiwari, Ph.D. Vanderbilt University School of Medicine, Current Position: Assistant Professor of Anesthesiology. (Faculty, General Mentorship)
2012 - Present	Jonathan Wanderer, M.D. Vanderbilt University Medical Center, Current Position: Instructor. (Faculty, General Mentorship)
2012 - Present	Suanne Daves, M.D. Vanderbilt University School of Medicine, Current Position: Associate Professor of Anesthesiology, Anesthesiologist in Chief, Vanderbilt Children's Hospital. (Faculty, General Mentorship)

Other Significant Activities

2008	Grant Review Activities: Reviewer, Center for Integration of Medicine and Innovative Technology Strategic Award Program

Grants and Funding

T32 (GM07592-22) Keith W. Miller (PI) 1998 - 2001

Soluble Protein Models of Anesthetic-Protein Interactions

I developed a system to study anesthetic-protein interactions based on structurally characterized portions of PKC. In this part of the project, I sub-cloned and expressed the putative target portion of PKC, and developed purification capabilities for large quantities of the protein.

Role: Co-Investigator

Grant number unavailable 2000 - 2001

Foundation for Anesthesia Education and Research

Identification and Characterization of Anesthetic Binding Sites on Protein Kinase C

In this work, I sub-cloned and purified a nested set of PKC fragments thought to contain an anesthetic binding site. This research allowed co-workers to identify a specific amino acid residue in PKC that reacted preferentially with two photoreactive anesthetic alcohols, and characterization of this anesthetic binding site is ongoing in Dr. Miller's laboratory

Role: Principal Investigator

Total Cost: $35,000.00

Grant number unavailable 2000 - 2010

Cognitive Aspects of Physician-Patient Communication

In this project to improve preoperative preparation of patients needing anesthesia for surgery, we discovered that clinicians universally exceed their patients' cognitive capacities, despite the use of reinforcing activities, and this was reflected in poor recall of specific details of pre-anesthetic instructions.

Role: Co-Principal Investigator

K08 (GM63807-01) 2001 - 2001

Anesthetic Binding Sites on Protein Kinase C

In this project, the plan was to use structural biology techniques to attempt to develop an atomic-level picture of an anesthetic-protein interaction. Although this objective was ultimately achieved by co-investigators, I chose to change career pathways at the initiation of the project.

Role: Principal Investigator

SBIR DMI-0320262 (phase 1) 2003 - 2004

SBIR Phase I: Supply Tracking for Smart Anesthesia Workstation using RFID (Radio Frequency Identification)

This was a development project in collaboration with a start-up company specializing in radiofrequency ID (RFID) technology to construct an anesthesia Bluebell cart , adding three important functionalities: (1) keyless, automatic access control to the cart, (2) automatic inventory management & reordering and (3) automatic allergy & medication interaction checking. A working prototype cabinet that successfully automatically identified drugs being removed and replaced was constructed.

Role: Principal Investigator

Total Cost: $18,098.00

DAMD 17-02-2-0006 2003 - 2004

US Army Materiel Research Command / Center for Integration of Medicine and Innovative Technology

Development of Truly Patient-centric Anesthesia Delivery in the OR of the Future

This project extended the experience gained in the CIMIT ORF implementation to take the patient-centric anesthesia concept to its next logical level: the completely mobile anesthetized patient in the hospital setting. We aimed to demonstrate that successive patients can be maintained in a safely anesthetized state for the duration of the typical operative procedure using available portable equipment (infusion pumps, physiologic monitors, and a transport ventilato all made patient-centric by virtue of being mounted on the OR bed during induction, transport and maintenance of anesthesia.

Role: Principal Investigator

Total Cost: $25,000.00

Grant number unavailable 2003 - 2004

Instrumentarium Corporation

Prototype Implementation of an Integrated Information Collection and Display System in the OR (Captus Pilot)

The purpose of the project was to improve clinicians' situational awareness about perioperative processes, and to alert practitioners to process exceptions. We used automated tracking technology to compare actual patient locations to expected locations in real time, and were able to detect 'patient-in-wrong-location' process exceptions with 100% sensitivity and specificity.

Role: Principal Investigator

Total Cost: $131,451.00

SBIR W81XWH-04-C-0015 2003 - 2006

Telemedicine and Advanced Technology Research Center (TATRC) / US Army Materiel Research Command

Patient Safety Perioperative Readiness Support System

This was an SBIR-funded collaboration with LiveData (Cambridge, MA), aiming to integrate real time clinical & administrative data streams to create an OR-level total patient information display. We integrated devices including physiologic, gas & level-of-consciousness monitors, infusion pumps, endosurgical equipment, surgical video, hospital information & ordering systems, anesthesia & nursing documentation systems and real-time patient & staff locations to create a continuously updating, single-display snapshot of the patient.

Role: Principal Investigator

Total Cost: $261,653.00

Grant number unavailable 2003 - 2010

Effects of Novel Operating Room Architecture on Non-operative OR Times and OR Utilization

The goal of this project was to continually assess the overall performance of the MGH-CIMIT Operating Room of the Futu implementation project and similar projects throughout the MGH perioperative system.

Role: Principal Investigator

Grant number unavailable 2004 - 2005

Center for Integration of Medicine and Innovative Technology

Career Development Award in Perioperative Systems Design Research

The goal of this project was to prospectively assess the impact of technology intensity, staffing changes and process re-engineering in the MGH-CIMIT Operating Room of the Future implementation project. The ORF was found to be cost effective and more productive relative to typical ORs.

Role: Principal Investigator

Total Cost: $38,688.00

SBIR 2 R44 RR01876-02 David W. Rattner (PI) 2004 - 2006

Improving Healthcare Efficiency using Real Time Location

I served as methodologist and analyst on a project to test the utility of an active radiofrequency patient tracking system (Radianse IPS, Lawrence, MA) by deploying it in an environment where patients are transferred back and forth between care areas as part of routine care. We demonstrated that while patients spent time waiting in the perioperative process, the perioperative workflow appeared to be optimized to efficiently utilize hospital clinicians' time and effort.

Role: Co-Investigator

Grant number unavailable 2004 - 2006

GE Medical Systems / Information Technology

Clinical Evaluation of the Emerald Physiologic Monitoring System

At project initiation, General Electric Medical Systems-Information Technology was developing the Emerald System, the first of a new generation of physiologic monitors. The goal of this project was to obtain feedback from practicing clinician during the Emerald development process, to guide the development to its optimal conclusion.

Role: Principal Investigator

Total Cost: $64,883.00

Grant number unavailable 2004 - 2010

Data-mining an Anesthesia Information Management System Database for Retrospective Quality Control

Anesthesia information management systems can be used to resolve questions by retrospective data-mining, and is currently being applied to: (1) characterization of clinicians' intra-operative temperature measurement and management (2) a multicenter project to determine the true incidence of decompressive laminectomy for hematoma after epidural catheterization, (3) characterization of management and outcomes of rate-related ECG changes during anesthesia and (4 a multicenter characterization of gaps in monitoring during anesthesia.

Role: Principal Investigator

Grant number unavailable 2005 - 2012

Real-Time Active Process Management Using Anesthesia Information Management Systems

I lead a study at four high-performance academic medical centers in the US, using automatic, real-time monitoring of th performance of physiologic monitors. We demonstrated that during routine care, gaps in monitoring during surgery are frequent. In two centers, monitoring-the-monitors technology was engineered to inform providers (via computer pop-ups at the point of care about gaps in blood pressure monitoring during anesthesia. At the MGH site, the notifications were a sent to the anesthesiologists' text pagers. Sending notifications significantly reduced the frequency and duration of gaps monitoring, but only when the notification route included text paging. Thus, integration of multiple monitoring, data analysis, and communication technologies is required for effective automatic improvement of patient care processes in h criticality medical settings.

Role: Principal Investigator

W81XWH-07-2-0011 2006 - 2007

US Army Materiel Research Command / Center for Integration of Medicine and Innovative Technology

Automatic Detection and Machine-Assisted Correction of Equipment Errors During Anesthesia

The goal if this project is to utilize the computerized Anesthesia Information Management System (a form of electronic health record) to search for gaps in physiologic monitoring during surgery and automatically prompt clinicians when gaps are discovered. This phase of the project was an incidence-finding preliminary effort.

Role: Principal Investigator

Total Cost: $25,000.00

Grant number unavailable 2006 - 2007

Center for Integration of Medicine and Innovative Technology

Extension of the CIMIT OR of the Future Catalytic Site to New Surgical Workflows

We assessed the operational and financial impact of discharging laparoscopic cholecystectomy (LC) patients directly from the post-anesthetic care unit (PACU) in comparison with post-transfer discharge from a hospital bed in a busy academic hospital. This intervention significantly reduces bed utilization, decreases in-hospital transfers, and allows congested hospitals to better accommodate patient care needs.

Role: Principal Investigator

Total Cost: $50,000.00

Grant number unavailable 2007 - 2008

Center for Integration of Medicine and Innovative Technology

Clinical Systems Innovation in the Perioperative Environment

The goal of this project is to continually assess the overall performance of the MGH-CIMIT Operating Room of the Future implementation project. Ongoing work on the project now focuses on introducing statistical process control methodology the reporting and analyses. This allows ongoing longitudinal assessment of ORF performance on any metric for which the are reliable data.

Role: Principal Investigator

Total Cost: $13,500.00

Grant number unavailable 2007 - 2010

Massachusetts General Hospital

Modeling of the Perioperative System as a Queuing Network

The goal of this project is to reduce delays in the perioperative patient flow system caused by the uncertainty of peaks ir demand. Results from other industries suggest that complex perioperative systems can be described by relatively simple queueing models, and we are developing such models to understand the relationship between operating room case-load, number of recovery beds, and the severity of recovery room congestion. So far, we have found a very sensitive relationship between these variables, implying that small changes in capacity or demand will significantly influence waiti for recovery beds.

Role: Principal Investigator

Total Cost: $50,000.00

Grant number unavailable 2007 - 2010

Validation of Non-invasive Cardiac Output Measurements in Liver Transplantation Patients

The project performed simultaneous side-by-side comparisons of multiple non-invasive cardiac output measurement devices in liver transplant patients (whose hyperdynamic circulation challenges non-invasive measurement), using thermodilution cardiac output as a reference standard.

Role: Principal Investigator

Grant number unavailable 2007 - 2010

Assessment of Pulse-Oximetry Algorithms Optimized for the Operating Room

This was a clinical assessment of new pulse oximetry algorithms that have been developed by the vendor specifically to avoid problems wherein standard algorithms delays annunciation of real losses of perfusion (such as caused by asystole)

Role: Principal Investigator

Grant number unavailable 2008 - 2009

Center for Integration of Medicine and Innovative Technology

Clinical Systems Innovation in the Perioperative Environment

Ongoing longitudinal assessment of ORF and other perioperative systems performance on any metric for which there are reliable data.

Role: Principal Investigator

Total Cost: $35,714.00

Grant number unavailable 2008 - 2009

Massachusetts General Hospital - Clinical Research Program

Real-time Automated Reminders to Control Drug & Supply Costs: Effectiveness and Outcomes

The goal of the project is to leverage the electronic Anesthesia Information Management System to improve cost efficien by tracking drug utilization and messaging clinicians about cost-preferred choices in real time during clinical anesthesia care. The project will also monitor cost savings, process of care impact and clinical outcomes of implementing lower cost anesthesia drug and supply choices.

Role: Principal Investigator

Total Cost: $127,034.00

SBIR W81XWH-04-C-0015 2008 - 2010

Telemedicine and Advanced Technology Research Center (TATRC) / US Army Materiel Research Command

Integrated Clinical Environment Manager

This is an SBIR-funded collaboration with LiveData (Cambridge, MA) to develop use cases and a prototype for software t integrates medical devices and provided interoperability in the clinical environment.

Role: Principal Investigator

Total Cost: $151,354.00

SBIR 1 R44 RR030694-01 2010 - Present

Pilot Implementation and Assessment of a Computerized Preanesthetic Assessment Tool

This is an SBIR-funded collaboration with MedSleuth (San Francisco, CA) to implement software that constructs a preanesthetic evaluation & problem list from the patient's self-reported medication list and reasons for using the medications. The project also tests the ability of the software to assign an ASA physical status classification score that is consistent with the score assigned by expert clinicians.

Role: Principal Investigator

Grant number unavailable 2011 - Present

Anesthesia Patient Safety Foundation

Enhancing Perioperative Safety Through the Determination of Intraoperative Predictors of Post-Operative Deterioration

This project will develop a prediction system for early post-operative esculations of care based on signals detectable with the intra-operative physiologic monitor data.

Role: Principal Investigator

Honors / Awards

1986	Phi Beta Kappa, The University of California, Berkeley, California
1986	Graduation with Distinction in General Scholarship and Highest Honors in the Biochemistry Major , The University of California, Berkeley, California
1986	Medical Scientist Training Program Award, The University of Chicago, Chicago, Illinois
1992	Department Award for Outstanding Performance in the Field of Biochemistry & Molecular Biology , The University of Chicago, Chicago, Illinois
1993	Alpha Omega Alpha, The University of Chicago, Chicago, Illinois
1993	Diplomate of the American Board of Anesthesiology, ABA
2000	Foundation for Anesthesia Education and Research New Investigator Grant recipient
2002	Center for Integration of Medicine and Innovative Technology (CIMIT) Director s Award
2002	Partners in Excellence Award- CIMIT OR of the Future , Partners Healthcare, Boston, Massachusetts
2003	Symposium on Healthcare Design Distinction Award for Team Design: Operating Room of the Future
2004	Society for Technology in Anesthesia Award: Best New Technology Abstract", STA Annual Meeting, Albuquerque, NM
2006	Massachusetts Technology Leadership Council Leadership Award: category: New Technology Adoption , Massachusetts Technology Leadership Council
2006	Partners in Excellence Award- Leadership, Anesthesia Equipment, Monitoring & Support , Partners Healthcare, Boston, Massachusetts
2006	Partners in Excellence Award- Leadership, OR of the Future Project , Partners Healthcare, Boston, Massachusetts
2007	Partners in Excellence Award- Point of Care Testing in the OR , Partners Healthcare, Boston, Massachusetts
2007	Physician Mentor Recognition Award , Women Physicians Congress of the American Medical Association
2009	Jeffrey B. Cooper Award for Anesthesia Patient Safety , Department of Anesthesia & Critical Care, Massachusetts General Hospital, Boston, Massachusetts
2014	"FAER Academy of Research Mentors in Anesthesiology", Foundation for Anesthesia Education and Research
2015	Academy for Exellence in Teaching, Office of Health Science Education, Vanderbilt University School of Medicine, Nashville, Tennessee

Publications

Peer Reviewed Publications

Research Articles

1. **Sandberg, W.S.** & Terwilliger, T.C. Influence of Interior Packing and Hydrophobicity on the Stability of a Protein. Science 1989 Jul;245(4913):54-57. PMID: 2787053.
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8. Wanderer, J.P., **Sandberg, W.S.**, & Ehrenfeld, J.M. Real-Time Alerts and Reminders Using Information Systems. Anesthesiology Clinics 2011 Sep;29(3):389-96. PMID: 21871401 PMCID: PMC3164521.
9. McEvoy, M.D., Niconchuk, J.A., Ehrenfeld, J.M., **Sandberg, W.S.** Maintenance of Certification in Anesthesiology Part 4: Improvement in Medical Practice. Is it of Value and Where Do I Begin?. Advances in Anesthesia 2015; In press.
10. Apfelbaum, J.L., Singleton, M.A., Ehrenwerth, J., Bell, C., Connis, R.T., Mason, K.P., McClain, C.D., Nickinovich, D.G., & **Sandberg, W.S.** Practice Advisory on Anesthetic Care for Magnetic Resonance Imaging: An Updated Report by the American Society of Anesthesiologists Task Force on Anesthetic Care for Magnetic Resonance Imaging. Anesthesiology 2015 Mar;122(3):495-520. PMID: 25383571.

Research Papers

1. **Sandberg, W.S.** Engineering Parallel Processing Perioperative Systems for Improved Throughput. American Society of Anesthesiologists Newsletter 2010; 74(1):26-7-30-1.
2. Tiwari, V. & **Sandberg, W.S.** Analytics-Based Surgical Volume Predictions Improves Capacity Planning and Operations at the Vanderbilt University Medical Center. Association of Anesthesia Clinical Directors Newletter 2014; October/November:1-3.

Research Articles

1. Austin, T.M., Lam, H.V., Shin, N.S., Daily, B.J., Dunn, P.F., & **Sandberg, W.S.** Elective Change of Surgeon During the OR Day Has an Operationally Negligible Impact on Turnover Time. Journal of Clinical Anesthesia 2014 Aug;26(5):343-9. PMID: 25074630.
2. Ehrenfeld, J.M., Henneman, J.P., Bulka, C.M., & **Sandberg, W.S.** Continuous Non-invasive Hemoglobin Monitoring during Orthopedic Surgery: A Randomized Trial. Journal of Blood Disorders & Transfusion 2014 Nov;5(9).

Book Chapters

1. **Sandberg, W.S.**, DuBois, B., & Miller, K.W. Lipid Membrane and Ligand-Gated Ion Channels in Anesthetic Action. Membrane Permeability: 100 Years Since Ernest Overton (Current Topics in Membranes). Editors: Deamer, D.W. Boston: Academic Press; 1999; 48 311-350.
2. **Sandberg, W.S.** Anesthesia and Airway Management for Tracheal Resection and Reconstruction. Thoracic Anesthesia/Hyperbaric Medicine (International Anesthesia Clinics). Editors: Dunn, P.F. & Barach, P. Philadelphia, Pennsylvania, United States: Lippincott Williams & Wilkins; 2000 Dec;38 55-75. PMID: 10723669.
3. **Sandberg, W.S.** & Miller, K.W. The Meyer-Overton Relationship and Its Exceptions. Neural Mechanisms of Anesthesia. Editors: Antognini, J.F., Carstens, E.E., & Raines, D.E. Totawa, New Jersey, United States: Humana Press; 2003; 371-394.
4. **Sandberg, W.S.** & White, R.M. The Role of the Anesthesia Team in the Avoidance, Diagnosis, Management and Genesis of Complications During Laparoscopic Surgery. Complications of Gynecologic Endoscopic Surgery. Editors: Isaacson, K. Philadelphia, Pennsylvania, United States: Saunders Elsevier Press; 2006.

5. Tokarczyk, A.J. & **Sandberg, W.S.** Monitoring. Clinical Anesthesia Procedures of the MGH, 7/e. Editors: Dunn, P. Philadelphia, Pennsylvania, United States: Lippincott, Williams & Wilkins; 2007.
6. **Sandberg, W.S.** & Raines, D.E. Anesthesia for Liver Surgery and Transplantation. Anesthesiology. Editors: Longnecker, D.E., Brown, D.L., Newman, M.F., & Zapol, W.M. New York, New York, United States: McGraw-Hill; 2008 Dec;1338-1377. ISBN: 978-0071459846.
7. Wang, J.P. & **Sandberg, W.S.** Anesthesia. Oxford American Handbook of Surgery . Editors: Berger, D.L. New York: Oxford University Press; 2009; 539-568. ISBN: 0195304626.
8. Newmark, J.L. & **Sandberg, W.S.** Supraglottic Airway Devices. The MGH Textbook of Anesthetic Equipment. Editors: Sandberg, W.S., Urman, R.D., & Ehrenfeld, J.M. Philadelphia, Pennsylvania, United States: Elsevier Saunders; 2011; 72-91. ISBN: 978-1-4377-0973-5.
9. Kim, A.L. & **Sandberg, W.S.** Anesthesia for Esophageal and Gastric Surgery. Essential Clinical Anesthesia. Editors: Vacanti, C.A., Sikka, P.K., Urman, R.D., Dershwitz, M., & Segal, B.S. New York: Cambridge University Press; 2011; 640-646.
10. Newmark, J.L. & **Sandberg, W.S.** Noninvasive Physiological Monitors. The MGH Textbook of Anesthetic Equipment. Editors: Sandberg, W.S., Urman, R.D., & Ehrenfeld, J.M. Philadelphia, Pennsylvania, United States: Elsevier Saunders; 2011; ISBN: 978-1-4377-0973-5.
11. Brookman, J.C. & **Sandberg, W.S.** Liver Disease. Essential Clinical Anesthesia. Editors: Vacanti, C.A., Sikka, P.K., Urman, R.D., Dershwitz, M., & Segal, B.S. New York: Cambridge University Press; 2011; 49-55.
12. Brookman, J.C. & **Sandberg, W.S.** Anesthesia for Liver Transplantation. Essential Clinical Anesthesia. Editors: Vacanti, C.A., Sikka, P.K., Urman, R.D., Dershwitz, M., Segal, B.S. New York: Cambridge University Press; 2011; 651-659.
13. Ahn, Y.K. & **Sandberg, W.S.** Endotracheal Airway Devices. The MGH Textbook of Anesthetic Equipment. Editors: Sandberg, W.S., Urman, R.D., & Ehrenfeld, J.M. Philadelphia, Pennsylvania, United States: Elsevier Saunders; 2011; ISBN: 978-1-4377-0973-5.
14. Chatburn, J.A. & **Sandberg, W.S.** Patient Warming Devices. The MGH Textbook of Anesthetic Equipment. Editors: Sandberg, W.S., Urman, R.D., & Ehrenfeld, J.M. Philadelphia, Pennsylvania, United States: Elsevier Saunders; 2011; ISBN: 978-1-4377-0973-5.
15. Henke, V.G. & **Sandberg, W.S.** Intravenous Therapy, Fluid Delivery Systems for Resuscitation, and Cell Salvage Devices. The MGH Textbook of Anesthetic Equipment. Editors: Sandberg, W.S., Urman, R.D., & Ehrenfeld, J.M. Philadelphia, Pennsylvania, United States: Elsevier Saunders; 2011; ISBN: 978-1-4377-0973-5.
16. **Sandberg, W.S.** The Changing Financial Landscape of Procedural Medicine. 2011 Jun.
17. Pilla, M., Raines, D., & **Sandberg, W.S.** Anesthesia for Liver Surgery and Transplantation. Anesthesiology, 2/e. Editors: Longnecker, D.E., Brown, D.L., Newman, M.F., & Zapol, W.M. New York: McGraw-Hill; 2012; 1049-1081.

Conference Proceedings

1. Seim, A.R., Meyer, M., & **Sandberg, W.S.** Does Parallel Workflow Impact Anesthesia Quality?. AMIA ... Annual Symposium Proceedings 2005. 2005; 1053 PMID: 16779340 PMCID: PMC1560880.
2. Levine, W.C., Meyer, M., Brzezinski, P., Robbins, J., Lai, F., Spitz, G., & **Sandberg, W.S.** Usability Factors in the Organization and Display of Disparate Information Sources in the Operative Environment. AMIA ... Annual Symposium Proceedings 2005. 2005; 1025 PMID: 16779312 PMCID: PMC1560624.
3. Meyer, M., Levine, W.C., Brzezinski, P., Robbins, J., Lai, F., Spitz, G., & **Sandberg, W.S.** Integration of Hospital Information Systems, Operative and Peri-Operative Information Systems, and Operative Equipment into a Single Information Display. AMIA ... Annual Symposium Proceedings 2005. 2005; 1054 PMID: 16779341 PMCID: PMC1560891.
4. Levine, W.C., Meyer, M., Egan, M., Brzezinski, P., Robbins, J., Chueh, H., & **Sandberg, W.S.** Development of a Vendor Agnostic, Full Disclosure System for Capture, Display, and Storage of Operative Systems Data. AMIA ... Annual Symposium Proceedings 2006. 2006; 1006 PMID: 17238625 PMCID: PMC1839297.
5. Meyer, M., Fairbrother, P., Egan, M.T., Chueh, H., & **Sandberg, W.S.** Using Location Tracking Data to Assess Efficiency in Established Clinical Workflows. AMIA ... Annual Symposium Proceedings 2006. 2006; 1031 PMID: 17238650 PMCID: PMC1839639.
6. Ehrenfeld, J.M. & **Sandberg, W.S.** Managerial and Clinical Decision Support in the Digital Operating Room. International Journal of Computer Assisted Radiology and Surgery. 2010 Jun;5(Suppl 1):S194-S195.
7. Ghassemi, F., Dunn, P., Levi, R., **Sandberg, W.S.**, & Segev, D. A Quantitative Framework for Staffing in a Department of Anesthesia. 2011 Jun.

Others

1. Lecture Series Syllabus: Department of Anesthesia and Critical Care, Massachusetts General Hospital Understanding Clinical Uses of Patient Care Equipment in the OR Environment .
2. Resident Teaching Material: A Framework for Setting Up a Lung Transplant. 2002.
3. Resident Teaching Material: A Primer in Anesthesia for Thoracic Surgery at Massachusetts General Hospital. 2002.

4. **Sandberg, W.S.**, Ganous, T.J., & Steiner, C. OR of the Future - Setting the Research Agenda for Perioperative Systems Design; Telemedicine and Advanced Technology Research Center (TATRC), United States Army Research and Materiel Command, Report # 02-05, http://www.tatrc.org/website_Orfuture/five/. 2003 Jan.
5. Goals and Objectives for Resident Trainees on the OR of the Future Rotation, Department of Anesthesia and Critical Care, MGH, Boston, MA. 2005.
6. From Vision to Reality: Planning, Designing and Implementing a Modern OR, http://www.surgprodmag.com/modernor/. 2006 Sep.
7. How to Get Ready for Pay-for-Performance in the OR, http://www.fmqai.com/temp/PFP.htm. 2007 Jun.
8. Course Syllabus: Center for Integration of Medicine and Innovative Technology Creating the Perioperative Environment of the Future: Vision 2010 . 2010.
9. **Sandberg, W.S.** Essential Clinical Anesthesia (Section Editor, Anesthesia for General Surgical Procedures). 2011; 631-659.

Monographs

1. **Sandberg, W.S.**, Urman, R.D., & Ehrenfeld, J.M., eds. The MGH Textbook of Anesthetic Equipment. Philadelphia, Pennsylvania, United States: Elsevier Saunders; 2011; ISBN: 978-1-4377-0973-5.

Presentations

Presentations at Scientific Meetings

1. Seim, A.R., Ryen, S., Curran, P.K., Fagerhaug, T., Sandberg, W.S., & Myhre, H. 28th congress of the Scandinavian Society of Anaesthesiology and Intensive Care Medicine. Retkjavik, Iceland. 2005 Jul; Causes of Case Cancellations on the Day of Surgery: A System Problem.
2. Seim, A.R., Fagerhaug, T., Hernes, T.N., Myhre, H.O., Ryen, S.M., & Sandberg, W.S. IFIP 5.7 Advances in Production Management Systems: Modeling and Implementing the Integrated Enterprise. Rockville, Maryland. 2005 Sep 18; Patient Flow Characteristics: Value Stream Mapping of Patient Flow at a Norwegian University Hospital.
3. Sandberg, W.S. & Ehrenfeld, J.M. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; Atlanta, Georgia. 2005 Oct; Double Lumen Tubes: Usage and Performance by Frequent and Infrequent Users.
4. Seim, A.R., Meyer, M., & Sandberg, W.S. American Medical Informatics Association Annual Meeting. AMIA; Washington, District of Columbia. 2005 Oct; Does Parallel Workflow Impact Anesthesia Quality?.
5. Levine, W.C., Meyer, M.A., Brzezinski, P., Robbins, J., Lai, F., Spitz, G., & Sandberg, W.S. American Medical Informatics Association Annual Meeting. AMIA; Washington, District of Columbia. 2005 Oct; Usability Factors in the Organization and Display of Disparate Information Sources in the Operative Environment.
6. Ehrenfeld, J.M. & Sandberg, W.S. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; Atlanta, Georgia. 2005 Oct; Right vs. Left-Sided Double Lumen Tubes: Usage and Performance by Infrequent Users.
7. National Presentation. American Society of Anesthesiologists 2006 Annual Meeting. American Society of Anesthesiologists; Chicago, Illinois. 2006; Automated Error Detection and Notification Improves Anesthesia Billing Performance.
8. National Presentation. American Society of Anesthesiologists 2006 Annual Meeting. American Society of Anesthesiologists; Chicago, Illinois. 2006; Development of a Vendor-Agnostic Full Disclosure System for Operative Systems Data.
9. Sandberg, W.S., Ryen, S., Curran, P., & Seim, A.R. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; Chicago, Illinois. 2006 Oct; Causes of Cancellations on the Day of Surgery at Two Major University Hospitals.
10. Ehrenfeld, J.M. & Sandberg, W.S. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; Chicago, Illinois. 2006 Oct; Incidence of Intraoperative Gaps in Patient Monitoring During Anesthesia.
11. Ehrenfeld, J.E. & Sandberg, W.S. Association of University Anesthesiologists Annual Meeting. Association of University Anesthesiologists; Chicago, Illinois. 2007 Apr; Characteristics of Patients Successfully Discharged Directly to Home from the PACU after Laparoscopic Cholecystectomy.
12. Krupka, D.C., Sathaye, S., Harders, M., Malangoni, M.A., Smith, M., Schubert, A., Berger, D.L., & Sandberg, W.S. International Forum on Quality and Safety in Healthcare. Barcelona, Spain. 2007 Apr; Impact of Differing Methods to Increase the Throughput of an Operating Room.
13. Meyer, M.A., Craft, D.L., Sokal, S.M., McCrensky, K.A., Levine, W.C., Sandberg, W.S., & Berger, D.L. New England Surgical Society, 88th Annual Meeting. New England Surgical Society; Burlington, New Hampshire. 2007 Sep; Can OR Schedule Optimizing Software Improve OR Efficiency?.
14. Ehrenfeld, J.M. & Sandberg, W.S. American Society of Anesthesiologists Annual Meeting. American Society of

Anesthesiologists; San Francisco, California. 2007 Oct; Temperature Monitoring and Management Practices in a Large Academic Anesthesia Department.

15. Mashour, G.A., Kheterpal, S., Shanks, A., Sandberg, W.S., & Tremper, K.K. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2007 Oct; Clinical Validation of the Extended Mallampati Score.
16. Fox, J.F., Sandberg, W.S., & Levine, W.C. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2007 Oct; Anesthesia Information Management System Data Guide Cost Management Decisions.
17. Hobai, I.A., Gauran, C., Chitilian, H.V., Ehrenfeld, J.M., & Sandberg, W.S. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2007 Oct; Significance and Management of Intraoperative Heart Rate Related EKG Changes.
18. Ehrenfeld, J.M. & Sandberg, W.S. International Anesthesia Research Society 82nd Clinical & Scientific Congress. International Anesthesia Research Society; San Francisco, California. 2008 Mar; A Novel Method for Creating Alerts of Intra-Operative Gaps in Patient Monitoring During Anesthesia.
19. Ehrenfeld, J.E. & Sandberg, W.S. 2008 Joint International Congress of ILTS, ELITA & LICAGE. Paris, France. 2008 Jul; Incidence of Gaps in Physiologic Monitoring During Liver Transplantation.
20. Sandberg, W.S., Levine, W.C., Daily, B.J., & Dunn, P.F. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; Orlando, Florida. 2008 Oct; Operating Room Time Cost of Switching Surgeons During the Electively Scheduled Work Day.
21. Chatburn, L.T., Dunn, P.F., Chatburn, J.A., & Sandberg, W.S. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; Orlando, Florida. 2008 Oct; Temporal Distribution of Emergency Surgical Cases at a Large Academic Hospital.
22. Chatburn, L.T., Chatburn, J.A., Dunn, P.F., & Sandberg, W.S. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; Orlando, Florida. 2008 Oct; Analysis of Non-Dedicated OR Capacity for Emergency Surgical Cases at a Large Academic Hospital.
23. Chatburn, L.T., Chatburn, J.A., Dunn, P.F., & Sandberg, W.S. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; Orlando, Florida. 2008 Oct; Achieving a 30-minute-to-OR Target for Emergency Cases: A Single-center Performance Analysis.
24. National Presentation. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; New Orleans, Louisiana. 2009; Creating an Infrastructure to Extract Information From My AIMS.
25. Ehrenfeld, J.M., Spring, S., Pierce, E., Peterfreund, R., Forbes, V., & Sandberg, W.S. International Anesthesia Research Society 83rd Clinical & Scientific Congress. IARS; San Diego, California. 2009 Mar; Utilization of an Anesthesia Information Management System for Physician Credentialing.
26. Sandberg, W.S., Spring, S.F., Walsh, J.L., & Ehrenfeld, J.E. Euroanaesthesia 2009. Milan, Italy. 2009 Jun; Computer Driven Performance Improvement in Anesthesia Practice.
27. Sandberg, W.S. & Seim, A.R. Euroanaesthesia 2009. Milan, Italy. 2009 Jun; A Structured Program for Evaluation of Medical Technology in the OR of the Future.
28. Karlsen, E., Seim, A.R., Faxvaag, A., Sandberg, W.S., & Toussaint, P. Euroanaesthesia 2009. Milan, Italy. 2009 Jun; Technologies for Coordination Support in Hospitals - A Review.
29. Ehrenfeld, J.M., Sandberg, W.S., Warren, L., Kwo, J., & Bickmore, T. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Diego, California. 2010 Oct; Use of a Computer Agent to Explain Anesthesia Concepts to Patients.
30. Ehrenfeld, J.M., Henneman, J.P., Bateman, B.T., & Sandberg, W.S. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Diego, California. 2010 Oct; The Hidden Incidence and Cost of Epidural Hematomas.
31. Ehrenfeld, J.E., Kondili, D., Silvestri, S., Szabo, M., & Sandberg, W.S. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Diego, California. 2010 Oct; Prevention of Perioperative Positioning Related Injuries.
32. Ehrenfeld, J.M., Henneman, J.P., & Sandberg, W.S. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Diego, California. 2010 Oct; Impact of Continuous and Noninvasive Hemoglobin Monitoring on Intraoperative Blood Transfusions.
33. Society of Academic Anesthesia Associations, Annual Meeting. SAAA; Denver, Colorado. 2011; Fellowship Training: What Does an Academic Anesthesia Chair Want?.
34. Society of Academic Anesthesia Associations, Annual Meeting. SAAA; Denver, Colorado. 2011; Future of Anesthesiology: A Lifetime of Pumping Gas is not in the Cards.
35. American Society of Anesthesiologists, Annual Meeting. ASA; Chicago, Illinois. 2011; OPPE / FPPE / OMG: How to Develop Credentialing Systems to Meet Joint Commission Requirements.
36. Ehrenfeld, J.M., Wanderer, J.P., Hersey, S., Eagle, S., & Sandberg, W.S. International Anesthesia Research Society Annual Meeting. IARS; Vancouver, Canada. 2011 May; Pilot Implementation & Assessment of a Computerized Preanesthetic Assessment Tool.
37. Ghassemi, F., Dunn, P., Levi, R., Levine, W., Sandberg, W.S., & Segev, D. INFORMS Healthcare. Montreal,

Canada. 2011 Jun; A Quantitative Framework for Staffing in a Department of Anethesia.

38. Sandberg, W.S. INFORMS Healthcare. Montreal, Canada. 2011 Jun; The Changing Financial Landscape of Procedural Medicine.
39. Ehrenfeld, J.M., Hersey, S., Higgins, M., & Sandberg, W.S. Society for Medical Innovation and Technology. Tel Aviv, Israel. 2011 Sep; Validation and Pilot Testing of a Novel Web-Based Computerized Preanesthetic Evaluation Tool.
40. Hemachandra, L., Kla, K.M., Rothman, B.S., Ehrenfeld, J.M., & Sandberg, W.S. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; Washington, District of Columbia. 2012 Oct; Analyzing the Need for Dedicated Trauma Rooms: A Data-Drive Modeling Approach.
41. Washington University School of Medicine; St. Louis, Missouri. 2013 May 14; Adventures in Pre-Operative Patient Education Research.
42. Sandberg, W.S. Grand Rounds. Weill Cornell Medical College; New York, New York. 2013 Jun; Future of Anesthesia: A Lifetime of Pumping Gas is not in the Cards.
43. Fackler, J., Wetzel, R., Kennedy, C., & Sandberg, W.S. Meaningful Use of Complex Medical Data. Children's Hospital Los Angeles, The Saban Research Institute; Los Angeles, California. 2013 Aug; Problems I Want Solved; Requirements of Bedside Decision Support.
44. Tiwari, V., Ehrenfeld, J., & Sandberg, W. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2013 Oct; Evaluating Improvements in First-Case-On-Time-Starts Using Process Control Methodologies.
45. Wanderer, J., Ehrenfeld, J., Sandberg, W., & Epstein, R. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2013 Oct; The Changing Scope of Difficult Airway Management.
46. Starr, S., Ehrenfeld, J., Baysinger, C., & Sandberg, W. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2013 Oct; Initiation of a Nitrous Oxide Service: Implications for Patient Access to Obstetric Anesthesia Services.
47. Wanderer, J., Hester, D., Sandberg, W., & Ehrenfeld, J. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2013 Oct; Identification of Factors Influencing Anesthetic Drug Cost Variation.
48. Ehrenfeld, J., Denton, J., & Sandberg, W. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2013 Oct; Utilization of the Surgical Apgar Score as a Continuous Measure of Intraoperative Risk.
49. Epstein, R., Ehrenfeld, J., Rothman, B., & Sandberg, W. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2013 Oct; Lack of Utility of a Decision Support System to Mitigate Delays in Admission From the Operating Room to the Post Anesthesia Care Unit.
50. Tiwari, V., Furman, W., & Sandberg, W. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2013 Oct; Best of Abstracts (Clinical Science): Predicting Surgical Volume.
51. House II, L., Calloway, N., Sandberg, W., & Ehrenfeld, J. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2013 Oct; Intraoperative and Demographic Factors More Strongly Predict Patient Wake-Up Time Than Duration of Clinical Anesthesia Training.
52. Tiwari, V., Ehrenfeld, J., & Sandberg, W.S. Association of Anesthesia Clinical Directors Annual Meeting. Association of Anesthesia Clinical Directors; Nashville, Tennessee. 2014 Mar; Evaluating Improvements in First Case On Time Starts Using Process Control Methodologies (Best Abstract of Meeting winner).
53. Tiwari, V., Furman, W., & Sandberg, W.S. Association of Anesthesia Clinical Directors Annual Meeting. Association of Anesthesia Clinical Directors; Nashville, Tennessee. 2014 Mar; Predicting Daily Surgical Case Volume.
54. Dobie, K.H., Han, X., Schildcrout, J.S., & Sandberg, W.S. American Society of Regional Anesthesia 39th Annual Meeting. American Society of Regional Anesthesia; Chicago, Illinois. 2014 Apr; New Technique for Blockade of the Brachial Plexus for Shoulder Surgery Enhances Patient Satisfaction and Preserves Motor Function.
55. McEvoy, M.D., Newton, M.W., Ehrenfeld, J.M., Wanderer, J.P., Higgins, M., McQueen, K.A., & Sandberg, W.S. International Anesthesia Research Society Meeting. (IARS) International Anesthesia Research Society; Montreal, Canada. 2014 May; Comparison of Anesthesia Training Experience at a Rural Referral Hospital in Western Kenya to an ACGME-Approved Program in the United States.
56. Wanderer, J., Patel, N., Pilla, M., Sandberg, W., Algren, J., & Rothman, B. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; New Orleans, Louisiana. 2014 Oct; Implementation and External Validation of the Z-Score System for Normalizing Residency Evaluations.
57. Tiwari, V. & Sandberg, W. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; New Orleans, Louisiana. 2014 Oct; Using Providers' Self-Reported Time Away Information to Predict Daily Surgical Service Volume Months in Advance.
58. Ehrenfeld, J., Shotwell, M., Gupta, R., Sandberg, W., Johnson, M., & Bulka, C. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; New Orleans, Louisiana. 2014 Oct; Regional Anesthesia, Time to Hospital Discharge, and In-Hospital Mortality: A Propensity Score Matched

Analysis.

59. Starnes, J.R., McEvoy, M.D., Ehrenfeld, J.M., Sandberg, W., & Wanderer, J.P. 2015 Annual Meeting and International Science Symposium. International Anesthesia Research Society; Honolulu, Hawaii. 2015 Mar; Automated Case Cancellation Review System Improves System Based Practice Learning.
60. McEvoy, M.D., King, A.B., Wanderer, J.P., Geiger, T., Terekhov, M., Ehrenfeld, J.M., Sandberg, W. 2015 Annual Meeting and International Science Symposium. International Anesthesia Research Society; Honolulu, Hawaii. 2015 Mar; Effect of Implementing a Perioperative Surgical Home Including an Enhanced Recovery After Surgery Pathway for Colorectal Surgery Patients.
61. Newton, M.W., Sileshi, B., Mungai, M., Njoroge, M., Kimeto, J., Sandberg, W.S., & McEvoy, M.D. 2015 CUGH Global Health Conference. Consortium of Universities for Global Health; Boston, Massachusetts. 2015 Mar; Operative Trauma in a Tertiary Care Center in Kenya: Detailed Causality, Demographics, and Mortality.
62. Sileshi, B., McEvoy, M.D., Wanderer, J.P., Njunge, A., Kimeto, J., Scherdin, J., Sandberg, W.S., Newton, M.W. 2015 CUGH Global Health Conference. Consortium of Universities for Global Health; Boston, Massachusetts. 2015 Mar; Surgical Apgar Score and Safe Surgery Checklist Use in Kenya: Preliminary Results of Over 3,000 Cases at a Single Tertiary Care Center.

Invited Presentation - Local

1. Telemedicine and Advanced Technology Research Center Product Line Review. Cambridge, Massachusetts. 2002; Anesthesia in the Operating Room of the Future.
2. Center for Integration of Medicine and Innovative Technology. 2005; Perioperative Systems Design.
3. Partners Healthcare Information Services. Boston, Massachusetts. 2005; The O.R. of the Future.

Invited Presentation - Regional

1. National Meeting. CIMIT Annual Stakeholder s Meeting. CIMIT; Cambridge, Massachusetts. 2002; Anesthesia in 2020.
2. VHA National Physician Leadership Council Meeting. Boston, Massachusetts. 2003; Operating Room of the Future.
3. Annual Meeting. The Council of Teaching Hospitals; Cambridge, Massachusetts. 2003; Technology and Workflow in the CIMIT Operating Room of the Future.
4. Annual Meeting. Eastern Surgical Society; Boston, Massachusetts. 2004; The O.R. of the Future.
5. Annual Meeting. The New England Association of Nurse Anesthetists; Manchester, New Hampshire. 2004; Bronchoscopic Intubation.
6. Conference: Gearing Up for RFID Compliance: Will You Be Ready?. MarcusEvans; 2004; Radiofrequency Identification in the OR of the Future: More Than Just a Promise.
7. Annual Meeting. The Council of Teaching Hospitals; Cambridge, Massachusetts. 2007; Parallel Processing in the OR: The CIMIT / MGH Operating Room of the Future Project.
8. Annual Meeting. New England Society of Anesthesiologists; Annual Meeting, Rhode Island. 2008; OR of the Future: Implications for Current Practice.
9. Annual Meeting. The Council of Teaching Hospitals; Boston, Massachusetts. 2009; CIMIT- Perioperative Research Options: A Successful Model for Nurturing Innovation within Health Care Delivery Systems.
10. Annual Meeting. Tennessee Society of Anesthesiologists Annual Meeting,. TSA; Nashville, Tennessee. 2011; OPPE / FPPE / OMG: Anesthesia Information Management Systems and Real-Time Point of Care Support.

Invited Presentation - National

1. National Meeting. Gordon Conference on Protein Stability. 1990; Apolar Substitutions of the Gene V Protein Hydrophobic Core and their Effects on Stability.
2. National Meeting. Anesthesia History Association Annual Meeting. Anesthesia History Association; Williamsburg, Virginia. 1997; Legends and Fish Stories: The Role of Oral History in Anesthesia Education.
3. National Meeting. The Association of University Anesthesiologists Annual Meeting. The Association of University Anesthesiologists; Rochester, New York. 2001; Identification of an Anesthetic Binding Site on Protein Kinase C delta.
4. National Meeting. American Association of Nurse Anesthetists; Boston, Massachusetts. 2003; Robotic Surgery in the 21st Century.
5. National Meeting. Medicine Meets Virtual Reality 11. Telemedicine and Advanced Technology Research Center (TATRC), United States Army Research and Materiel Command; Newport Beach, California. 2003; Update: Setting the Research Agenda for Perioperative Systems Design.
6. National Meeting. Society for Technology in Anesthesia; Albuquerque, New Mexico. 2004; Parallel Processing and Architectural Change to Increase Efficiency in Single ORs.
7. National Meeting. Operating Room of the Future Workshop: OR 2020. Georgetown University / Walter Reed Army Medical Center; Ellicott City, Maryland. 2004; OR 2020: Parallel Processing and Technology Development in the CIMIT ORF.

8. National Meeting. Computer Assisted Radiology and Surgery 2004 Annual Meeting. Chicago, Illinois. 2004; Technology & Real Time Process Management in the OR of the Future.
9. National Meeting. Health Technology Center (a non-profit advisory board for academic hospitals) The Future of Interventional and Surgical Services; San Francisco, California. 2004; The Changing Tide of Interventional and Surgical Services: The CIMIT/MGH OR of the Future Project.
10. National Meeting. American College of Surgeons 90th Annual Clinical Congress. American College of Surgeons; New Orleand, Louisiana. 2004; OR of the Future: The Anesthesiologist s Perspective.
11. National Meeting. UCLA Seminars on Imaging and Informatics. University of California, Los Angeles; Lake Arrowhead, California. 2004; Workflow in Digital Operating Rooms of the Future.
12. National Meeting. American Society of Anesthesiologists 2004 Annual Meeting. American Society of Anesthesiologists; Las Vegas, Nevada. 2004; Can Anesthesiologists Be Un-installed.
13. Medicine Meets Virtual Reality 13. Telemedicine and Advanced Technology Research Center (TATRC), United States Army Research and Materiel Command; Long Beach, California. 2005; Safety in the Perioperative Environment.
14. National Meeting. American Association of Nurse Anesthetists National Meeting. American Association of Nurse Anesthetists; Washington, District of Columbia. 2005; Robotic surgery in the 21st Century.
15. Workshop on Perioperative Safety. San Francisco, California. 2005; Safety in the Perioperative Environment.
16. American Society of Anesthesiologists 2006 Annual Meeting. American Society of Anesthesiologists; Chicago, Illinois. 2006; Perioperative Pay-For-Performance: How Does It Influence Intraoperative Care?.
17. University of Iowa, Department of Anesthesia; Iowa City, Iowa. 2006; OR of the Future- More Than An Interesting Name.
18. Healthcare Information and Management Systems Society Annual Meeting. Healthcare Information and Management Systems Society; San Diego, California. 2006; Technology of the Future: Impact on the Nursing Shortage, Workflow and Practice Across the Care Continuum.
19. Healthcare Information and Management Systems Society Annual Meeting. Healthcare Information and Management Systems Society; San Diego, California. 2006; Back to the Future: A Total Perioperative Patient Situational Awareness System.
20. Healthcare Information and Management Systems Society Annual Meeting. Healthcare Information and Management Systems Society; San Diego, California. 2006; The Perioperative Patient Zone of Safety.
21. American College of Surgeons 34th Annual Spring Meeting. American College of Surgeons; Dallas, Texas. 2006; Operating Room of the Future- Current Status of Perioperative Systems.
22. The Future of Digital Delivery of Care. Health Technology Center (a non-profit advisory board for academic hospitals); San Francisco, California. 2006; How Digital Technologies Will Transform Healthcare: Middleware Comes of Age.
23. American College of Surgeons 92nd Annual Clinical Congress. American College of Surgeons; Chicago, Illinois. 2006; Developing Operating Room Systems to Maximize Efficiency: The Massachusetts General Hospital Experience.
24. Society for Technology in Anesthesia Seventeenth Annual Meeting. Society for Technology in Anesthesia; Orlando, Florida. 2007; Anesthesia Information Management Systems and Decision Support: Opportunities, Test Cases and Financial Impact.
25. Case Western Reserve University Department of Anesthesiology; Cleveland, Ohio. 2007; Eighth Annual Ali Gharib Memorial Lecture: Speculations on the Future of Anesthesiology.
26. Resident Lecture. University of Pennsylvania, Department of Anesthesia and Critical Care; Philadelphia, Pennsylvania. 2007; Perioperative Systems Design in the OR of the Future: Results and Translations.
27. American Society of Anesthesiologists 2007 Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2007; Use of Automated Anesthesia Information Management Systems for Retrospective Reviews and Improvement of Documentation.
28. Healthcare Information and Management Systems Society Annual Meeting. Healthcare Information and Management Systems Society; New Orleans, Louisiana. 2007; Getting Ready for Pay for Performance in the Operating Room.
29. Army Telemedicine Partnership Series: Hospital of the Future. Telemedicine and Advanced Technology Research Center (TATRC), United States Army Research and Materiel Command; Nashville, Tennessee. 2007; Safety in the Perioperative Environment.
30. Healthcare Information and Management Systems Society Annual Meeting. Healthcare Information and Management Systems Society; Orlando, Florida. 2008; Everything, Everywhere: Integrated Real-Time Process Management.
31. Department of Anesthesiology, University of Michigan; Ann Arbor, Michigan. 2008; Beyond Pager Spam: What Can We Learn from a One-Time Alert?.
32. The Society of American Gastrointestinal and Endoscopic Surgeons 2008 Annual Meeting. The Society of American Gastrointestinal and Endoscopic Surgeons; Philadelphia, Pennsylvania. 2008; RFID & Other Wireless technologies for the OR & Hospital of the Future.
33. Resident Lecture. Vanderbilt University Department of Anesthesiology; Nashville, Tennessee. 2008; Anesthesia

Information Management Systems, Documentation Quality, and You.

34. Society for Ambulatory Anesthesia 2008 Mid-year Meeting. Society for Ambulatory Anesthesia; Orlando, Florida. 2008; Does the O.R. of the Future Have a Role in the Ambulatory Surgery Center?.
35. American Association of Clinical Directors 20th Annual Meeting. American Association of Clinical Directors; Orlando, Florida. 2008; Update on the American Association of Clinical Directors Procedural Terms Glossary.
36. Society for Technology in Anesthesia, Mid-year Meeting. Society for Technology in Anesthesia; Orlando, Florida. 2008; Pay for Performance: Are Our Information Systems Ready?.
37. Tennessee Society of Anesthesiologists Annual Meeting. Tennessee Society of Anesthesiologists; Nashville, Tennessee. 2009; Anesthesia Information Management Systems: Moving to Improve Documentation And Clinical Performance.
38. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; New Orleans, Louisiana. 2009; Ergonomics of the AIMS Workstation.
39. Healthcare Information and Management Systems Society Annual Meeting. Healthcare Information and Management Systems Society; Chicago, Illinois. 2009; Wired! The Fully Integrated OR Suite.
40. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; New Orleans, Louisiana. 2009; Doing More With Less: Cost Containment and Work Process Change to Increase Effectiveness.
41. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Diego, California. 2010; Using IT to Support Individual Performance and Collaboration Across Distributed Teams.
42. Healthcare Information and Management Systems Society Annual Meeting. Healthcare Information and Management Systems Society; Atlanta, Georgia. 2010; Multiple Indoor Location Tracking Systems: Concurrent Pilot and Assessment.
43. Rhode Island Anesthesia Society 15th Annual Rhode Island Anesthesia Conference. Rhode Island Anesthesia Society; 2010; Anesthesia Information Management Systems and the Future of Anesthesia.
44. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Diego, California. 2010; OPPE / FPPE / OMG: How to Develop Credentialing Systems to Meet Joint Commission Requirements.
45. Meaningful Use of Complex Medical Information. Children's Hospital of Los Angeles / National Library of Medicine; Los Angeles, California. 2012 Aug 11; Using Real Time EMR Data to Provide Transparency, Near-Real Time Decision Support and Risk Mitigation in High Risk, High Reward Environments.
46. Society of Academic Anesthesiology Associations Annual Meeting. Society of Academic Anesthesiology Associations; Chicago, Illinois. 2014 Nov; Faculty Development: The Vanderbilt System.
47. Winter Anesthesia Conference. California Society of Anesthesiologists; Maui, Hawaii. 2015 Jan 14; The Changing Scope of Difficult Airway Management.
48. Winter Anesthesia Conference. California Society of Anesthesiologists; Maui, Hawaii. 2015 Jan 15; Basics of Quality Improvement: How & What to Measure and Common Pitfalls.
49. Winter Anesthesia Conference. California Society of Anesthesiologists; Maui, Hawaii. 2015 Jan 16; Case-Based Discussion: The Perioperative Surgical Home: Is It Different from a Well-Run Anesthesiology Practice?.
50. Winter Anesthesia Conference. California Society of Anesthesiologists; Maui, Hawaii. 2015 Jan 16; The Future of Anesthesia What We All Need to Be Worrying About.

Invited Presentation - International

1. Kehittyvä LääKäri 2003 (A career advancement forum for doctors). Helsinki University; Helsinki, Finland. 2003; Operating Room of the Future Project.
2. Departments of Surgery and Anesthesia & Intensive Care Medicine, Töölö Hospital, Helsinki University Hospitals; Helsinki, Finland. 2003; Future Hospitals and Operation Theatres- the Massachusetts General Hospital Experience.
3. Increasing the Capacity of NHS Trusts: Pathways to Performance Improvement Success Through Care Delivery Planning and Facility Innovation. Harvard Graduate School of Design; Cambridge, Massachusetts. 2003; Ambulatory Surgery: The Impact of the Operating Room of the Future.
4. Increasing the Capacity of NHS Trusts: Pathways to Performance Improvement Success Through Care Delivery Planning and Facility Innovation. Harvard Graduate School of Design; Cambridge, Massachusetts. 2004; Innovative Models of Service Delivery: Lessons from Massachusetts.
5. St. Olav s Hospital; Trondheim, Norway. 2005; OR of the Future Project: Scope, Developments and Future Directions.
6. Computer Assisted Radiology and Surgery 19th International Congress and Exhibition. Computer Assisted Radiology and Surgery; Berlin, Germany. 2005; Acquisition, Durability and Impact of Parallel Processing Perioperative System Designs in North America.
7. University Medical Center; Utrecht, Netherlands, The. 2009; Anesthesia Information Management Systems: Ergonomics and Decision Support.
8. The Netherlands Cancer Institute / Antoni van Leeuwenhoek Hospital; Amsterdam, Netherlands, The. 2009; A Structured Program for Design and Evaluation of Future Perioperative Systems.

9. Symposium: Human Factors in High Risk Health Care. University of Twente; Enschede, Netherlands, The. 2009; A Structured Program for Design and Evaluation of Future Perioperative Systems.
10. University Medical Center; Utrecht, Netherlands, The. 2009; Redesigning the Operating Room Complex: the Harvard OR of the Future Concept.
11. St. Olav's Hospital; Trondheim, Canada. 2011; The Future of Perioperative Medicine in the United States.
12. INFORMS Healthcare 2011 Annual Meeting. INFORMS Healthcare; Montreal, Canada. 2011; Panel Title: Novel Models of Healthcare Delivery Lecture Title: The Changing Economic Landscape of Procedural Medicine .
13. Warren Sandberg, MD, PhD & Noemi Dooham, MD, PhD. WONCA 20th World Conference. Prague, Czech Republic. 2013 Jun; Family Medicine and Global Women's Health: A Critical Contributor to Impacting the Global Burden of Disease.
14. Warren S. Sandberg. Symposium: Clinical Decision Support: Chances and Challenges. University Medical Center; Utrecht, Netherlands, The. 2015 May 12; The Present & Possible Future of Real-time Alerts & Reminders.

Invited Presentation - Other

1. Resident Lecture. Children's Hospital of Pennsylvania, Department of Anesthesiology; Philadelphia, Pennsylvania. 2008; Anesthesia Information Management Systems, Documentation Quality, and You.

Problem based learning discussion

1. Department of Anesthesia and Critical Care, MGH; Boston, Massachusetts. 2003; Anesthesia for Eight Laparoscopic Cholecystectomies in One Day.
2. Department of Anesthesia and Critical Care, MGH; Massachusetts. 2003; Lung Isolation in Difficult Circumstances.
3. Department of Anesthesia and Critical Care, MGH; Massachusetts. 2009; Preoperative Patient Teaching and Fundamentals of Human Memory.

Internal Grand Rounds

1. Department of Anesthesia and Critical Care, MGH; Boston, Massachusetts. 2003; The CIMIT OR of the Future Project.
2. Department of Anesthesia and Critical Care, MGH; Massachusetts. 2004; The Promise of Automatic Identification and Data Collection Technologies in the Operating Room of the Future.
3. Department of Anesthesia and Critical Care, MGH; Massachusetts. 2004; Indoor Positioning Systems.
4. Department of Anesthesia and Critical Care, MGH; Massachusetts. 2006; Perioperative Systems Design: The MGH OR of the Future Project- Results & Translations.
5. Department of Anesthesiology, Perioperative and Pain Medicine, Brigham and Women's Hospital; Massachusetts. 2007; The CIMIT / MGH OR of the Future Project.
6. Department of Gastroenterology, MGH; Massachusetts. 2009; Can This Patient Be Sedated?.

University Talk

1. The Department of General Anesthesia, Cleveland Clinic Foundation; Cleveland, Ohio. 2004; The CIMIT OR of the Future Project- Implementation and Preliminary Results.
2. Designing the Integrated Radiology / Surgery Procedure Area of the Future. Harvard Graduate School of Design; Cambridge, Massachusetts. 2004; The CIMIT / MGH OR of the Future: Process Efficiency through Architectural Change.
3. Department of Anesthesia and Critical Care, MGH; Massachusetts. 2005; Paradoxical Embolism During Liver Transplantation.
4. Department of Anesthesia and Critical Care, MGH; Massachusetts. 2005; Introduction of 21st Century Anesthesia Delivery Systems to Clinical Practice.
5. Department of Anesthesia and Critical Care, MGH; Massachusetts. 2006; Induction of Anesthesia in the Morbidly Obese Patient with Difficult Airway and Florid Gastro-esophageal Reflux.
6. Department of Pulmonary Medicine, MGH; Massachusetts. 2007; Portopulmonary Hypertension and Liver Transplantation.
7. Department of Anesthesia and Critical Care, MGH; Massachusetts. 2008; Beyond Pager Spam: What Can We Learn from a One-Time Alert?.

External Grand Rounds

1. MetroHealth Medical Center, Department of Anesthesiology, Case Western Reserve University; Cleveland, Ohio. 2004; Increasing OR Efficiency Through Parallel Processing and Architectural Change.
2. New York Hospital of Queens; New York. 2005; OR of the Future: Implementation, Lessons Learned and Future Directions.

3. Medical University of South Carolina; Charleston, South Carolina. 2006; The OR of the Future- Where Technology Meets Team Work.
4. University of Iowa, Department of Anesthesia; Iowa City, Iowa. 2006; Perioperative Systems Design: The MGH OR of the Future Projec.
5. University of Massachusetts Department of Anesthesiology; Worcester, Massachusetts. 2007; Anesthesia in the OR of the Future.
6. University of Pennsylvania, Department of Anesthesia and Critical Care; Philadelphia, Pennsylvania. 2007; Anesthesia Information Management Systems and Decision Support: Opportunities, Test Cases and Financial Impact.
7. Washington University of St. Louis, Department of Anesthesia and Critical Care; St Louis, Missouri. 2007; Anesthesia Information Management Systems and Decision Support: Opportunities, Test Cases and Financial Impact.
8. University of Cincinnati, Department of Anesthesiology; Cincinnati, Ohio. 2007; Anesthesia Information Management Systems and Decision Support: Opportunities, Test Cases and Financial Impact.
9. Cleveland Clinic Foundation, Regional Anesthesiology Practice; 2008; OR of the Future- Using Technology to Improve Patient Care and Outcomes.
10. Cleveland Clinic Foundation, Regional Anesthesiology Practice; 2008; The Future is Now: Anesthesia Information Management System Data to Improve Patient Care and Financial Performance.
11. Vanderbilt University Department of Anesthesiology; Nashville, Tennessee. 2008; Adding Functionality to Commercial Anesthesia Information Management Systems.
12. Children s Hospital of Pennsylvania, Department of Anesthesiology; Philadelphia, Pennsylvania. 2008; OR of the Future in an Academic Hospital: Implementation, Outcomes and Extensions.
13. State University of New York, Stony Brook, Department of Anesthesia; Stony Brook, New York. 2009; Automatic Process Monitoring and Process Control in Anesthetizing Locations.
14. University of Rochester, Department of Anesthesiology; Rochester, New York. 2012 Mar; Future of Anesthesiology: A Lifetime of Pumping Gas is not in the Cards.
15. Washington University School of Medicine; St. Louis, Missouri. 2013 May 15; Beyond Record Keeping: Automated Process Monitoring and Process Control in the Operating Room.
16. Weill Cornell Medical College; New York, New York. 2013 Jun 10; Beyond Record Keeping: Automated Process Monitoring and Process Control in the Operating Room.

Workshop

1. Duke University School of Medicine; Grand Cayman, Cayman Islands. Feb 20; Anesthesia.
2. Warren Sandberg, MD, PhD. Anesthesia Camp. Duke University School of Medicine; Grand Cayman, Cayman Islands. 2013 Feb; It's Not Vegas - What We Do Really Does Leave the OR.
3. Warren Sandberg, MD, PhD. Anesthesia Camp. Duke University School of Medicine; Grand Cayman, Cayman Islands. 2013 Feb; Future of Anesthesia: A Lifetime of Pumping Gas is Not in the Cards.
4. Warren Sandberg, MD, PhD. Anesthesia Camp. Duke University School of Medicine; Grand Cayman, Cayman Islands. 2013 Feb; Anesthesia Performance Assessment & Reporting - From Individual to Organization.
5. Warren Sandberg, MD, PhD. Anesthesia Camp. Duke University School of Medicine; Grand Cayman, Cayman Islands. 2013 Feb; Future Trends in Surgery.

Podcasts / Webinar

1. Stanford University Clinical Excellence Research Center; Stanford, California. 2014 Aug 29; How ICU Care Can be Modified Today to Most Greatly Reduce Annual Total US Spending for Healthcare Without Reduction in the Quality of Care Sought by Well Informed Patients or Their Designated Representatives.

Panel Presentation

1. American Society of Anesthesiologists 2006 Annual Meeting. American Society of Anesthesiologists; Chicago, Illinois. 2006; Beyond Creating the Anesthetic Record- What Else Does an Automated Anesthesia Information Management System Mean for Our Patients and Our Practice?.
2. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; Orlando, Florida. 2008; Novel Ways to Increase OR Throughput: Introduction and Synthesis.
3. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; New Orleans, Louisiana. 2009; Making It In Lean Times: How Academic and Private Practices Are Coping with the Second Great Depression.
4. Production and Operations Management Society 2010 Annual Meeting. Production and Operations Management Society; Vancouver, Canada. 2010; Panel Title: Capacity & Resource Management in Perioperative Systems Lecture Title: A Generalized Simulation Tool to Model Patient Transportation Systems .
5. American Association of Clinical Directors Annual Meeting. American Association of Clinical Directors; Huntington Beach, California. 2011; Academy for New Medical Directors.

6. Warren Sandberg, MD, PhD. American Society of Anesthesiologists Annual Meeting. American Society of Anesthesiologists; San Francisco, California. 2013 Oct; Perioperative Medicine: The Future is Now.