SOAP
Society for Obstetric Anesthesia and Perinatology

Sponsored by the Society for Obstetric Anesthesia and Perinatology

The Society for Obstetric Anesthesia and Perinatology Presents:

SOAP 43rd Annual Meeting

'Providing Safe Outcomes for Mother and Baby'

April 13-17, 2011 ♦ Loews Lake Las Vegas Resort ♦ Henderson, Nevada

Meeting Syllabus

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SOAP

520 N. Northwest Highway, Park Ridge, IL 60068
Phone: 847-825-6472
Fax: 847-825-5658
E-mail: soap@soap.org
Website: www.soap.org

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Henderson, Nevada

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E-mail: soap@soap.org • Website: www.soap.org

Join us in Las Vegas!

Dear Friends,

On behalf of the SOAP Program Committee we invite you to attend the 43rd Annual SOAP Meeting in Las Vegas, April 13-17, 2011. 'Excited about the program' is an understatement as this promises to be one of the best SOAP meetings to date. The program is packed with sessions that include old favorites as well as new sessions that feature short clinically-relevant lectures. The format is expected to maximize value for those attending the annual meeting. 'Providing Safe Outcomes for Mother and Baby' was chosen as this year's theme, and you will be treated to safety-related sessions interspersed throughout the program.

Plan on arriving early to partake in two workshops planned for Wednesday, April 13, 2011 which were specifically coordinated to allow attendance at both. Jose Carvalho and Ashu Wali organized a state of the art Ultrasound in Obstetric Anesthesia workshop and Advanced Airway Management workshop, respectively. Enrollment in the workshops will include access to a website developed specifically to enhance your educational experience, particularly if visited before coming to the meeting. Both workshops will include some of the most technologically advanced equipment available.

The Annual Meeting program also includes 24 oral presentations in four sessions that feature the best research being conducted in obstetric anesthesia, 2 pro/con debates (Failed Spinal is Due to Bad Bupivacaine; Patient Scheduled for Cesarean Section for Failure to Progress in Labor: Patchy Block with Epidural – Plan is to do a Spinal for Cesarean Section), 3 panels of leading experts presenting 10 clinically relevant lectures, 2 poster presentation sessions, a PBLD Breakfast with the Expert Session discussing cases with complex medical problems, a session featuring the best case reports of the year, a resident/medical student forum, and 7 lectures by renowned speakers including Sulpicio Soriano (Effects of Anesthetics on Neurodevelopment of Fetus), Mark Warner (ASA President Address), Valerie Arkoosh (Health Care Reform: Impact on Physicians and Practice), Aaron Caughey (What's New in Obstetrics: Critical Care Management of the Parturient), William Camann (Fred Hehre Lecture), and Paloma Toledo (Gerard W. Ostheimer Lecture).

We are also honored to present the Society's Distinguished Service Award to a very worthy recipient, Joanne Douglas.

The meeting also includes an exciting social program featuring a welcome reception, a wellness walk/run, an annual celebratory banquet with awards presentation, and a free afternoon for site seeing, shopping, exercising, or relaxing. Elvis Presley and Marilyn Monroe are rumored to be interested in attending the welcome reception, and we might even be able to talk Sinatra into doing a few numbers for us at the banquet.

Please mark your calendars now because this is one Annual SOAP meeting you don't want to miss! We look forward to seeing you in beautiful Las Vegas in the spring of 2011.

Sincerely,

Maya S. Suresh, M.D.
SOAP President-Elect and
Program Committee Chair

Kenneth E. Nelson, M.D.
SOAP 2011 Meeting Host

Program Committee

Maya S. Suresh, M.D.
Program Chair
Baylor College of Medicine
Houston, Texas

William R. Camann, M.D.
Brigham and Women's Hospital
Harvard Medical School
Boston, Massachusetts

Robert D'Angelo, M.D.
Wake Forest University School
of Medicine
Forsyth Medical Center
Winston-Salem, North Carolina

Joy L. Hawkins, M.D.
University of Colorado Denver
Aurora, Colorado

McCallum R. Hoyt, M.D., MBA
Brigham and Women's Hospital
Harvard Medical School
Boston, Massachusetts

Kenneth Nelson, M.D.
Meeting Host
Wake Forest University School
of Medicine
Forsyth Medical Center
Winston-Salem, North Carolina

Vilma E. Ortiz, M.D.
Massachusetts General Hospital
Boston, Massachusetts

Quisqueya "Kiki" Palacios, M.D.
Baylor College of Medicine
Houston, Texas

Craig Palmer, M.D.
University of Arizona
Health and Science Center
Tucson, Arizona

Barbara M. Scavone, M.D.
Northwestern University
Feinberg School of Medicine
Chicago, Illinois

Dennis C. Shay, M.D.
Mary Birch Hospital for Women
San Diego, California

Richard M. Smiley, M.D., Ph.D.
Columbia University
New York, New York

John T. Sullivan, M.D., MBA
Northwestern University
Feinberg School of Medicine
Chicago, Illinois

Lawrence C. Tsen, M.D.
Brigham and Women's Hospital
Harvard Medical School
Boston, Massachusetts

Manuel C. Vallejo, Jr., M.D.
University of Pittsburgh
Pittsburgh, Pennsylvania

Gurinder M.S. Vasdev, M.D.
Mayo Clinic College of Medicine
Rochester, Minnesota

Ashutosh Wali, M.D.
Baylor College of Medicine
Sugarland, Texas

Program Faculty

* Annual Meeting Faculty - Lecturers, Panelists
\+ Advanced Airway Workshop Faculty
^ Ultrasound Workshop Faculty
~ Judges
\# Moderators/Introductions
< PBLD Experts

Katherine W. Arendt, M.D. +
Mayo Clinic
Rochester, Minnesota

Valerie A. Arkoosh, M.D. *
University of Pennsylvania
Philadelphia, Pennsylvania

Radha Arunkumar, M.B., B.S. +
MD Anderson Cancer Center
Houston Texas

Cristian Arzola, M.D., MSc ^
Mount Sinai Hospital
University of Toronto
Toronto, Ontario, Canada

Mrinalini Balki, M.D. * ^
Mount Sinai Hospital
University of Toronto
Toronto, Canada

Gerard M. Bassell, M.D. #
University of Kansas School of Medicine
Wichita, Kansas

Jeanette Bauchat, M.D. #
Northwestern University
Chicago, Illinois

Jaakov Beilin, M.D. *
Mount Sinai School of Medicine
New York, New York

Christopher Burkle, M.D.+
Mayo Clinic
Rochester, Minnesota

Alexander J. Butwick, M.B., B.S. *
Stanford University School of Medicine
Stanford, California

William R. Camann, M.D. *
Brigham and Women's Hospital
Harvard Medical School
Boston, Massachusetts

Christopher R. Cambic, M.D. #
Northwestern Memorial Hospital
Chicago, Illinois

David C. Campbell, M.D., M.Sc. #
Saskatoon Health Region
Saskatoon, Canada

Eric C. Cappiello, M.D.~
Brigham and Women's Hospital
Boston, Massachusetts

Brendan Carvalho, M.B., B.Ch. * ~
Stanford University School of Medicine
Stanford, California

Jose CA Carvalho, M.D., Ph.D., FANZCA, FRCPC ^
Mount Sinai Hospital
University of Toronto
Toronto, Ontario, Canada

Aaron B. Caughey, M.D., Ph.D. *
Oregon Health & Science University
Portland, Oregon

Shobana Chandrasekhar, M.D. # +
Baylor College of Medicine
Sugarland, Texas

Daniel J. Cook, M.D. +
Cookgas, LLC.
St. Louis, Missouri

Patricia L. Dalby, M.D. ~
University of Pittsburgh Medical Center
Pittsburgh, Pennsylvania

Robert D'Angelo, M.D. * #
Wake Forest University School of Med.
Forsyth Medical Center
Winston-Salem, North Carolina

Christina Davidson, M.D. *
Baylor College of Medicine
Houston, Texas

Laura S. Dean, M.D. ~
Wake Forest University School of Med.
Forsyth Medical Center
Winston-Salem, North Carolina

Niki M. Dietz, M.D. +
Mayo Clinic
Rochester, Minnesota

Joanne Douglas, M.D. * <
(2011 DSA Recipient)
British Columbia Women's Hospital
Vancouver, British Columbia, Canada

Michaela K. Farber, M.D. #
Brigham and Women's Hospital
Harvard Medical School
Boston, Massachusetts

Roshan Fernando, M.B., Ch.B. ~ *
Royal Free Hospital
University of London
Radlett, United Kingdom

Helene Finegold, M.D. #
University of Pennsylvania
Pittsburgh, Pennsylvania

Michael Froelich, M.D. *
The University of Alabama at Birmingham
Birmingham, Alabama

Robert R. Gaiser, M.D. <
University of Pennsylvania Health and Sciences
Philedelphia, Pennsylvania

Eric Goldszmidt, M.D., FRCPC ^
Mount Sinai Hospital
University of Toronto
Toronto, Ontario, Canada

Stephanie R. Goodman, M.D. ~
Columbia University
New York, New York

Ashraf S. Habib, M.B., B.Ch. #
Duke University Medical Center
Durham, North Carolina

Brian A. Hall, M.D. +
Mayo Clinic
Rochester, Minnesota

Barry A. Harrison, M.D., FANZCA +
Mayo Clinic College of Medicine - Jacksonville
Jacksonvill, Florida

David M. Hatch, M.D. #
Wake Forest University School of Medicine
Winston-Salem, North Carolina

Joy Hawkins, M.D. #
University of Colorado, Denver
Denver, Colorado

Nicole Higgins, M.D. #
Northwestern University
Chicago, Illinois

Paul R. Howell, F.R.C.A. # ~ <
St. Bartholomew's Hospital
London, England, United Kingdom

McCallum R. Hoyt, M.D., MBA ~ #
Brigham and Women's Hospital
Harvard Medical School
Boston, Massachusetts

Gerard S. Kamath, M.D. +
Mayo Clinic College of Medicine
Rochester, Minnesota

Bhavani S. Kodali, M.D. * ~ <
Brigham and Women's Hospital
Boston, Massachusetts

Ruth Landau, M.D. ~ *
University of Washington
Seattle, Washington

Allison J. Lee, M.D., M.B., B.S. #
University of Miami
Miami, Florida

Barbara L. Leighton, M.D. * <
Washington University School of Medicine
St. Louis, Missouri

Clarita Margarido, M.D., Ph.D. ^
Women's College Hospital and Sunnybrook Health Sciences Centre
University of Toronto
Toronto, Ontario, Canada

Chawla L. Mason, M.D. ~ +
Baylor College of Medicine
Houston, Texas

Jill M. Mhyre, M.D. * # ~
University of Michigan Health System
Ann Arbor, Michigan

Rafeek Mikhael, M.D., Ph.D. ^
Toronto General Hospital
University of Toronto
Toronto, Ontario, Canada

Albert Moore, M.D., FRCPC ^
Royal Victoria Hospital
McGill University
Montreal, Quebec, Canada

Dave N. Nanan, M.D. +
Anesthesia Associates
Beaumont, Texas

Kenneth E. Nelson, M.D. *
Wake Forest University School of Medicine
Forsyth Medical Center
Winston-Salem, North Carolina

Yayoi Ohashi, M.D., Ph.D. ^
Mount Sinai Hospital
University of Toronto
Toronto, Ontario, Canada

Alice L. Oswald, M.D. # +
Baylor College of Medicine
Houston, Texas

John A. Pacey, M.D., FRCS(C) +
Verathan Medical (Canada) ULC
Barnaby, British Columbia, Canada

Arvind Palanisamy, M.D., M.B. ~
Brigham and Women's Hospital
Harvard Medical School
Boston, Massachusetts

Quisqueya "Kiki" Palacios, M.D. ~
Baylor College of Medicine
Houston, Texas

Peter Pan, M.D. *
Wake Forest University Medical Center
Advance, North Carolina

Rita M. Patel, M.D. *
University of Pittsburgh School of Medicine
Pittsburgh, Pennsylvania

Linda S. Polley, M.D. # ~ <
University of Michigan Health System
Ann Arbor, Michigan

Stephen Pratt, M.D. #
Beth Israel Deaconess Medical Center
Harvard Medical School
Boston, Massachusetts

Program Faculty

* Annual Meeting Faculty - Lecturers, Panelists
\+ Advanced Airway Workshop Faculty
^ Ultrasound Workshop Faculty
~ Judges
\# Moderators/Introductions
< PBLD Experts

Roanne L. Preston, M.D. *
British Columbia Women's Hospital
Vancouver, British Columbia, Canada

Edwin H. Rho, M.D. +
Mayo Clinic College of Medicine
Rochester, Minnesota

Jessica N. Rock, M.D. #
Medical College of Wisconsin
Milwaukee, Wisconsin

Paul Sahota, M.D., FRCPC ^
BC Women's Hospital and Health Center, Vancouver
Vancouver, British Columbia, Canada

Alan C. Santos, M.D. *
St Luke's-Roosevelt Hospital Center
New York, New York

Kelly A. Saran, R.N., M.S.
University of Michigan Health System
Ann Arbor, MI

Barbara M. Scavone, M.D. # ~
Northwestern University
Feinberg School of Medicine
Chicago, Illinois

Kenneth P. Scott, M.D. +
Mayo Clinic College of Medicine
Rochester, Minnesota

Scott Segal, M.D. <
Tufts Medical Center
Boston, Massachusetts

Dennis C. Shay, M.D. #
Anesthesia Service Medical Group
San Diego, California

Naveed T. Siddiqui, M.D. ^
Mount Sinai Hospital
University of Toronto
Toronto, Ontario, Canada

Shakeel A. Siddiqui, M.B., B.S. +
Texas Children's Hospital
Houston, Texas

Richard M. Smiley, M.D., Ph.D. # ~
Columbia University
New York, New York

Sulpicio G. Soriano, M.D. *
Harvard Medical School
Boston, Massachusetts

Joan E. Spiegel, M.D. #
Beth Israel Deaconess Medical Center
Harvard Medical School
Boston, Massachusetts

Bill Sullivan, QC *
British Columbia Women's Hospital
Vancouver, British Columbia, Canada

John T. Sullivan, M.D., MBA #
Northwestern University
Feinberg School of Medicine
Chicago, Illinois

Maya S. Suresh, M.D. * # +
Baylor College of Medicine
Houston, Texas

Wendy Teoh, M.B., B.S., FANZCA #
KK Women's & Children's Hospital
Singapore, Singapore

Paloma Toledo, M.D. # * ~
Northwestern University
Chicago, Illinois

Ashley M. Tonidandel, M.D. ~
Wake Forest University School of Medicine
Forsyth Medical Center
Winston-Salem, North Carolina

Laura Torres, M.D. +
Baylor College of Medicine
Houston, Texas

Lawrence C. Tsen, M.D. ~ #
Brigham and Women's Hospital
Harvard Medical School
Boston, Massachusetts

Rakesh B. Vadhera, M.D. +
University of Texas Medical Branch - at Galvaston
Galvaston, Texas

Manuel C. Vallejo, Jr., M.D. * ~ ^ <
University of Pittsburgh
Pittsburgh, Pennsylvania

Gurinder Vasdev, M.D. +
Mayo Clinic
Rochester, Minnesota

Ivan A. Velickovic, M.D. ~
State University of New York
Downstate Medical Center
Brooklyn, New York

Ashutosh Wali, M.D. + # ~
Baylor College of Medicine
Houston, Texas

Mark A. Warner, M.D. *
Mayo Clinic College of Medicine
Rochester, Minnesota

Jonathan H. Waters, M.D. ~
Magee Women's Hospital
Pittsburgh, Pennsylvania

Paul M Wieczorek, M.D., FRCPC ^
SMBD-Jewish General Hospital
McGill University
Montreal, Quebec, Canada

Jack L. Wilson, M.D. +
Mayo Clinic
Rochester, Minnesota

Richard N. Wissler, M.D., Ph.D. ~
University of Rochester Medical Center
Rochester, New York

David J. Wlody, M.D. # ~
State University of New York
Downstate Medical Center
Brooklyn, New York

Cynthia A. Wong, M.D. ~
Northwestern University
School of Feinberg Medicine
Chicago, Illinois

Edward A. Yaghmour, M.D. #
Northwestern University
Chicago, Illinois

Program Information

Program Information

The purpose of the Society is to provide a forum for discussion of medical problems unique to the peripartum period and to promote excellence in medical care, research and education in anesthesia, obstetrics, obstetric medicine and neonatology.

Accreditation and Designation

The Society for Obstetric Anesthesia and Perinatology is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

SOAP Annual Meeting

The Society for Obstetric Anesthesia and Perinatology designates this live activity for a maximum of 21 *AMA PRA Category 1 Credit(s)*™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Participation in the SOAP 43rd Annual Meeting

Attendance shall be open to all health practitioners, provided that they have registered for the meeting. CME credit will only be offered to M.D.s, D.O.s or equivalent. A completed Physician Verification of Attendance form must be turned in to SOAP at the conclusion of the meeting. The form will be available on-site.

Mission of SOAP Program Committee

The mission of the Society's Program Committee is to provide anesthesiologists, obstetricians, and other physicians and members of related allied health specialties with the knowledge that will reinforce past learning as well as disseminate new concepts, practices, and skills involving anesthesia and analgesia for the pregnant woman.

Target Audience

The SOAP 43rd Annual Meeting is intended for anesthesiologists, obstetricians, neonatologists, obstetric medicine specialists, maternal-fetal medicine specialists, residents, fellows and medical students. The Society supports the attendance by associate members in the educational sessions of the annual meeting. The program is generated from member requests and an assessment of need by the program committee. Attendance at this meeting does not guarantee competency or proficiency in the performance of any procedures which may be discussed or taught during the course.

Advanced Airway Management Workshop

The Society for Obstetric Anesthesia and Perinatology designates this live activity for a maximum of 4 *AMA PRA Category 1 Credit(s)*™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Use of Ultrasound in Obstetric Anesthesia: Spinals and Epidurals, Vascular Access, and TAP Blocks Workshop

The Society for Obstetric Anesthesia and Perinatology designates this live activity for a maximum of 3.5 *AMA PRA Category 1 Credit(s)*™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

PBLD Breakfast with the Experts

The Society for Obstetric Anesthesia and Perinatology designates this live activity for a maximum of 1.5 *AMA PRA Category 1 Credit(s)*™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Educational Format

CME activities may include the following formats: plenary sessions, debates, lectures, poster discussions, oral abstracts, problem-based learning, and skill-set workshops.

Special Needs Statement

The Society for Obstetric Anesthesia and Perinatology is committed to making its activities accessible to all individuals and fully complies with the legal requirements of the Americans with Disabilities Act and the rules and regulations thereof. If you are in need of an accommodation, please do not hesitate to call the SOAP office at (847) 825-6472 and/or submit a description of your needs in writing to soap@asahq.org.

Statement of Need

The SOAP Annual Meeting provides a forum devoted to obstetric anesthesia, offering clinically relevant lectures, panels and workshops; highlights of the best research being conducted in obstetric anesthesia; networking opportunities with peers at social events; and exposure to relevant products/services of interest to our attendees in the exhibits area.

Commercial Support Acknowledgement

This CME activity is supported by educational grants. A complete list of supporters will be provided onsite.

Disclosure and Resolution of Conflicts of Interest

The Society for Obstetric Anesthesia and Perinatology adheres to ACCME Essential Areas, Standards, and Policies regarding industry support of continuing medical education. In accordance with the ACCME Standards for Commercial Support of CME, SOAP implemented mechanisms, prior to the planning and implementation of this CME activity, to identify and resolve conflicts of interest for all persons in a position to control content of this CME activity. All presenters are required to make a verbal disclosure prior to their presentation.

Commercial Support Acknowledgement

The Society for Obstetric Anesthesia and Perinatology would like to thank the following supporters of the SOAP 43rd Annual Meeting:

AIRTRAQ®

Support provided for the Airway Workshop;
Airtraq provided manikins, scopes, and monitors.

COVIDIEN
positive results for life™

Support provided for the Airway Workshop;
Covidien provided a manikin and supraglottic airways.

Ambu

Support provided for the Airway Workshop;
Ambu provided manikins, masks, and scopes.

FAER

FAER provided educational grant support.

CLARUS MEDICAL

Support provided for the Airway Workshop;
Clarus Medical provided manikins, monitors, and optical stylets.

STORZ
KARL STORZ — ENDOSKOPE

Support provided for the Airway Workshop; Karl Storz Endoskope provided manikins, bronchoscopes, videolaryngoscopes, and stylets.

COOK® MEDICAL

Support provided for the Airway Workshop;
Cook Medical provided manikins, cricothyrotomy kits, retrograde kits, and airway exchange catheters.

Kingsystems
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Support provided for the Airway Workshop;
King Systems provided manikins and supraglottic airways.

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Laerdal Medical

Support provided for the Airway Workshop;
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OLYMPUS

Support provided for the Airway Workshop; Olympus Surgical provided videoscopes, manikins, monitors and models.

LMA™

Support provided for the Airway Workshop;
LMA North America provided manikins and videolaryngoscopes.

SonoSite

Support provided for the Ultrasound Workshop; Sonosite provided ultrasound machines, blue phantoms, gel, and a technician.

mindray™ NORTH AMERICA

Support provided for the Ultrasound Workshop;
Mindray provided ultrasound machines, blue phantoms, gel, and a technician.

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VERATHON MEDICAL

Support provided for the Airway Workshop;
Verathon Medical provided videolaryngoscopes, a manikin, and monitor.

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Program Objectives

Use of Ultrasound in Obstetric Anesthesia: Spinals and Epidurals, Vascular Access, and TAP Blocks Workshop

At the end of this session, participants will be able to:

- Describe the physics and basic application of ultrasound.
- Utilize ultrasound to assist placement of neuraxial blocks.
- Acquire techniques to facilitate the placement of central and peripheral venous access and arterial line.
- Practice and visualize the placement of blocks through hands-on demonstrations.

Advanced Airway Management Workshop

At the end of this session, participants will be able to:

- Review the American Society of Anesthesiologists difficult airway algorithm.
- Identify the use of appropriate devices during difficult laryngoscopy on difficult mask ventilation.
- Utilize devices in a cannot intubate/cannot ventilate situation.
- Identify devices that will prevent the risk of aspiration.
- List the invasive techniques to secure the airway in critical airway situations.

Gertie Marx Research Competition

At the end of this session, participants will be able to:

- Recognize the most recent and best peer reviewed obstetric anesthesia research abstracts from around the world (presentation in this session will be by fellows).

Gertie Marx/FAER Education Lecture

At the end of this session, participants will be able to:

- Identify the effects of anesthetics on the developing brain.
- Identify factors that might affect neurodevelopment.

Clinical Update Session: JCAHO Alert/Patient Safety/Improving Outcomes

At the end of this session, participants will be able to:

- Identify risk factors for hemorrhage and methods to decrease morbidity and improve outcomes.
- Determine the risk factors for uterine rupture in a patient undergoing vaginal birth after cesarean section (VBAC).
- Identify methods to improve outcomes in patients undergoing VBAC.
- Describe the reasons for the decline in general anesthesia in the United States and United Kingdom.
- Identify methods to maintain advanced airway skills.
- Identify methods to implement early warning systems to avert catastrophes.
- Identify the crisis resource management systems.

Poster Review

At the end of this session, participants will be able to:

- Identify the most recent peer reviewed research in obstetrics, obstetric anesthesia, and perinatology.

Special Lecture: Health Care Reform

At the end of this session, participants will be able to:

- Identify the impact of Health Care reform on physicians and their practice.

Oral Presentation Sessions

At the end of this session, participants will be able to:

- Identify the most recent peer reviewed research in obstetrics, obstetric anesthesia, and perinatology presented by the researchers.

What's New in Obstetrics: Critical Care Management of Parturient

At the end of this session, participants will be able to:

- Assess the current state of the cesarean rate in the U.S. and related morbidity and mortality.
- Discuss etiologies for the rise in cesareans.
- Incorporate approaches to reduce the cesarean rates in their own health systems.

Fred Hehre Lecture

At the end of this session, participants will be able to:

- Recognize the impact of our communication style on the patients' perception of us.
- Identify ways that we can convey medical information to patients while decreasing anxiety and improving acceptance.
- Understand the importance of various cultural influences on the childbirth experience.

PBLD Breakfast with the Experts

At the end of this session, participants will be able to:

- Identify perioperative anesthetic considerations in a morbidly obese parturient.
- Determine and organize a plan for labor analgesia and anesthesia for cesarean delivery in the morbidly obese parturient.
- Identify risk factors and complications associated with previous cesarean section now presenting with hypertension and bleeding for urgent cesarean delivery.
- Identify risk factors for difficult airway and role of new airway devices and techniques in advanced airway mangement.

Best Paper Presentations

At the end of this session, participants will be able to:

- Identify the most recent and best peer reviewed research in obstetrics, obstetric anesthesia, and perinatology. (Presentations in this session will be by Attending Anesthesiologists).

Gerald W. Ostheimer Lecture

At the end of this session, participants will be able to:

- Evaluate the level of evidence for new preventative and therapeutic strategies in the vast field of maternal fetal medicine, perinatology, and obstetric anesthesia.
- Describe and apply state of the art obstetric analgesia and anesthesia.
- Identify novel concepts in areas of research relevant to understanding and management of pregnancy related disorders, neonatal outcomes, and obstetric anesthesia.

Research Update 2011 Panel

At the end of this session, participants will be able to:

- Identify factors that impact the tone and contractility of the uterine muscle in laboratory setting.
- Identify factors and medications that can improve uterine tone in the operating setting.
- Identify the role of oxytocin on pain and behavioral issues.

Ethics and Legal Panel

At the end of this session, participants will be able to:

- Identify the ethical and legal challenges of keeping the mother, fetus and the anesthesiologists safe.
- Describe the ethical and legal concerns of disclosing adverse events.

Best Case Reports Session

At the end of this session, participants will be able to:

- Organize anesthetic plans to treat a variety of complex and rare diseases and obstetric anesthetic complications.

Disclosures

Each presenter is required to disclose the existence of any financial interest and/or other relationship(s) (e.g. employee, consultant, grant recipient/research support he/she might have with a) the manufacturer(s) of any commercial product(s) to be discussed during his/her presentation and/or b) the commercial contributor(s) of the activity.

Key

1 Salary
2 Ownership
3 Royalties
4 Equity Position
5 Stock Options
6 Funded Research
7 Consulting Fees
8 Honoraria
9 Other Material Support

Planner/Faculty Disclosures

The following planning committee members and/or faculty have indicated that they have relationships with industry to disclose:

Valerie A. Arkoosh, M.D.	9, Epimed
Alexander J. Butwick, M.B., B.S.	6, Masimo
Daniel J. Cook, M.D.	2, Cookgas, LLC.
Michaela K. Farber, M.D.	6, Masimo Corp.
Ashraf S. Habib, M.B., B.Ch.	6, Hospira, Merck & Co.
John A. Pacey, M.D., FRCS(C)	1, 2, 4, Verathon Medical Center
Stephen Pratt, M.D.	7, Harvard RMF
Richard M. Smiley, M.D., Ph.D.	6, 7, Insite Medical Technologies
John T. Sullivan, M.D., MBA	1, 9, Zonare Medical Systems

The following planning committee members and/or faculty have indicated that they have no relationships with industry to disclose relative to the content of this CME activity:

Katherine W. Arendt, M.D.
Radha Arunkumar, M.B., B.S.
Cristian Arzola, M.D., M.Sc.
Mrinalini Balki, M.D.
Gerard M. Bassell, M.D.
Jeanette Bauchat, M.D.
Jaakov Beilin, M.D.
Christopher Burkle, M.D.
William R. Camann, M.D.
Christopher R. Cambic, M.D.
David C. Campbell, M.D., M.Sc.
Eric C. Cappiello, M.D.
Brendan Carvalho, M.B.,B.Ch.
Jose C.A. Carvalho, M.D., Ph.D., FANZCA, FRCPC
Aaron B. Caughey, M.D., Ph.D.
Shobana Chandrasekhar, M.D.
Patricia L. Dalby, M.D.
Robert D'Angelo, M.D.
Christina Davidson, M.D.
Laura S. Dean, M.D.
Niki M. Dietz, M.D.
Joanne Douglas, M.D.
Roshan Fernando, M.B., Ch.B.
Helene Finegold, M.D.
Michael Froelich, M.D.
Robert R. Gaiser, M.D.
Eric Goldszmidt, M.D., FRCPC
Stephanie R. Goodman, M.D.
Brian A. Hall, M.D.
Barry A. Harrison, M.D., FANZCA
David M. Hatch, M.D.
Joy Hawkins, M.D.
Nicole Higgins, M.D.
Paul R. Howell, F.R.C.A.
McCallum R. Hoyt, M.D., MBA
Gerards S. Kamath, M.D.
Bhavani S. Kodali, M.D.
Allison J. Lee, M.D., M.B., B.S.
Barbara L. Leighton, M.D.
Clarita Margarido, M.D., Ph.D.
Chawla L. Mason, M.D.
Albert Moore, M.D., FRCPC
Rafeek Mikhael, M.D., Ph.D.
Jill M. Mhyre, M.D.
Kenneth E. Nelson, M.D.
Yayoi Ohashi, M.D., Ph.D.
Arvind Palanisamy, M.D., M.B.
Quisqueya "Kiki" Palacios, M.D.
Craig Palmer, M.D.
Rita M. Patel, M.D.
Linda S. Polley, M.D.
Roanne L. Preston, M.D.
Jessica N. Rock, M.D.
Paul Sahota, M.D., FRCPC
Alan C. Santos, M.D.
Kelly A. Saran, R.N., M.S.
Barbara M. Scavone, M.D.
Kenneth P. Scott, M.D.
Dennis C. Shay, M.D.
Naveed T. Siddiqui, M.D.
Shakeel A. Siddiqui, M.B., B.S.
Sulpicio G. Soriano, M.D.
Joan E. Spiegel, M.D.
Bill Sullivan, QC
Maya S. Suresh, M.D.
Wendy Teoh, M.B., B.S., FANZCA
Paloma Toledo, M.D.
Ashley M. Tonidandel, M.D.
Lawrence C. Tsen, M.D.
Manuel C. Vallejo, Jr., M.D.
Gurinder Vasdev, M.D.
Ivan A. Velickovic, M.D.
Ashutosh Wali, M.D.
Mark A. Warner, M.D.
Jonathan H. Waters, M.D.
Paul M. Wieczorek, M.D., FRCPC
Richard N. Wissler, M.D., Ph.D.
David J. Wlody, M.D.
Cynthia A. Wong, M.D.
Edward A. Yaghmour, M.D.
Kathryn J. Zuspan, M.D.

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Abstract Author Disclosures

The following abstract authors have indicated that they have relationships with industry to disclose:

Valerie A. Arkoosh, M.D.	9, Epimed
Alexander J. Butwick, M.B., B.S., FRCA	6, Masimo Corporation
Laurie A. Chalifoux, M.D.	9, Zonare Medical Systems
Raymond Glassenberg, M.D.	4, EZC Medical
Medge Owen, M.D.	6, International Association for the Study of Pain; Lacy Foundation
Enrique Silva, M.D.	6, InSite Medical Technologies
Richard Smiley, M.D., Ph.D.	6, 7, InSite Medical Technologies
John T. Sullivan, M.D., MBA	1, 9, Zonare Medical Systems
James K. Wall, M.D., M.S.E.	1, 2, 4, 3, 5, 6 InSite Medical Technologies
Eric Willis, M.S.E.	1, 2, 4, 5, 6 InSite Medical Technologies
Fletcher Wilson, M.S.E.	1, 2, 4, 5, 6 InSite Medical Technologies
Jie Zhou, M.D., MBA, M.S.	8, Abbott

The following abstract authors have indicated that they have no relationships with industry to disclose relative to the content of this CME activity:

David Abbatematteo, M.D.
Alaa A. Abd-Elsayed, M.D., MPH
Purang Abolmaesumi, Ph.D.
Wendy B. Abramson, M.D.
Ovadia Abulafia, M.D.
Butnaro Adi, M.D.
Rishimani Adsumelli, M.D.
Rishi Adsumelli, M.D.
Shvetank Agarwal, M.D.
Wonsik Ahn
Amit Alam, B.S.
Meredith A. Albrecht, M.D. Ph.D.
Terrence K. Allen, M.B., B.S., FRCA
Victoria M. Allen, M.D., M.Sc., FRCSC
Theodore A. Alston, M.D.
Kan Amano, M.D.
Suresh Anandakrishnan, FRCA, M.B., B.S.
Pamela Angle, M.D., M.Sc.
Alistair Ankers, FRCA
Julie Arafeh, R.N., MSN
Thomas L. Archer, M.D., MBA
Pod M. Armstrong, M.D., FFRCP
Paidrig M.J. Armstrong, M.D., FRCPC
Samueloff Arnon, M.D.
Cristian Arzola, M.D., M.Sc.
Eric J. Ashford, M.D.
Ahmed F. Attaallah
Christina Aye, M.B., B.S.
Kirsten E. Baca, M.D.
Manasi Badve, M.B., B.S., M.D.
Lee Baer, Ph.D.
Mrinalini Balki, M.B., B.S., M.D.
Ron Banister, M.D.
Philip Barclay, FRCA
Brian T. Bateman, M.D.
Jeanette R. Bauchat, M.D.
Joseph Baus, M.D.
Curtis L. Baysinger, M.D.
Samira Behboudi, M.S.
Yaakov Beilin, M.D.
Inna Belfer, M.D., Ph.D.
Paul Bernstein, M.D.
Manish Bhardwaj, M.B., B.S., FRCA, M.D.
Pradeep G. Bhide, Ph.D.
Daniel A. Biggs, M.D.
Felicity S. Billings, M.D.
Felix Blasl, BS
Jean-Louis Blouin, Ph.D.
Laurent A. Bollag, M.D.
Edwin Bone, FRCA
John Bonner, M.B., Ch.B. FRCA
Jessica L. Booth, M.D.
Mary Bowen, FCARCSI
Brandon L. Bowman, M.D.
Roderick S. Bramwell, M.D.
Michael Brett, M.B., Ch.B. FRCA
Alison J. Brewer, M.B., Ch.B., FRCA
Malcolm A. Broom, M.B., Ch.B., B.Sc., FRCA, P.G. Cert. Med. Ed.
Amisha N. Buru, M.D., M.B., Ch.B., FRCA
Caroline Columbres, M.D.
William M. Callahan, M.D., MPH
Stephanie Camaglia, M.D. Candidate
William Camann, M.D.
Christopher Cambic, M.D.
Jean Marie Carabuena, M.D.
Tekuila R. Carter, M.D.
Brendan Carvalho, M.B., B.Ch., FRCA, M.D.
Jose CA Carvalho, M.D., Ph.D., FANZCA, FRCPC
Catherine Cha, M.D.
Thomas M. Chalifoux, M.D.
Garud S. Chandan, M.B., B.S., FRCA
Laura Chang, M.D.
Laura Yonkyung Chang, M.D.
Jonathan E. Charnin, M.D.
Kallol Chaudhuri, M.D., Ph.D.
Katherine L. Cheesman, FRCA BSc
Beth A. Chekemian, DO
Jonah Chieza, FRCA
Eun Su Choi, Master
Patrick J. Choi, M.D.
Lorraine Chow, M.D.
Brenda J. Christopher, BS, M.D.
Patrick W. Clark, M.D.
Jefferson Clivatti, M.D.
Sheila Cohen, M.B., Ch.B., FRCA
Matthew D. Cohen, D.O.
Jennfier Hochman Cohn, M.D.
Lanny Coker, D.N.Sc
George W. Colclough, M.D.
Jack Colman, M.D.
Malachy Columb, FRCA
Mary Ellen Cooke, M.D.
Daniel Cordovani, M.D.
Caley Coulson, B.S.
Lisa M. Councilman, M.D.
Vanessa Cowie, FRCA, M.B., Ch.B.
Margaret G. Craig, M.D.
Steven D. Cromwell, M.D.
Gregory Crosby, M.D.
Deborah J. Culley, M.D.
Christine M. Curcio, M.D.
Wong A. Cynthia, M.D.

Abstract Author Disclosures

The following abstract authors have indicated that they have no relationships with industry to disclose relative to the content of this CME activity:

Michael D'Ambra, M.D.
Robert D'Angelo, M.D.
Lindbergh Dinsay, M.D.
Feng Dai, Ph.D.
Patricia Dalby, M.D.
Mudar Dalloul, M.D.
Malcolm Daniel, M.B., Ch.B., FRCP, FRCA
Kay Daniels, M.D.
Gary Danton, M.D., Ph.D.
Elyad Davidson, M.D.
Sharon Davies, M.D., FRCPC
Wade Davis, Ph.D.
Cheryl DeSimone, M.D.
Elena Deacu, M.D.
Krishnaprasad Deepika, M.D.
Michelle Delemos, M.D.
Galina Dimitrova, M.D.
Jasmine Djordevic, B.Sc.
Anne Doherty, M.D.
James A. Dolak, M.D., Ph.D.
Joanne M. Douglas, M.D., FRCPC
Kristi Downey, M.Sc.
John Downing, M.D.
George Dumitrascu, M.D., FRCPC
Susan Dunington, M.A., M.Sc.
Victor F. Duval, M.D.
Sally Eason, M.B., Ch.B. FRCA
Wesley J. Edwards, M.B., B.S., FRCA
Jami M. Eidem, M.D.
James C. Eisenach, M.D., Ph.D.
Paul I. Eisenberg, M.D.
Robert L. Eldridge, M.D.
Deborah Elstein, Ph.D.
Chris Elton, M.B., Ch.B., FRCA
Kingsley O. Enohumah, M.B., B.S., M.Sc., FCARCSI
Magda Erik-Soussi, M.Sc.
Angelika Fadeev, M.D.
Niall Fanning, M.D.
Michaela Kristina Farber, M.D.
Dan Farine, M.D.
Ali S. Faris, M.B., Ch.B, FIBMS
Michael G. Fehlings, M.D., Ph.D.
Joe Feinglass, Ph.D.
James A. Feix, M.D.
Claudia L. Fernandez, M.D.
Roshan Fernando, FRCA
Nicholas Ferreri, M.D.
Peralta Feyce, M.D.
Helene Finegold, M.D.
Robert N. Fish, M.D.
William Fleming, FRACS, FRCS
Svetlana Floka, M.S.
Pamela Flood, M.D.
Steven T. Fogel, M.D.
Patricia J. Fogertey, R.N., MSN
Annemarie E. Fogerty, M.D.
Regina Y. Fragneto, M.D.
Kevin M. Frank, M.D.
Zeev Friedman, M.D
Andrea J. Fuller, M.D.
Ranjan Gupta, M.D.
George Gallos, M.D.
Roxane Gardner, M.D., MPH, D.Sc.
Ahia Garshasbi
Bin Ge, M.D., M.S.
Ronald B. George, M.D., FRCPC
Liane Germond, M.D.
Peter Gerner, M.D.
Lesley Gilbertson, M.D.
Ravpreet S. Gill, M.D.
Bonny Gillis, M.D.
Yehuda Ginosar, M.D.
Lacey M. Godeaux, B.S., M.D.
Laura Goetzl, M.D.
Susan Goheen, M.D., FRCPC
Eric Goldszmidt, M.D.
Christopher G. Goodier, M.D.
Evan J. Goodman, M.D.
Lawrence T. Goodnough, M.D.
Gabrella Gosman, M.D.
Yaakov Gozal, M.D.
Timothy P. Graham, M.D.
Caroline Grange, FRCA
Michal Granot, Ph.D.
Nakish D. Grant, M.D.
Erica N. Grant, M.D.
Paul Greig, FRCA
Paul R. Greig, M.B., Ch.B. B.Sc. Med. Sci. FRCA
Eliot Grigg, M.D.
Arabela Grigorescu, Ph.D.
William A. Grobman, M.D., MBA
Mara A. Grossman, M.D.
Victoria E. Gryszowka, M.D.
Susan Guest, R.N.
Awini Gunasekera, B.Sc., M.B., B.S., MRCP, FRCA
Berrin Gunaydin, M.D., Ph.D.
Maria Cristina Gutierrez, M.D.
Mingpin Hu, M.D.
Ashraf S. Habib, M.B., Ch.B., M.Sc., FRCA
Mark Haham, M.D.
Mona Halim-Armanios, M.D.
Stephen Halpern, FRCPC
Sayeh Hamzehzadeh, M.D.
Scott Harder, M.D.
Andrea Hards, B.Sc., M.B., Ch.B.
Lynnette C. Harris, B.S.N.
Ronen Harris, M.D.
Romana Hasnain-Wynia, Ph.D.
Samah Hassan, M.D.
Zaki-Udin Hassan, M.B., B.S.
David M Hatch, M.D.
Ann T. Hau, M.D.
Ivan Hayes, FCARCSI
Latha Hebbar, M.D., FRCA
Gregory Hebert, B.S.
Vanessa G. Henke, M.D.
Sara C. Herman, M.D.
Philip Hess, M.D.
Nicole Higgins, M.D.
Martin Hill, Ph.D.
Christopher S. Hinkewich, M.D.
Jennifer S. Hochman, M.D.
Mark Hoeft, M.D.
Ira S. Hofer, M.D.
Guilherme Holck, M.D.
Paul Howell, B.Sc., M.B., Ch.B., FRCA
Stephen Howell, M.D.
Mccallum R. Hoyt, M.D., MBA
Ling Qun Hu, M.D.
Joanne C. Hudson, M.D.
H. Jane Huffnagle, D.O.
Lindsay Hurlburt, M.D.
Igor Ianov, M.D.
Mary J. Im, M.D.
Alexander Ioscovich, M.D.
Gillian R. Isaac, M.D., Ph.D.
Matthew W. Isenhower, M.D.
Unyime Ituk, M.B., B.S.,FCARCSI
Simon Ivry, M.D.
Mark Jackson, M.D.
Erika James, M.D.
Thomas James, M.D.
Robert Jee, M.D.
Leo Jeyaraj, M.D., FRCA
Suyogi V. Jigajinni, B.Sc., M.B., Ch.B., FRCA
Claire Joannides, B.M.
Stacie Johnson, M.D.
Philip Jones, M.D., FRCPC
Daniel T. Jones, M.D.
Cheryl Jones, M.D.
Girish P. Joshi, M.B., B.S., M.D., FFARSCI
Cornelia Junghans, Ph.D.
Alina Justiz, M.D.
Rafael Justiz, M.D.
Viktor Kacer, M.D.
Rachel M. Kacmar, M.D.
Allaudin Kamani, M.D.
Senthil Kanniah, FRCA
Asieh Kazem-Haghighi, M.D.
Rachel J. Kearns, M.B., Ch.B., MRCP, FRCA
James C. Kelly, M.D.
Jay Kersh, M.D.
Ku-mie Kim, M.D., Ph.D.
Peter H. Kim, M.D.
John Kingdom, M.D.
Edgar Kiss, B.S., M.D.
Alex Kiss, Ph.D.
Oksana Klimkina, M.D.
Michaela Klimkova, M.D.
Bhavani Shankar Kodali, M.D.
Joanna Koenigsberg, M.D.
James J. Konvicka, M.D.
Edward Kosik, DO
Tyler Koski, M.D.
Vesela Kovacheva, M.D. Ph.D.
John J. Kowalczyk, B.Sc.
Jake Kraft, M.S.
Ilya Krayevsky, M.D.
Cindy Ku, M.D.
Krzysztof M. Kuczkowski, M.D.
Elena V. Kuklina, M.D., Ph.D.
Aseem Kumar, M.D.
Anil Kumar, M.B., B.S.
Pranab Kumar, M.D., FRCA
Roshmi Kumar, FRCA
Adrienne Kung, M.D.
Peter D. Kuszewski, M.D.
Husong Li, M.D., Ph.D.
Michael A. Lamm, D.O.
Ruth Landau, M.D.
Ursula Landman, M.D.
William Lariviere, Ph.D.
Helen Lawrence, B.M., B.Ch., FRCA
Christine Lay, M.D.
Amy I. Lee, M.D.
Allison J. Lee, M.D., M.B., B.S.
Carlos-Nicholas Lee, M.D.
Lisa R. Leffert, M.D.
Barbara L. Leighton, M.D.
Ralph Leighton, M.B., B.S., FRCA
Sara Levintow, B.S.
Jason M. Lewis, M.D.
Yunping Li, M.D.
Yat Wah Li, B.Sc., B.M., FRCA
Deena Liles, M.D.
Grace Lim, M.D.
Steve Lipman, M.D.
Kerry N. Litchfield, M.B., Ch.B., FRCA
John C. Liu, M.D.
Shih Kai Liu, M.D.
Neil A. Logan, M.B., Ch.B.

Abstract Author Disclosures

The following abstract authors have indicated that they have no relationships with industry to disclose relative to the content of this CME activity:

Micheal Looney, M.B., B.Ch., B.A.O.
Andrew Loukas, M.D.
Todd R. Lovgren, M.D.
Jeffrey Lu, M.D.
Elizabeth J. Luna, Ph.D.
Natesan Manimekalai, M.D
Agnes Miller, M.D.
Malcolm W. MacDougall, M.B., Ch.B., Ph.D., MRCOG
George A. Macones, M.D.
Abhinava S. Madamangalam, M.D.
Brian Mahoney, M.D.
Anita Maitra, M.D.
Max Maizels, M.D.
Shuba Mallaiah, FRCA
Dustin B. Mangus, M.D.
Virgil Manica, M.D.
Natesan Manimekalai, M.D.
Darren J. Marchal, M.D.
Julio Marenco, M.D.
Nathan A. Marengi, M.D.
Clarita Bandeira Margarido, M.D., Ph.D.
Kristine Marmai, B.Sc., M.D., FRCPC
Bridget M. Marroquin, M.D.
Scott Marshall, D.O.
Marte A. Martinez, M.D.
Radhika Marwah, M.D.
Chawla LaToya Mason, M.D.
Simon Massey, FRCA. MRCP
Deirdre M. McCarthy, B.S.
Robert J. McCarthy, M.D.
Conan McCaul, FCARCSI
Kevin C. McDonnell, Bachelor of Science, M.D.
Allison McGeer, M.D, FRCPC
Elizabeth M. McGrady, M.B., Ch.B., FRCA
Kevin J. McKeown, M.D., M.Sc., Hon. B.Sc.
Mary L. McLaughlin, R.N.C.
Sara McNeillis, M.B., B.S., FRCA
Professor Karim Meeran, M.D., FRCP, FRCP
Angela Meier, M.D., Ph.D.
Michele M. Mele, M.D.
Carolina Ribeiro Mello, M.D.
Emily Methangkool, M.D.
Jessica L. Meyers, M.D.
Jill M. Mhyre, M.D.
Rafeek Mikhael, M.D., Ph.D.
Simon Millar, M.B., Ch.B., FRCA
Agnes Miller, M.D.
Russell Miller, M.D.
Rebecca D. Minehart, M.D.
Upma Misra, M.B., B.S., FRCA
Aya Mitani, MPH
Wint Yu Mon, M.B., B.S.
Natalie C. Moreland, M.D.
Kathleen G. Morgan, Ph.D.
Daniel Morland, B.A., M.B., B.S., FRCA
Raina Moyer, B.S.
Holly Muir, M.D., FRCPC
Umamaheswari Mukkamalla, M.D.
Rudram Naidu Muppuri, M.D.
Alicia Murdoch, B.Sc.
Jamie D. Murphy, M.D.
Matthew Norkunas, M.D.
Ramana K. Naidu, M.D.
Usha P. Nair, FRCA
Vijanitha Nallendran, MRCOG
Prad Natarajan, M.B., Ch.B., FRCA
Alexander Nelken, M.D.
Monica Neumann, M.D.
Kimberly Ngo, M.D.
Dung Nguyen, M.D.
Albert P. Nguyen, M.D.
Michael A. Nichols, CRNA
Hokuto Nishioka, M.D.
Heather C. Nixon, M.D.
Lisa O'Brien, Ph.D.
Kenny O'Connor, M.B., Ch.B., FRCA
Babatunde O. Ogunnaike, M.D.
Yayoi Ohashi, M.D., Ph.D.
Hisako Okada, M.D.
Toshiyuki Okutomi, M.D.
Vanessa A. Olbrecht, M.D.
Itamar S. Oliveira, Jr., M.D., Ph.D.
Jeffery A. Ollis, M.D.
Erik Olness, M.D.
Adeyemi Olufolabi, M.D.
Sharon Orbach-Zinger, M.D.
Michael Orosco, M.D.
Vilma E. Ortiz, M.D.
Clemens M. Ortner, M.D.
Maryanne P. Otto, M.D.
DONALD S. PROUGH, M.D.
Sun Ha Paek
Arvind Palanisamy, M.B., B.S., M.D., FRCA
Toledo Paloma, M.D., MPH
Peter H. Pan, M.D., MSEE
Moeen Panni, M.D., Ph.D.
Joana Panni, Ph.D.
Antonin Parizek, M.D., Ph.D.
Christine Park, M.D.
Joong Shin Park
Lance Parks, D.O.
Andrea Paskova, M.D.
Rebecca Patchin, M.D.
Prabir R. Patel, M.B., B.S., B.Sc., FRCA
Dalby L. Patricia, M.D.
Stephen K. Patteson, M.D.
Feyce Peralta, M.D.
Amy L. Phelps, Ph.D.
May C.M. Pian-Smith, M.D., M.S.
Aaron Pink, B.Sc.
Solmaz Pirzadeh, M.D.
Felicity Plaat, M.B., B.S., FRCA
Mihaela Podovei, M.D.
Andrey Pogodin, M.S.
Fabiana Coutinho Polinelli, Med. Student
Mansukh T. Popat, FRCA
David T. Porembka, D.O., FCCM
Alex T. Porter, M.D.
Pooya P. Pouralifazel, M.D.
Manju Prasad, M.D.
Andrea Puck, R.N.
Ferenc Puskas, M.D., Ph.D.
L. Qian, M.D.
Thomas Quach, Hon. B.Sc., M.D.
Dharshini Radhakrishnan, M.B., B.S., FRCA
Sivam Ramanathan, M.D.
Karunakaran Ramaswamy, M.B., B.S., FRCA
Jayanthie S. Ranasinghe, M.D.
Zakir Rangwala, M.D.
Abtin Rasoulian, M.Sc.
Elena Reitman, M.D.
Maya Reznichenko, B.S.
Edwin Rho, M.D.
Lisa A. Rhodes, M.D.
Miriam L. Ricardo-Chan, M.D.
Jeremy Rice, D.O.
Michael G. Richardson, M.D.
Philippe Richebe, M.D.
Alina Rivlis, M.A., MBA
Julia L. Robertson, M.B., Ch.B., FRCA
Emily Robson, M.B., Ch.B., FRCA
Jessica N. Rock, M.D.
Michelle Roet, FCARCSI
Robert Rohling, Ph.D.
Anna Rosenfeld, M.D., MPH
Lauren Ross, M.D.
Zvia Rudich, M.D.
Robin Russell, M.D., FRCA
Christa N. Rylant, M.D.
Tanmay Shah, M.B., B.S., M.D.
Yaping Shi, M.D.
Michelle Simon, M.D.
Emery P. Stephen, M.D.
Atika Sabharwal, M.B., Ch.B., FRCA
Neeti Sadana, M.D.
Paul Sahota, M.D.
Gaurav Saigal, M.D.
Aliya Salman, M.B., B.S., M.D.
Marwa M. Salman, M.Sc., FRCA
Migdalia H. Saloum, M.D.
Saltzman Saltzman, M.D.
Bruce Saltzman, M.D.
Ghasan Samara, M.D.
Monica K. San Vicente, M.D., FRCPC
Aalia Sange, M.B., B.S., M.D., FRCA, FCARCSI
Daisy Sangroula, M.D.
Divina Santo, M.D.
Alan Santos, M.D.
Simrat Saran, M.D.
Sasso B. Sasso, M.D.
Uma B. Sasso, M.D.
Kenneth Sauve, M.D.
Angeline K. Sawicki, M.D.
Janet E. Schafer, M.D.
Abraham Schreiber, M.D.
John Schultz, M.D.
Lee H. Schwamm, M.D.
Christina M. Scifres, M.D.
Gareth Seaward, M.D., M.Sc.
Scott Segal, M.D., MHCM
Scott Segal, M.D.
Mathew Sermer, M.D.
Nirav K. Shah, B.A., B.S., M.D.
Vibhuti Shah, M.D. M.Sc.
Sonalee Shah, D.O.
Nirja Shah, M.D.
Anne E. Shapiro, D.O.
Saju Sharafudeen, FRCA
Nadir Sharawi, M.B., Ch.B., FRCA
Catherine Sheehan, M.B., B.S., FRCA
David Sherer, M.D.
Efim Shifman, Ph.D.
Patrick Shih, M.D.
Jacob W. Shipley, M.D.
Helen Shnol, B.A.
Takashi Shoda, M.D.
Jonathan Short, M.D.
Naveed T. Siddiqui, M.D
Ajaz M. Siddiqui, M.D.
Matthew Sigakis, M.D.
Marcos Silva, M.D.
Allan Simpao, M.D.
Suganthi D. Singaravelu, M.B., B.S., FRCA
Sudha I. Singh, M.D., FRCPC
Vanessa Skelton, FRCA

Abstract Author Disclosures

The following abstract authors have indicated that they have no relationships with industry to disclose relative to the content of this CME activity:

Kate Slade, M.B., Ch.B.
Robert H. Small, M.D., P.E.
Maria J. Small, M.D., MPH
Kelley Smith, SRNA
Thomas J. Smith, M.D.
Vinnie Sodhi, B.Sc., M.B., B.S., FRCA
Mieke A. Soens, M.D.
Sam Soltanifar, M.A., FRCA
Vitaly Soskin, M.D.
Tede Spahn, C.R.N.A.
Lauren Sparks, M.D.
Joan Spiegel, M.D.
Chhavi Srivastava, M.B., B.S., M.D., FRCA
Richard Stacey, FRCA, M.B., B.S.
David M. Stamilio, M.D., M.S.C.E
Deborah Stein, M.D.
Ellen Steinberg, M.D.
David Steiner, Ph.D.
Adrienne Stewart, FRCA
Sundrayah N. Stoller, M.D.
David Streiner, Ph.D.
Mark Stypula, M.D.
Talkad Sudarshana, M.D.
Pervez Sultan, M.B., Ch.B., FRCA
Maya S. Suresh, M.D.
Dumas Susan, M.D.
Heather A. Suss, M.D.
Madhav Swaminathan, M.D.
Amy K. Swinson, MRCP, FRCA
Ashley L. Szabo, B.S., M.D. Candidate
Kalpana Tyagaraj, M.D.
Gombo Tall, M.D.
Weike Tao, M.D.
Maria Angela Tardelli, M.D., Ph.D.
Ayca Tas, M.D.
John A. Thomas, M.D.
Jennifer Thompson, M.B., Ch.B., FRCA
Sanjeev Thunga, M.B., B.S., FRCA
Galina Tikhova, M.S.
Brandon M. Togioka, M.D.
Paloma Toledo, M.D., MPH
Scott Tonidandel, Ph.D.
Ashley M. Tonidandel, M.D., MS
Antonio Torres, M.D.
Connie K. Tran, M.D.
Lawrence C. Tsen, M.D.
Gary R. Uhlir, M.D.
John Ulatowski, M.D., Ph.D., MBA
Nobuya Unno, M.D.
Vishal Uppal, M.B., Ch.B., FRCA
Geeta Uppin, R.N.
Rakesh Vadhera, M.D.
Aruna K. Vaddadi, M.D.
Sachin T. K. Valap, M.B., B.S., FRCA
Manuel C. Vallejo, D.M.D., M.D.
Marc Van de Velde, M.D., Ph.D.
Gurinder M. Vasdev, M.D.
Anasuya Vasudevan, FRCA
Ivan Velickovic, M.D.
Pardeep Virdi, M.D.
Ofer Wellisch, M.D., MPH
Michelle A. Walters, M.B., B.S.
Toni Walzer, M.D.
Jonathan P. Wanderer, M.D.
Chi Fei Wang, M.D.
Jingping Wang, M.D., Ph.D.
Izabella Wasiluk, M.D.
John Wasnick, M.D.
Jonathan H. Waters, M.D.
Jim Watson, M.D., FRCPC.
Jason Waugh, MRCOG
Jeff Weaver, M.D.
Lawrence S. Weinstein, M.D.
Robyn S. Weisman, M.D.
Professor Catherine Williamson, M.B., Ch.B., M.D., FRCP
Samantha Wilson, FRCA
Gregory Wolff, M.D.
Jessica A. Wolin, M.D.
Cynthia A. Wong, M.D.
Lisa K. Wong, M.D.
Christopher L. Wu, M.D.
Sarah Wyhs, M.D.
Jason Wyse, M.D.
Yun Xia, M.D., Ph.D.
Americo M. Yamashita, M.D.
Steven J. Young, M.B., Ch.B., FRCA
Mark Zakowski, M.D.
Ming Zhang, M.D., Ph.D.
Ying Zhu, M.D.

Disclosure and Resolution of Conflicts of Interest

The Society for Obstetric Anesthesia and Perinatology adheres to ACCME Essential Areas, Standards, and Policies regarding industry support of continuing medical education. In accordance with the ACCME Standards for Commercial Support of CME, SOAP implemented mechanisms, prior to the planning and implementation of this CME activity, to identify and resolve conflicts of interest for all persons in a position to control content of this CME activity. All presenters are required to make a verbal disclosure prior to their presentation.

Program Schedule

Wednesday, April 13, 2011

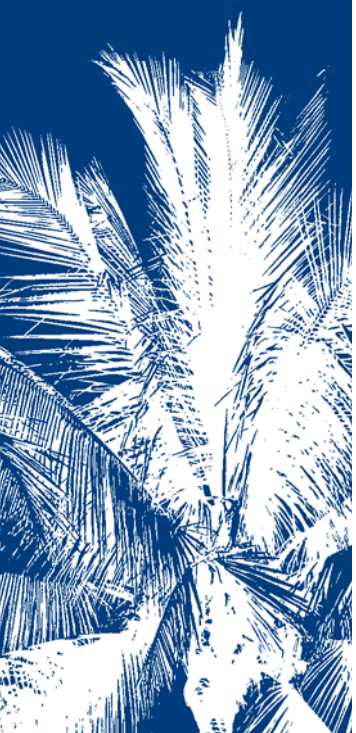
Opportunities for Questions and Answers will be provided at the conclusion of each presentation.

Medinas Foyer	7:30 a.m. - 5:00 p.m.	Registration
Casablanca North	8:00a.m. - 11:30 a.m.	Use of Ultrasound in Obstetric Anesthesia:Spinals and Epidurals, Vascular Access, and TAP Blocks Workshop Program Director: Jose CA Carvalho, M.D., Ph.D., FANZCA, FRCPC
Casablanca North	1:00 p.m. - 4:30 p.m.	Use of Ultrasound in Obstetric Anesthesia:Spinals and Epidurals, Vascular Access, and TAP Blocks Workshop Program Director: Jose CA Carvalho, M.D., Ph.D., FANZCA, FRCPC
Casablanca ABC	1:00 p.m. - 5:00 p.m.	Advanced Airway Management Workshop Program Director: Ashutosh Wali, M.D.
Casablanca FGH South	5:00 p.m. - 6:00 p.m.	Exhibits Sneak Preview
Andalusian Garden	6:00 p.m. - 8:00 p.m.	Welcome Reception

Thursday, April 14, 2011

Opportunities for Questions and Answers will be provided at the conclusion of each presentation.

Medinas Foyer	6:30 a.m. - 5:00 p.m.	Registration
Casablanca FGH South/ Baraka Room	6:30 a.m. - 7:10 a.m.	Hosted Breakfast, Exhibits, and Poster Viewing
Casablanca ABCDE North	7:10 a.m. - 7:30 a.m.	Welcome to the 43rd Annual Meeting President: Robert D'Angelo, M.D. President Elect: Maya S. Suresh, M.D. 2011 Meeting Host: Kenneth Nelson, M.D. FAER Grants: Joy Hawkins, M.D.
Casablanca ABCDE North	7:30 a.m. - 9:00 a.m.	Gertie Marx Research Competition (6 presentations) Moderator: Gerard M. Bassell, M.D. Judges: Roshan Fernando, M.B., Ch.B.; Cally Hoyt, M.D.; Ruth Landau, M.D.; Kiki Palacios, M.D.; Lawrence C. Tsen, M.D.; Cynthia Wong, M.D.
Casablanca ABCDE North	9:00 a.m. - 9:15 a.m.	Distinguished Service Award Recipient: Joanne Douglas, M.D. Presenter: Roanne Preston, M.D.
Casablanca FGH South/ Baraka Room	9:15 a.m. - 10:10 a.m.	Coffee Break, Exhibits, and Poster Viewing
Casablanca ABCDE North	10:10 a.m. - 11:00 a.m.	Failed Spinal is Due to Bad Bupivacaine Moderator: Wendy Teoh, M.D. Pro – Manuel C. Vallejo, Jr., M.D. Con – Kenneth E. Nelson, M.D.
	10:30 a.m. - 3:00 p.m.	(Spouse/Guest) Optional Tour #1 Hoover Dam and Ethel M Chocolate Factory Tour
Casablanca ABCDE North	11:00 a.m. - 12:00 p.m.	Gertie Marx/FAER Education Lecture: Effects of Anesthetics on Neurodevelopment of Fetus Sulpicio (Sol) Soriano, M.D. Introduction: Maya S. Suresh, M.D.
La Menzah Lawn	12:00 p.m. - 1:00 p.m.	Lunch
Casablanca ABCDE North	1:00 p.m. - 1:30 p.m.	ASA Update Mark A. Warner, M.D., ASA President Introduction: Robert D'Angelo, M.D., SOAP President



Program Schedule

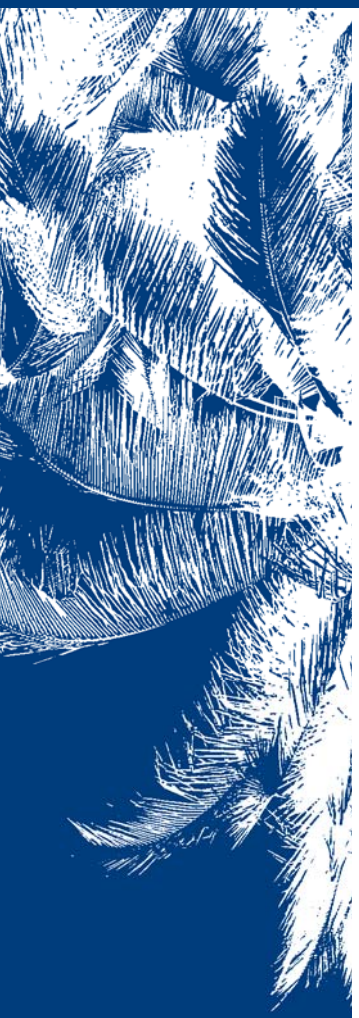
Thursday, April 14, 2011 (cont.)

Casablanca ABCDE North	1:30 p.m. - 3:10 p.m.	Clinical Update - JCAHO Alert/Patient Safety/Improving Outcomes Moderator: Paul R. Howell, F.R.C.A., OAA President
	1:30 p.m. - 1:50 p.m.	Postpartum Hemorrhage - Improving Outcomes Yaakov (Jake) Beilin, M.D.
	1:50 p.m. - 2:10 p.m.	Changing Views on VBAC Christina Davidson, M.D.
	2:10 p.m. – 2:30 p.m.	Declining Use of GA in Obstetrics: Maintaining Advanced Airway Skills Maya S. Suresh, M.D.
	2:30 p.m. - 2:50 p.m.	Implementation of Early Warning Systems - United Kingdom Roshan Fernando, M.B., Ch.B.
	2:50 p.m. - 3:10 p.m.	Crisis Resource Management - United States Jill Mhyre, M.D.
Casablanca FGH South/ Baraka Room	3:10 p.m. - 3:30 p.m.	Coffee Break, Exhibits, and Poster Viewing
Casablanca ABCDE North	3:30 p.m. - 4:45 p.m.	Poster Review Session #1 Mrinalini Balki, M.D.; Michael Froelich, M.D.
Casablanca ABCDE North	4:45pm-6:45pm	SOAP Business Meeting and Elections

Friday, April 15, 2011

Opportunities for Questions and Answers will be provided at the conclusion of each presentation.

Loews North Parking Lot	6:15 a.m. - 7:30 a.m.	Wellness Walk / Fun Run Onsite at Loews Lake Las Vegas Resort
Medinas Foyer	6:30 a.m. - 1:30 p.m.	Registration
Casablanca FGH South/ Baraka Room	6:30 a.m. - 7:30 a.m.	Breakfast, Exhibits, and Poster Viewing
Casablanca ABCDE North	7:30 a.m. - 8:30 a.m.	Special Lecture: "Health Care Reform: Impact on Physicians and Practice" Valerie A. Arkoosh, M.D., M.P.H. Introduction: David Wlody, M.D.
Casablanca ABCDE North	8:30 a.m. - 10:00 a.m.	Oral Presentation Session #1 (6 Abstracts) Moderator: John Sullivan, M.D.
Casablanca FGH South/ Baraka Room	10:00 a.m. - 10:30 a.m.	Coffee Break, Exhibits, and Poster Viewing
Casablanca ABCDE North	10:30 a.m. - 11:30 a.m.	What's New in Obstetrics: Critical Care Management of the Parturient Aaron Caughey, M.D. Introduction: Linda Polley, M.D.
Casablanca ABCDE North	11:30 a.m. - 12:30 p.m.	Fred Hehre Lecture William Camann, M.D. Introduction: Lawrence C. Tsen, M.D.
	12:30 p.m.	Plenary Session Concludes



Program Schedule

Friday, April 15, 2011 (cont.)

Casablanca ABCDE North	12:45 p.m. - 3:00 p.m.	Resident & Medical Student Forum *(By Invitation)* Welcome/Lunch Buffet *Breakout location assignments will be announced onsite* *Breakout Rooms: Casablanca ABCDE North, Asilah Boardroom, Safi, Fez A, Fez B, Kenitra A, Kenitra B, Rabat A, Rabat B, The Club Room* All participants will start at 12:45 p.m. in *Casablanca ABCDE North for lunch and then proceed to breakouts as assigned* Coordinators: Jeanette Bauchat, M.D.; Shobana Chandrasekhar, M.D.; David M. Hatch, M.D.; Paloma Toledo, M.D. Update - ACGME Approval of OB Anesthesia Fellowship Alan Santos, M.D.; Rita M. Patel, M.D. Introduction: Paloma Toledo, M.D. Judges: Patricia Dalby, M.D.; Laura Dean, M.D.; Stephanie Goodman, M.D.; Bhavani Kodali, M.D.; Latoya Mason, M.D.; Jill Mhyre, M.D.; Arvind Palanisamy, M.D.; Linda Polley, M.D.; Richard Smiley, M.D.; Paloma Toledo, M.D.; Ashley Tonidandel, M.D.; Manuel C. Vallejo Jr., M.D.; Ivan Velickovic, M.D.; Jonathan Waters, M.D.; Richard Wissler, M.D.; David Wlody, M.D. Moderators: Michaela K. Farber, M.D.; Helene Finegold, M.D.; Ashraf Habib, M.B., B.Ch..; Nicole Higgins, M.D.; Allison J. Lee, M.D.; Alice L. Oswald, M.D.; Jessica N. Rock, M.D.; Joan E. Spiegel, M.D.
	1:00 p.m. - 5:30 p.m.	Optional Tour #2 - Vegas Then and Now City Tour ($55 fee)
	Evening	Dine Around - Las Vegas Strip - Reservations are now closed; additional new/reservations may no longer be accepted.

Saturday, April 16, 2011

Opportunities for Questions and Answers will be provided at the conclusion of each presentation.

Medinas Foyer	7:00 a.m. - 5:00 p.m.	Registration
South Hall	7:00 a.m. - 8:30 a.m.	Fellows Breakfast with the SOAP Board *(by invitation only)* Robert D'Angelo, M.D.
Casablanca H	7:00 a.m. - 8:30 a.m.	PBLD: Breakfast with the Experts Moderators: Ashutosh Wali, M.D., FFARCSI; David Campbell, M.D.
Baraka Room	7:30 a.m. – 8:30 a.m.	Hosted Continental Breakfast and Poster Viewing
Casablanca ABCDE North	8:30 a.m. - 10:00 a.m.	Best Paper Presentations (6 abstracts) Moderator: Barbara Scavone, M.D. Judges: Brendan Carvalho, M.D., B.Ch.; Paul R. Howell, F.R.C.A.; Jill M. Mhyre, M.D.; Linda S. Polley, M.D.; Barbara M. Scavone, M.D.; Ashutosh Wali, M.D.
Baraka Room	10:00 a.m. - 10:40 a.m.	Coffee Break and Poster Viewing
	10:30 a.m. - 3:30 p.m.	(Spouse/Guest) Tour #3 - Red Rock Canyon and Spurs Mountain Ranch Tour ($65 Fee)
Casablanca ABCDE North	10:40 a.m. - 11:40 a.m.	Debate: Urgent Cesarean Delivery for Failure to Progress in Labor: Patchy Block with Epidural – Plan is to Administer a Spinal Moderator: Joy Hawkins, M.D. *Pro: Barbara Leighton, M.D.* *Con: Brendan Carvalho, M.B., B.Ch.*

Program Schedule

Saturday, April 16, 2011 (cont.)

Casablanca ABCDE North	11:40 a.m. - 12:40 p.m.	Gerard W. Ostheimer Lecture - What's New in Obstetric Anesthesia? Paloma Toledo, M.D. Introduction: Jill Mhyre, M.D.
La Menzah Lawn, Baraka Room	12:45 p.m. - 1:45 p.m.	Hosted Lunch, Poster Viewing
Casablanca ABCDE North	1:45 p.m. - 3:15 p.m.	Oral Presentations Session #2 (6 Abstracts) Moderator: Dennis Shay, M.D.
Baraka Room	3:15 p.m. - 3:45 p.m.	Coffee Break and Poster Viewing
Casablanca ABCDE North	3:45 p.m. - 5:00 p.m.	Poster Review Session #2 Alexander Butwick, M.B., B.S., FRCA
Casablanca DE North	7:00 p.m. - 10:00 p.m.	SOAP 43rd Anniversary Celebratory Dinner with Awards Ceremony Onsite at Loews Lake Las Vegas Resort

Sunday, April 17, 2011

Opportunities for Questions and Answers will be provided at the conclusion of each presentation.

Medinas Foyer	6:30 a.m. - 12:00 p.m.	Registration
Baraka Room	6:30 a.m. - 7:30 a.m.	Hosted Continental Breakfast and Poster Viewing
Casablanca ABCDE North	7:30 a.m. - 8:30 a.m.	Research Update 2011: The Oxytocin Hour Moderator: Richard Smiley, FRCA
	7:30 a.m. - 7:45 a.m.	Getting Good Tone: Recent Findings in the Lab Mrinalini Balki, M.D.
	7:45 a.m. - 8:00 a.m.	Getting Good Tone: Recent Lessons From the OR Alexander Butwick, M.B., B.S., FRCA
	8:00 a.m. - 8:15 a.m.	Oxytocin: Beyond the Uterus Ruth Landau, M.D.
	8:15 a.m. - 8:30 a.m.	Panel Q&A
Casablanca ABCDE North	8:30 a.m. - 10:00 a.m.	Ethical and Legal Panel Moderator: Stephen Pratt, M.D.
	8:30 a.m. - 9:15 a.m.	The Ethical and Legal Challenges of Keeping the Mother, Fetus and Anesthesiologist Safe Joanne Douglas, M.D.; Bill Sullivan, QC (Barrister and Solicitor)
	9:15 a.m. - 9:45 a.m.	Ethical and Legal Concerns of Disclosing Adverse Events Kelly A. Saran, R.N., M.S.
	9:45 a.m. - 10:00 a.m.	Panel Q&A
Baraka Room	10:00 a.m. - 10:20 a.m.	Coffee Break and Poster Viewing
Casablanca ABCDE North	10:20 a.m. - 11:50 a.m.	Best Case Reports of the Year: You Did What? Peter Pan, M.D.; Bhavani Kodali, M.D.
Casablanca ABCDE North	11:50 a.m.	Closing Remarks Maya S. Suresh, M.D.

Educational Session Materials

Thursday, April 14, 2011

Opportunities for Questions and Answers will be provided at the conclusion of each presentation.

Medinas Foyer	6:30 a.m. - 5:00 p.m.	Registration
Casablanca FGH South/ Baraka Room	6:30 a.m. - 7:10 a.m.	Hosted Breakfast, Exhibits, and Poster Viewing
Casablanca ABCDE North	7:10 a.m. - 7:30 a.m.	Welcome to the 43rd Annual Meeting President: Robert D'Angelo, M.D. President Elect: Maya S. Suresh, M.D. 2011 Meeting Host: Kenneth Nelson, M.D. FAER Grants: Joy Hawkins, M.D.
Casablanca ABCDE North	7:30 a.m. - 9:00 a.m.	Gertie Marx Research Competition (6 presentations) Moderator: Gerard M. Bassell, M.D. Judges: Roshan Fernando, M.B., Ch.B.; Cally Hoyt, M.D.; Ruth Landau, M.D.; Kiki Palacios, M.D.; Lawrence C. Tsen, M.D.; Cynthia Wong, M.D.
Casablanca ABCDE North	9:00 a.m. - 9:15 a.m.	Distinguished Service Award Recipient: Joanne Douglas, M.D. Presenter: Roanne Preston, M.D.
Casablanca FGH South/ Baraka Room	9:15 a.m. - 10:10 a.m.	Coffee Break, Exhibits, and Poster Viewing
Casablanca ABCDE North	10:10 a.m. - 11:00 a.m.	Failed Spinal is Due to Bad Bupivacaine Moderator: Wendy Teoh, M.D. Pro – Manuel C. Vallejo, Jr., M.D. Con – Kenneth E. Nelson, M.D.
	10:30 a.m. - 3:00 p.m.	(Spouse/Guest) Optional Tour #1 Hoover Dam and Ethel M Chocolate Factory Tour
Casablanca ABCDE North	11:00 a.m. - 12:00 p.m.	Gertie Marx/FAER Education Lecture: Effects of Anesthetics on Neurodevelopment of Fetus Sulpicio (Sol) Soriano, M.D. Introduction: Maya S. Suresh, M.D.
La Menzah Lawn	12:00 p.m. - 1:00 p.m.	Lunch
Casablanca ABCDE North	1:00 p.m. - 1:30 p.m.	ASA Update Mark A. Warner, M.D., ASA President Introduction: Robert D'Angelo, M.D., SOAP President
Casablanca ABCDE North	1:30 p.m. - 3:10 p.m.	Clinical Update - JCAHO Alert/Patient Safety/Improving Outcomes Moderator: Paul R. Howell, F.R.C.A., OAA President
	1:30 p.m. - 1:50 p.m.	Postpartum Hemorrhage - Improving Outcomes Yaakov (Jake) Beilin, M.D.
	1:50 p.m. - 2:10 p.m.	Changing Views on VBAC Christina Davidson, M.D.
	2:10 p.m. – 2:30 p.m.	Declining Use of GA in Obstetrics: Maintaining Advanced Airway Skills Maya S. Suresh, M.D.
	2:30 p.m. - 2:50 p.m.	Implementation of Early Warning Systems - United Kingdom Roshan Fernando, M.B., Ch.B.
	2:50 p.m. - 3:10 p.m.	Crisis Resource Management - United States Jill Mhyre, M.D.
Casablanca FGH South/ Baraka Room	3:10 p.m. - 3:30 p.m.	Coffee Break, Exhibits, and Poster Viewing
Casablanca ABCDE North	3:30 p.m. - 4:45 p.m.	Poster Review Session #1 Mrinalini Balki, M.D.; Michael Froelich, M.D.
Casablanca ABCDE North	4:45pm-6:45pm	SOAP Business Meeting and Elections

Gertie Marx Research Competition

Abstract # 1

Pre-Operative Scar Hyperalgesia in Women Undergoing Repeat Cesarean Section

Abstract Type: Original Research
Poster Type: Oral or Poster
Clemens M. Ortner, M.D.[1]; Jake Kraft, M.S.[1]; Philippe Richebe, M.D.[1]; Laurent A. Bollag, M.D.[1]; Michal Granot, Ph.D.[2]; Ruth Landau, M.D.[1]
University of Washington[1]; University of Haifa[2]

Introduction: In the US, 1.2 Mio cesarean sections (CS) are performed annually out of which 30% are elective repeat CS (1). Acute post-CS pain and wound hyperalgesia remain an under-recognized problem that may Result in chronic post-surgical pain (2). Repeat CS represents a unique pain model as few surgical procedures are actually repeated following the same exact incision and surgical protocol. To the best of our knowledge, scar mapping to assess pre-op hyperalgesia has not been evaluated in this constantly growing surgical population. We hypothesized that a substantial proportion of women have abnormal scar mapping prior to their repeat CS, and that this otherwise unsuspected scar hyperalgesia may be associated with increased post-CS pain.

Methods: 165 women scheduled for repeat CS were enrolled in the study. Recall of persistent pain at previous CS was assessed. Mechanical temporal summation (mTS) & scar mapping to evaluate hyperalgesia (Fig) were tested pre-op. Spinal anesthesia was standardized (bupivacaine 12mg, fentanyl 25µg & morphine 100µg). Post-op pain scores (12, 24, 48h) and wound hyperalgesia at 48h were recorded. Statistical analysis included t-test for equality of means and Pearson correlation ($p<0.05$).

Results: Recall of persistent pain at previous CS was present in 13 women (8%). Pre-op scar hyperalgesia was found in 67 women (40%) with a median hyperalgesia index (HI)=0.42 (Q25=0.25;Q75=1.1, range 0.03-4.25). Women with pre-op hyperalgesia had higher pain scores at 12, 24 and 48h post-CS (Fig) and HI was correlated with pain severity ($r=0.29$, $p<0.001$), 48h post-op hyperalgesia ($r=0.594$, $p<0.001$) and pre-op mTS ($r=0.164$, $p< 0.05$).

Conclusion: We report a rather high incidence of pre-op scar hyperalgesia in women scheduled for repeat CS. In addition, pre-op hyperalgesia was associated with abnormal pre-op mTS, higher post-op pain scores and post-op wound hyperalgesia. The combination of several quantitative sensory tests that all substantiate central sensitization (hyperexcitation) suggests abnormal pain modulation in these women. Pre-op wound mapping may allow predict women at higher risk for severe acute and possibly persistent pain that would justify anti-hyperalgesic drugs in addition to standard multimodal analgesia. Such an approach has already been suggested; intra-op iv ketamine was most effective in women with abnormal pre-op temporal summation (3).

1 Zhang, AJOG 2010
2 Lavandhomme, IJOA 2010
3 Lavand'homme, SOAP 2009 (A258)

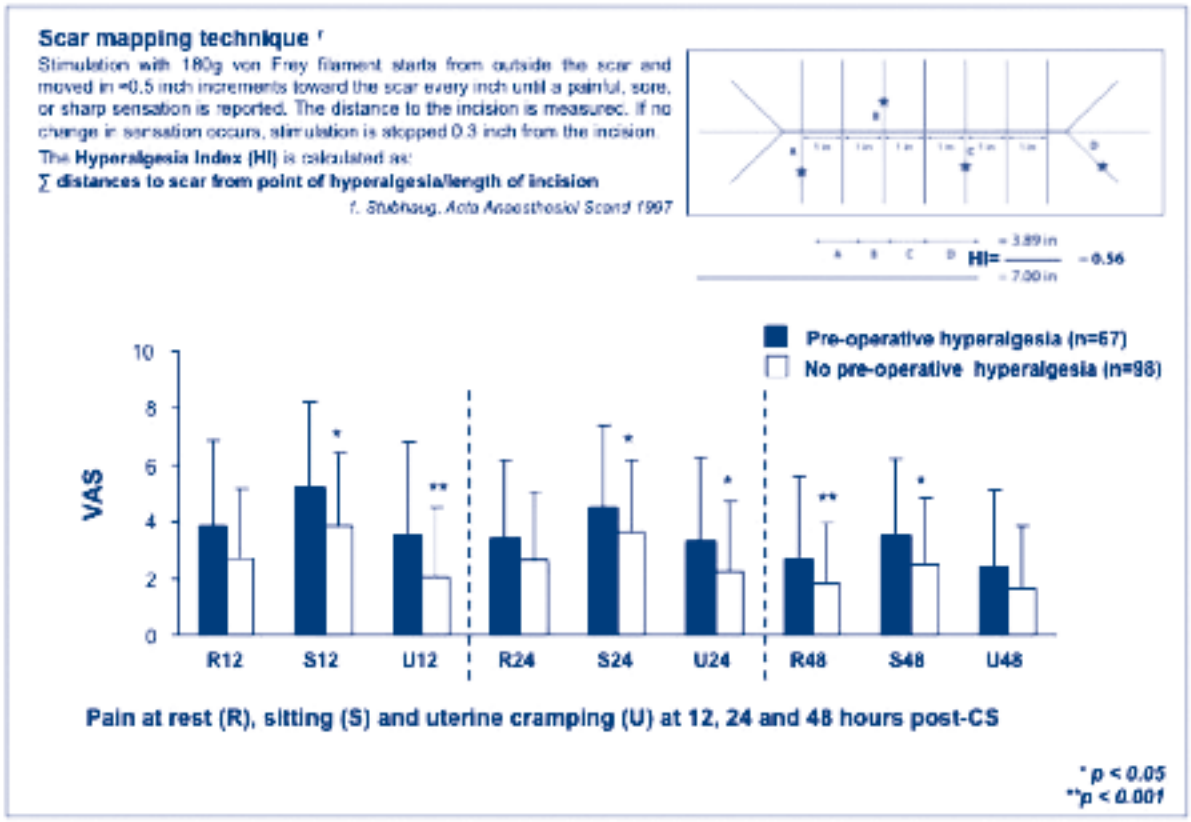


Figure: Pre-operative scar mapping and acute post-CS pain scores

Gertie Marx Research Competition

Abstract # 2

Oxytocin Receptor Genotype Is Predictive of the Duration of the First Stage of Labor

Abstract Type: Original Research
Poster Type: Oral or Poster
Elena Reitman, M.D.; Richard M. Smiley, M.D., Ph.D.; George Gallos, M.D.; Pamela Flood, M.D.
Columbia University

Introduction: Term labor occurs tens of millions of times a year yet is remarkably poorly understood. Significant differences in labor progress exist that may at least partially stem from definable genetic variation. A strong association between beta 2-adrenoceptor (β2AR) genotype and progress of labor has been demonstrated. Like the β2AR, the oxytocin receptor (OXTR) is expressed in the pregnant uterus where its activation modulates contractility. We tested the hypothesis that genetic differences in OXTR are predictive of labor progress in a population model.

Methods: We conducted a secondary analysis of delivery data from 1229 women enrolled in an NIH-funded investigation of the effect of genetics on preterm labor and who had a vaginal delivery after 34 weeks gestation. We obtained timed cervical exams, demographic and treatment data from the patients' electronic medical records. DNA was genotyped for three common OXTR polymorphisms. A mixed effects model was created in NONMEM to evaluate the effect of genetic differences in the OXTR on labor progress.

Results: The multivariate model for labor progress suggested that parturients who express OXTR rs2228485-T have faster latent labor (P<0.0001), while patients with OXTR rs53576-A transition to active labor later than other patients (P<0.0001). There is strong linkage disequilibrium between OXTR rs2228485-T and OXTR rs53576-A, which holds true in all ethnic groups. In this dataset with a high percentage of Hispanics, Hispanic ethnicity predicted later transition to active labor. Larger fetal weight was associated with later transition and prolonged active labor (P<0.0001) (Figure 1).

Discussion: OXTR genotype may join β2AR genotype as a candidate gene to contribute to a haplotype for labor progress. The three OXTR polymorphisms studied may have epigenetic effects that result in differences in receptor expression or modulation. Future studies of human uterine OXTR expression and modulation of contractility will help to clarify these issues.

This work was partially funded by the NICHD grant RO1 HD48805

Abstract # 3

No Pain, All Gain – Spinal Capsaicin and Bupivacaine For Prolonged Sensory Selective Block In Rats

Abstract Type: Original Research
Poster Type: Oral or Poster
Mieke A. Soens, M.D.[1]; Chi Fei Wang, M.D.[1]; Felix Blasl, B.S.[2]; Peter Gerner, M.D.
Brigham and Women's Hospital[1]; Paracelsus Medical University[2]

Introduction: Although the goal of local anesthetics (LA) is to block the transmission of signals in nociceptors to prevent pain, currently available LAs not only block sensory fibers, they also block motor and sympathetic fibers. The ability to selectively block sensory fibers, without causing hypotension and/or motor blockade could clearly lead to a major breakthrough in regional anesthesia. In prior studies we demonstrated that the co-administration of capsaicin with a LA around peripheral nerves elicits a prolonged nociceptive-selective nerve block. (1) The purpose of this study is to determine if the intrathecal injection of bupivacaine and capsaicin can create a prolonged sensory block, without prolonging motor block.

Methods: Sprague-Dawley rats (weights 250-300 g) were assigned to 3 treatment groups (n= 6-8 per group). Rats underwent spinal injection with either bupivacaine alone (B), bupivacaine followed by capsaicin after 1 minute (B+C) or capsaicin alone (C). Motor function was assessed by observation of tail drop. Nociception was evaluated by the nocifensive withdrawal reflex evoked by pinch of the tail. The animals were sacrificed on day 7 and spinal cords were sent for histopathology.

Results: There is a significant prolongation of the sensory block (130 min vs 77 min; p= 0.0067) and significant shortening of the motor block (38 min vs 83 min; p= 0.003) in the B+C group when compared to the B group. (see figure) There was no sensory or motor block in the C group. All of the animals recovered without neurologic deficit. Histopathology results are pending.

Conclusion: Our data show that the intrathecal injection of the combination of bupivacaine and capsaicin produces a prolonged differential block, without causing neurologic deficit. Several potential mechanisms could explain our findings. Capsaicin selectively binds to TRPV1 which is highly expressed in pain-transmitting C- fibers. Capsaicin may facilitate the entrance of bupivacaine into nociceptive fibers through TRPV1 channels (2), however this does not interfere substantially with traditional transmembrane crossing of LA into motor fibers. Alternatively, the activation of TRPV1 cells by capsaicin renders the cytoplasm of C-fibers more acidic (3) and therefore increases the charged form of the LA, which is generally more potent than its neutral counterpart and leaves the cell more slowly.

1.Anesthesiology 2008;109:872-878
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3.J Biol Chem 2004;2

Gertie Marx Research Competition

Abstract # 4

Hemodynamic Changes During Spinal Anesthesia Assessed With Non-Invasive Bioreactance: A Randomized Controlled Trial of Bolus and Infusion Regimens of Phenylephrine to Prevent Hypotension

Abstract Type: Original Research
Poster Type: Oral or Poster
Anne Doherty, M.D.; Yayoi Ohashi, M.D., Ph.D.; Kristi Downey, M.Sc.; Jose CA Carvalho, M.D., Ph.D.
Mount Sinai Hospital, University of Toronto

Introduction: Phenylephrine is commonly used to prevent/treat hypotension during spinal anesthesia for cesarean delivery (CD). However, the optimal regimen for the administration of phenylephrine is undetermined. This study used a non-invasive cardiac output monitoring device based on bioreactance technology (NICOM) to compare the efficacy of an intermittent infusion versus a bolus regimen in that setting.

Methods: This was a double-blinded, randomized clinical trial. We recruited healthy women undergoing elective CD under spinal anesthesia (1.8 ml 0.75% hyperbaric bupivacaine, 10 µg fentanyl and 100 µg morphine). Patients received either intermittent boluses or a continuous infusion of phenylephrine solution containing 120µg/ml. Intermittent boluses were administered if SBP ≤ baseline. A continuous infusion was started immediately after the intrathecal injection and continued at 1 ml/min unless SBP > baseline. The NICOM monitored SBP, HR, CO, SV and SVR. The primary outcome was the maximum decrease in CO in the pre-delivery period. Secondary outcomes included the maximum decrease in HR, the incidence of hypo- and hypertension, nausea/vomiting and bradycardia, the total dose of phenylephrine and neonatal umbilical blood gases and Apgar scores.

Results: Sixty patients were studied. There was no significant difference in the maximum change in CO between the groups (p=0.941). The incidence of hypotension, hypertension, nausea/vomiting and bradycardia was similar in both groups. The infusion group received more phenylephrine (p< 0.001). The hemodynamic profiles showed significant differences in the maintenance of SBP (p=0.007). In the infusion group, there was a fall in SBP>10% from baseline in the initial 6 min after intrathecal injection followed by a recovery to baseline. In the bolus group, SBP was maintained within 5% of baseline during this time (Figure 1). Although there were statistically significant changes in HR over time (p=0.011), there were no significant differences in HR between the two groups.

Discussion: The decreases in CO are similar with both regimens of phenylephrine administration and are related to increases in SVR and decreases in HR. A bolus regimen provides better control of SBP during the initial establishment of spinal anesthesia, at lower doses of vasopressor. These hemodynamic changes are not associated with maternal and neonatal adverse effects other than maternal nausea/vomiting.

References: Br J Anaesth 2004; 92: 469-74

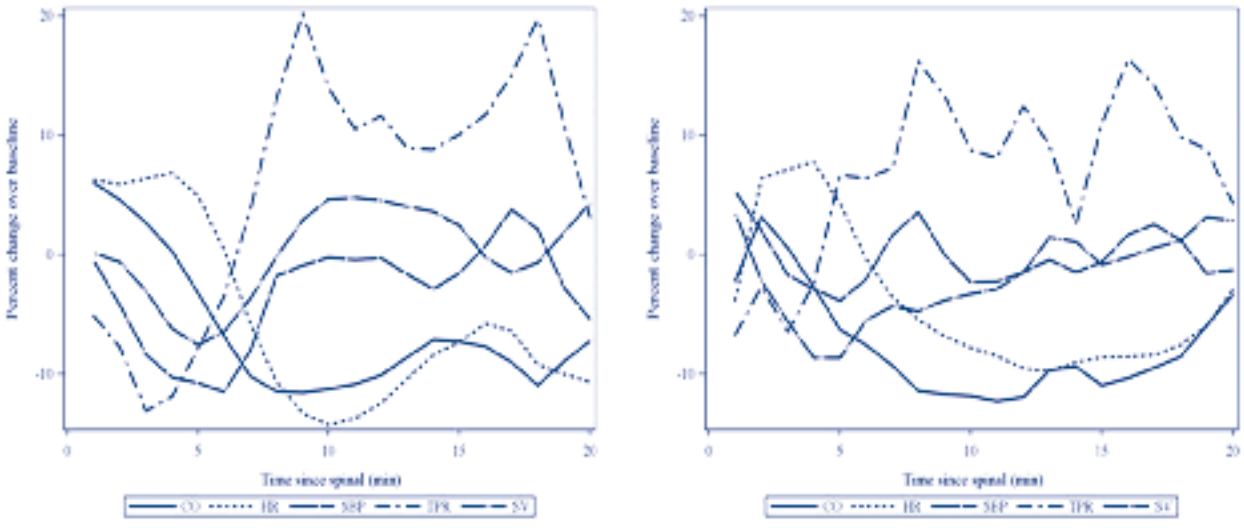

Figure 1 Hemodynamic profiles in the pre-delivery period.

Gertie Marx Research Competition

Abstract # 5

A Dose-Finding Study of Gabapentin for Post-Cesarean Delivery Pain Management: Limited Efficacy of a Single Preoperative Dose

Abstract Type: Original Research
Poster Type: Oral or Poster
Jonathan Short, M.D.; Paul Bernstein, M.D.; Vibhuti Shah, M.D., M.Sc.; Kristi Downey, M.Sc.; Susan Guest, R.N.; Jose CA Carvalho, M.D., Ph.D.
Mount Sinai Hospital, University of Toronto

Background: A single preoperative dose of gabapentin 600 mg reduced post-cesarean pain and improved maternal satisfaction, but its use was associated with increased maternal sedation in the first hours after delivery (1). We hypothesized that a lower dose of gabapentin may be effective, with less sedation. Mechanical temporal summation (TS) can be used to predict individuals who may experience increased postoperative pain (2). We also hypothesized that women who exhibit TS would have greater benefit from gabapentin.

Methods: We conducted a double-blind, randomized, placebo-controlled study. Women undergoing elective cesarean delivery were randomized to oral gabapentin 300 or 600 mg, or placebo, one hour before surgery. TS testing was performed at that time and a difference ≥1 cm between the 1st and 10th stimuli was considered TS+. Standard spinal anesthesia and postoperative analgesia was instituted, including intrathecal fentanyl and morphine, systemic diclofenac, acetaminophen and PRN morphine. Patients were assessed at 6, 12, 24, and 48 hours after surgical incision, for pain at rest and on movement, satisfaction with analgesia, supplemental narcotic consumption, and adverse effects. Apgar scores, cord blood gases, neonatal interventions and breastfeeding difficulties were noted. Three months after delivery, patients were contacted for assessment of chronic pain. The primary outcome was pain on movement at 24 hours.

Results: 132 women were randomized and six excluded. Pain scores and maternal satisfaction at 24 hours did not differ between the three groups (p>0.05). Gabapentin 300 mg was associated with lower pain scores and higher maternal satisfaction at 6 and 48 hours. Gabapentin 600 mg showed similar trends, but without significant differences from placebo. No differences in adverse effects were noted between groups. There was no apparent benefit in TS+ patients, although overall pain scores were significantly higher in these patients irrespective of the group.

Conclusion: We were unable to replicate the beneficial effects of gabapentin (1) in this study and did not demonstrate a dose-effect response at 300-600 mg. Gabapentin 300 mg might be a suitable dose in this setting, but a multiple dose regimen may be necessary for significant clinical effect.

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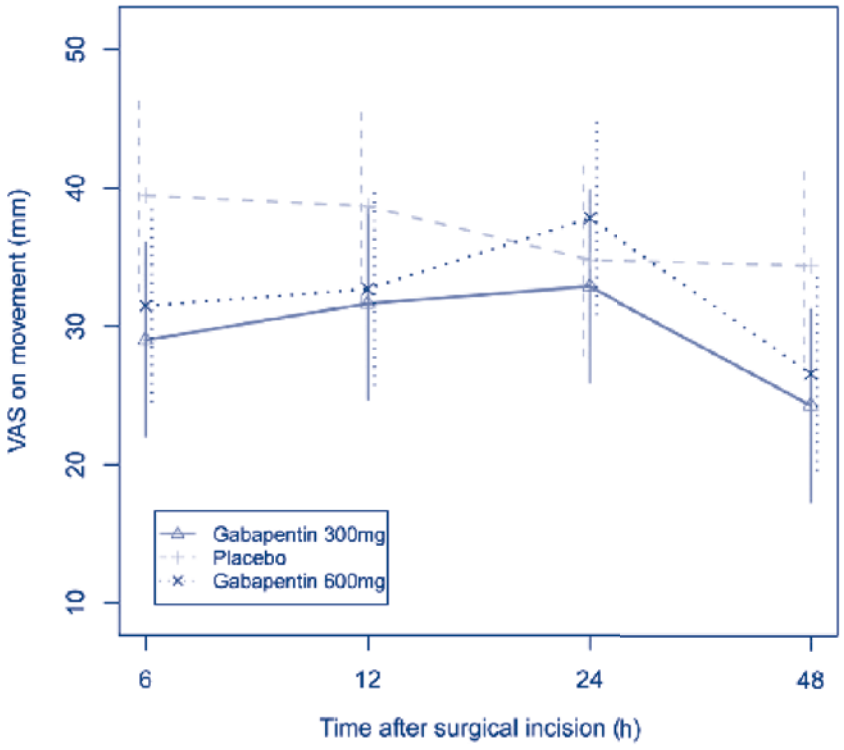

Figure 1. Comparison of pain scores on movement among the three groups at 6, 12, 24 and 48 hours after surgical incision. Pain scores for the Gabapentin 300 mg group were significantly lower compared to the placebo group at 6 (p=0.036) and 48 hours (p=0.045). No other significant differences were observed.

Gertie Marx Research Competition

Abstract # 6

Obese Parturients and the Incidence of Postdural Puncture Headache after Unintentional Dural Puncture

Abstract Type: Original Research
Poster Type: Oral or Poster

Feyce Peralta, M.D.[1]; Nicole Higgins, M.D.[1]; Laurie A. Chalifoux, M.D.[1]; Christian Stevens, M.D.[1]; Elizabeth Sanchez, M.D.[2]; Robert McCarthy, Ph.D.[1]
Northwestern University Feinberg School of Medicine[1]; Loyola University[2]

Background: An inverse relationship between body mass index (BMI) and postdural puncture headache (PDPH) incidence after unintentional dural puncture (UDP) has been suggested despite a lack of peer reviewed evidence. The proposed mechanism is based on the knowledge that lumbar epidural pressure is increased during term pregnancy while CSF pressure remains unchanged.1,2 It has also been shown that obese patients have decreased CSF volume compared to lean individuals.3 These findings suggest that a decreased intrathecal-epidural pressure gradient, Resulting in less CSF leak through the dural rent, may explain a lower incidence of PDPH.

We hypothesized that parturients with a BMI>35 kg/m2 have a lower incidence of PDPH than those with BMI<35 kg/m2 after unintentional dural puncture (UDP) with a 17-gauge Tuohy needle.

Methods: This study was a retrospective cohort study performed by chart review. Case logs from our institution were searched for patients who had an UDP during attempted epidural or combined spinal epidural placement between January 1, 2004 and August 30, 2009. The WHO BMI International Classification was used for BMI classification. Parturients with PDPH were grouped as underweight and normal weight (BMI<25 kg/m2); overweight (BMI 25–30 kg/m2); obesity class I (BMI 30–35 kg/m2); and obesity class II and III (BMI>35 kg/m2). The primary outcome was incidence of PDPH. Groups were compared using a chi-squared statistic. Post hoc comparisons were made using the Bonferroni Method. P<0.05 was required to reject the null hypothesis.

Results: We identified 385 cases of UDP and 336 contained information regarding PDPH. The overall incidence of PDPH following UDP was 56% (n=189). The incidence of PDPH was 67% (n=38) in the BMI<25 group and 34% (n=19) in the BMI>35 group (P<0.05, Figure 1). There was no difference in day of onset or maximum severity of the PDPH. The rate of EBP 72% (n=136) did not differ across BMI groups.

Conclusion: Our data support previous reports of decreased PDPH incidence following UDP in parturients with BMI>35.4 Therefore, when managing these parturients, one can consider the placement of intrathecal catheters for labor analgesia/anesthesia.

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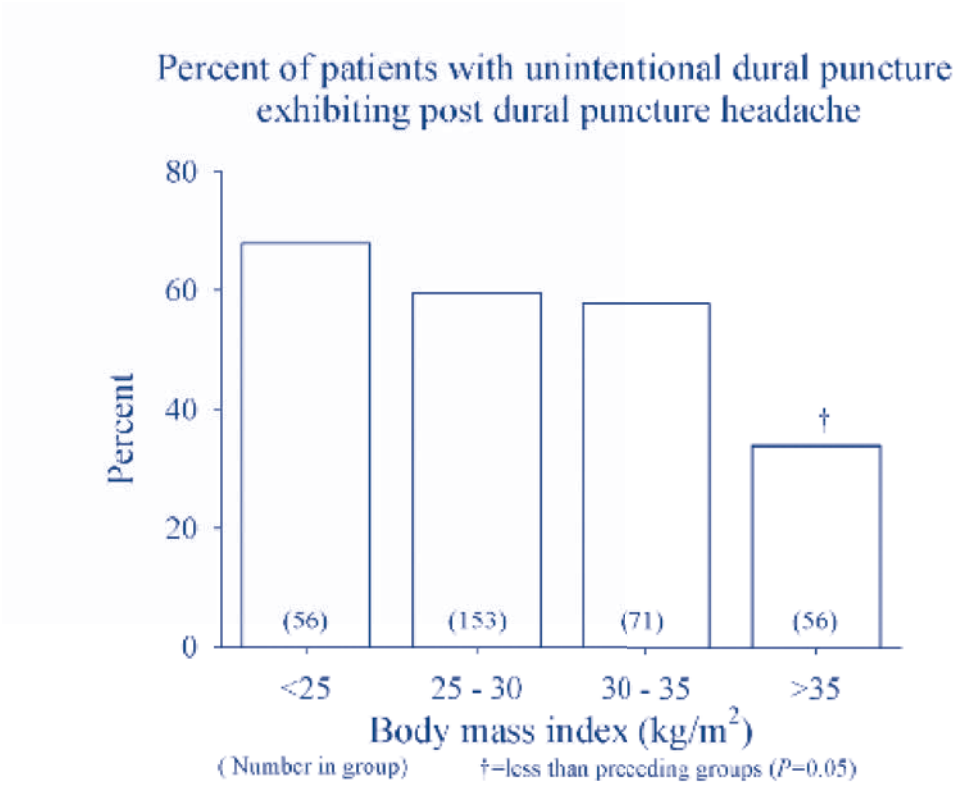

Pro: Failed Spinal is Due to Bad Bupivacaine

Manuel C. Vallejo, M.D.

Objective: Upon completion of this presentation, participants will be able to objectively determine causes of failed spinal anesthesia, including bupivacaine chemical alteration.

Summary: The reported incidence of failed spinal anesthesia ranges from 1-4% incidence. The etiology of a failed neuraxial block range from technical to patient-related factors and can have serious clinical consequences often requiring conversion to alternate anesthetic techniques. Ultimately, failed spinal anesthesia can compromise patient safety.

Identifiable causes of failed spinal reported in the literature include; technical failure, inadequate patient position (i.e. unilateral or patchy block), inadvertent subdural or epidural injection, inadequate intrathecal dose (i.e. inadequate duration), CSF flow maldistribution, defective local anesthetic (i.e. chemical inertness), ineffective mixing of preparations (i.e. precipitate formation and altered pH), human anatomic variability (i.e. spinal stenosis, previous surgery with residual scar formation, congenital arachnoid cyst, dural ectasia, and other barriers to local anesthesia spread such as the posterior septum, lateral denticulate ligament, and "rogue" strands). Other causes of an inadequate block include altered mutations in the voltage gated sodium channel (i.e. receptor genetic variation, polymorphism, diversity), and "Rachi-Resistance" which was named by Sebrechts in 1934. "Rachi-Resistance" is the phenomenon of certain patients being hyper resistant to spinal anesthesia. Sebrechts postulated this phenomenon reflected a peculiar idiosyncrasy which renders nerve roots insensitive or "resistant" to the action of local anesthetic solutions.

Technical failure can result from one of five phases: 1.) lumbar puncture, 2.) intrathecal solution injection, 3.) spreading of drug through the CSF, 4.) drug action on the spinal nerve roots and cord, and 5.) subsequent patient management. The aspiration of CSF both before and after injection is final confirmation that all of the medication was delivered intrathecally and should not result in technical failure.

Consequences of failed blocks have significant clinical consequences including redosing of the spinal anesthetic, conversion to general anesthesia, or pain during surgery. Efforts to identify and reduce the incidence of failed neuraxial anesthesia are of utmost importance considering the increased use of these techniques in obstetric cases. Immediate failed spinal resolution includes patient position manipulation, supplemental field block with local anesthesia, supplemental IV sedation, repeat spinal block, and the conversion to general anesthesia which all have added risks and consequences.

Ruppen et al. used high performance liquid chromatography and determined CSF lumbar bupivacaine concentration in patients with an adequate level of spinal anesthesia. He used plain intrathecal bupivacaine 0.5% in all study patients who had an adequate spinal block. The median adequate bupivacaine concentration in women was 187.6 µg/mL; range (25.9 to 781.0 µg/mL). Ruppen found a large variability (up to a six-fold difference) of CSF bupivacaine concentrations in patients with an adequate level of spinal anesthesia. There was no correlation between bupivacaine concentrations and the spinal block level 5-45 minutes after bupivacaine administration. Ruppen concluded there was no association between CSF bupivacaine concentration and spinal block level. Steiner et al. in a similar study by the same group, reported lumbar CSF concentrations of bupivacaine in 20 patients with an inadequate spinal block. They hypothesized that the primary reason for failed spinal anesthesia was an inadequate concentration of local anesthetic in the CSF. Steiner found CSF bupivacaine concentrations ranged from 3.36 to 1020 µg/mL. In 12 of 20 patients, concentrations were above 73 µg/mL, which was a concentration they felt should have led to an adequate block. Steiner speculated that bupivacaine maldistribution could be responsible for failed intrathecal blocks.

It is important to realize that repeat intrathecal injection can distribute in the same pattern, already adding high intrathecal concentrations, which can result in potential neurotoxic injury. Therefore, the total amount of local anesthetic administered on reinjection should not exceed the maximum single dose to provide adequate anesthesia for the surgical procedure. The BD™ spinal kit label specifically states "protect from freezing." The bupivacaine product insert recommends storage at 20-25 °C (68-77 °F) because of temperature instability which may render the product chemically inert.

Key Points:

1. The etiology of a failed spinal is most likely multifactorial, dependent on a number of factors ranging from technical to patient-related factors.
2. The aspiration of CSF both before and after injection helps to confirm that all medication was delivered intrathecally.
3. It is important to avoid storage of spinal kits in extreme temperature ranges which may render bupivacaine chemically inert.

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Con: Failed Spinal is Due to Bad Bupivacaine

Kenneth E. Nelson, M.D.

Objective: Upon completion of this presentation, participants will understand that there are many possible causes for failed spinal anesthesia, but local anesthetic failure, AKA “bad bupivacaine” is not one of them.

Summary: Spinal failure is well known to occur at a rate of approximately 2%, but the reasons for failure remain elusive. Perhaps the single most common explanation given is a failure of the drug compound, yet this is one of the least likely of all the possible causes listed below.

Judgment errors are a set of possible causes for spinal failure, and include inadequate dose, inappropriate drug, drug preparation error, lack of adjunct when indicated, poor match of the anesthetic to the surgical procedure, and an error in judgment with a combination of solution baricity and patient positioning.

Technical errors provide another potential set of causes, and include injecting the solution after free flow yet no aspiration of cerebrospinal fluid (CSF), patient movement during injection, needle movement during injection (for instance when checking for free flow of CSF half way through injection), and injecting even when free flow of CSF never occurs.

But even with adequate judgment and technical success, block failure still occurs. Some of the remaining explanations include local anesthetic resistance (rachiresistance, tachyphylaxis, sodium channel mutation), anatomic abnormalities (Tarlov cyst and other CSF-containing cystic masses, extremes of lumbosacral CSF volume, dural ectasia, physical barriers to CSF flow and distribution such as septae and trabeculae, and variations in regional CSF flow velocities.

Finally, “bad bupivacaine” remains a popular explanation for spinal failure, yet has never been demonstrated to be causative. To the contrary, many assays have been performed on the remaining spinal solution from a failed spinal anesthetic, and all have been shown to contain normal amounts of active drug.

Amongst all of these possible explanations for spinal failure, maldistribution is most likely, and must always be assumed in order to assure patient safety and to prevent complications from inappropriately re-injecting local anesthetics.

Key Points:

1. There are many possible explanations for failed spinal anesthesia.
2. Drug failure, AKA “bad bupivacaine” has been repeatedly disproven to be a cause for failure spinal anesthesia.
3. Believing that inactive drug has caused a failed spinal anesthetic can lead to patient harm when deciding to re-inject local anesthetic.

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Effects of Anesthetics on Neurodevelopment of Fetus

Sulpicio G. Soriano, M.D., F.A.A.P.

Objectives: Upon completion of this presentation, participants will be able to:

1. Identify the pertinent literature on the effects of anesthesia on the fetal and neonatal CNS.
2. Discuss the relevance of these preclinical findings to the care of obstetrical and pediatric patients.

Summary: Millions of newborn and infants receive anesthetic, sedative and analgesic drugs for surgery and painful procedures on a daily basis. Recent laboratory reports clearly demonstrate that anesthetic and sedative drugs induced both neuroapoptosis and neurocognitive deficits in laboratory models. This issue is of paramount interest to obstetrical and pediatric anesthesiologists and intensivists because it questions the safety of anesthetics used for fetal and neonatal anesthesia.[1,2] In an attempt to summarize the rapidly expanding laboratory-based literature on anesthetic-induced developmental neurotoxicity (AIDN), this review will examine published reports on the characterization and clinical extrapolation of this phenomenon in the care of obstetrical and pediatric patients.

N-methyl-D-aspartate antagonists (ketamine and nitrous oxide) and γ-aminobutyric acid agonists (isoflurane, sevoflurane, desflurane, propofol and midazolam) clearly induce neurodegenerative changes in neonatal animals.[3,4] There are two distinct histological changes associated with animal models of AIDN; neuroapoptosis and altered dendritic growth. AIDN leads to neuroapoptosis in neonatal and adult neurocognitive deficits in rats, mice and rhesus monkeys.[5-7] Altered dendritic growth has also been demonstrated in vitro and in juvenile mice.[8-10] Susceptibility to AIDM is not limited to the postnatal period, but to the fetus as well. Significant neuroapoptosis and neurocognitive decline has been reported in the offspring of pregnant rats and rhesus monkeys exposed to anesthetic drugs for a prolonged period.[6,11,12] Taken together, three factors appear to induce AIDN; 1. period of peak synaptogenesis, 2. high dose of the anesthetic and 3. long duration of exposure.

The extrapolation of these laboratory findings to clinical practice is vexing. No human phenotype of AIDN has been identified. Epidemiological studies suggest that multiple anesthetic exposures during childhood are associated with learning disabilities.[13] However, neuraxial anesthesia for cesarean delivery had a lower incidence of subsequent learning disabilities compared with vaginal delivery.[14] The incidence of learning disability was the same for the vaginal delivery with and without labor epidurals and caesarian sections under general anesthesia.[15] The Anesthesia and Life-Support Advisory Committee of the Food and Drug Administration convened an open public hearings on the Neurotoxic Potential of Anesthesia drugs on pediatric patients in March 27, 2007 and March 10, 2011. The first meeting concluded with the statement, “well-understood risks of anesthesia (respiratory and hemodynamic morbidity) continue to be the overwhelming considerations in designing an anesthetic, and the understood risks of delaying surgery are the primary reasons to determine the timing”.

Key Points:

1. Preclinical reports clearly demonstrate that anesthetic drugs induce neuroapoptosis during developmentally susceptible periods in a dose- and duration- depended manner.
2. Epidemiological reports have not identified a clear manifestation of AIDN in humans and extensive clinical investigations are underway.
3. Anesthesiologists should be aware of the rapid developments in this arena and be able to effectively communicate the significance of these findings to their patients.

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Clinical Update - JCAHO Alert/Patient Safety/Improving Outcomes

Postpartum Hemorrhage - Improving Outcomes

Yaakov (Jake) Beilin, M.D.

Objective: Upon completion of this presentation, participants will understand the role maternal hemorrhage has in the increasing maternal mortality rate. The management of hemorrhage including the use of cell salvage and rapid infusion protocol will be discussed and the importance of team work will be stressed.

Summary: Maternal mortality has increased in the United States from approximately 7 per 100,000 live births in 1996 to 13.3 in 2006. In 2010 The Joint Commission issues a sentinel alert entitled, “Preventing deaths during and after pregnancy.” Peripartum hemorrhage (PH) is one of the three leading cause of maternal mortality along with thromboembolism and hypertensive disorders of pregnancy.

The etiology of PH includes placenta previa, placenta abruption and placenta accreta. In particular, the incidence of placenta accreta has increased. Flood et al, assessed the etiology of peripartum hysterectomy in Dublin from 1965 through 2005. They found that placenta accreta was the inciting factor in only 5% of PH from 1965-1975 but increased to 47% from 1996-2005. The most likely explanation for the increase in placenta accreta is the rise in the cesarean delivery rate. The cesarean delivery rate in the United States has increased from roughly 21% in 1997 to 35% in 2010 and appears to be increasing further. Diagnoses of placenta accreta can be difficult since imaging modalities including sonography and MRI are associated with false negative results.

The key to a successful outcome is team work and coordination of care with the obstetricians, gynecology/oncology surgeons, blood bank, and interventional radiology. Anesthesia management of the patient at risk for hemorrhage includes placement of large bore IV access and arterial line and aggressive replacement of blood and blood products. Rapid transfusion protocols are becoming more common and has been shown in trauma to be associated with improved outcomes including decreased incidence of mortality, pneumonia, pulmonary failure, and sepsis.

Key Points:

1. Maternal mortality is increasing and maternal hemorrhage is a common etiology.
2. Teamwork and preparation is the key to a successful outcome
3. The use of a massive transfusion protocols may improve outcome.

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Changing Views on Vaginal Birth after Previous Cesarean Delivery (VBAC)

Christina Davidson, M.D.

Objectives:

1. To review the history of VBAC.
2. To review new tools used to identify optimal candidates for trial of labor after cesarean (TOLAC).
3. To review current recommendations regarding resources for health care-providers and facilities offering TOLAC.

Summary: Vaginal birth after cesarean (VBAC) describes vaginal delivery by a woman who has had a previous cesarean delivery (CD). Trial of labor after previous CD (TOLAC) provides women who desire a vaginal delivery with the possibility of achieving that goal. "Once a cesarean, always a cesarean" dominated obstetric practice in the US for most of the twentieth century (1). In 1980, an NIH Consensus Development Conference Panel questioned the necessity of routine repeat CD and outlined situations in which VBAC could be considered. This was supported by the American College of Obstetricians and Gynecologists (ACOG). TOLAC was offered more often in the 1980s through 1996, with an increase in VBAC rates from just more than 5% in 1985 to 28.3% by 1996 (2). Some third-party payers and managed care organizations even mandated that all women who had previous CD undergo TOLAC (3-4). As the number of women pursuing TOLAC increased, however, so did the number of reports of uterine rupture and other complications during TOLAC (3). As a result, the VBAC rate had decreased to 8.5% by 2006 and the total CD rate had increased to 31.1% (5). In some hospitals, TOLAC is no longer offered (2). Most maternal morbidity that occurs during TOLAC occurs when repeat CD becomes necessary. VBAC is associated with fewer complications, and a failed TOLAC is associated with more complications, than elective repeat CD (6-9). A predictive nomogram that incorporates variables easily ascertainable at the first prenatal visit has been developed to provide a patient-specific chance for successful VBAC (10). In addition, the VBAC success rate obtained from this nomogram can also be used to predict the probability of morbidity related to a TOLAC (11). Specifically, if the chance of VBAC is at least 70%, maternal morbidity is not greater for those women who undergo TOLAC than those who undergo elective repeat cesarean; women with a probability of VBAC success greater than 90% have a lower neonatal morbidity if they undergo TOLAC rather than an elective repeat cesarean (11).

In a 2010 consensus conference, the NIH examined the safety and outcome of TOLAC and VBAC and factors associated with decreasing rates. The NIH panel recognized that TOLAC was a reasonable option for many women with a prior CD (1) and called on organizations to facilitate access to TOLAC. ACOG recommends that TOLAC be undertaken at facilities capable of emergency deliveries since the risks associated with TOLAC may be unpredictable. When resources for immediate CD are not available, the College recommends that health care providers and patients considering TOLAC discuss the hospital's resources and availability of obstetric, pediatric, anesthetic, and operating room staffs. Respect for patient autonomy supports that patients should be allowed to accept increased levels of risk, however, patients should be clearly informed of such potential increase in risk and management alternatives (2).

Key Points:

1. The fluctuations in VBAC rates over the past century have been related to changing views in VBAC, assisted by the NIH and ACOG, as well as published trials reporting the risks associated with TOLAC.
2. VBAC is associated with fewer complications, and a failed TOLAC is associated with more complications, than elective repeat CD. Estimates for likelihood of successful VBAC should be incorporated into patient counseling during their prenatal care.
3. TOLAC should be undertaken at facilities capable of emergency deliveries since the risks associated with TOLAC may be unpredictable.

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Declining Use of GA in Obstetrics: Maintaining Advanced Airway Skills

Maya S. Suresh, M.D.

Objective

1. Discuss the general anesthesia-related maternal mortality in USA and UK and it's impact on the changing obstetrical anesthesia practice.
2. Discuss the impact on the anesthesia trainees' experience in general anesthesia.
3. Recognize the importance of training and acquiring advanced airway management skills so as to avoid airway catastrophes in obstetrical patients.

Background: In Western countries the recognition of adverse maternal and neonatal outcomes associated with difficult airway management has led to a dramatic decline in the use of general anesthesia (GA) for both elective and emergency cesarean delivery (CD).1, 2

Anesthesia-Related Maternal Mortality and Trends in Obstetrical Anesthesia: Although the total number of maternal deaths had been decreasing steadily in the last few decades, anesthesia-related complications are the seventh leading cause of maternal death both in the United States and United Kingdom.3, 4, 5, 6 The majority of the anesthesia-related deaths took place during CD.3, 7 Majority of the maternal deaths were related to difficult or failed intubation, aspiration and respiratory related complications. Although case fatality rates for GA are falling, rates for regional anesthesia are rising.7

Closed Claims Studies: The recent Closed Claims Study, published in the USA, revealed that obstetric anesthesia claims for injuries from 1990 to 2003 had declined compared with obstetric claims for injuries before 1990. The improvements in the statistics and decline in anesthesia-related maternal mortality in the past few years are probably associated with the use of respiratory system monitors in modern practice, the decrease in the use of GA in obstetric practice, and enhanced awareness of the risk of aspiration of gastric contents in the obstetric patient.1 However, the incidence of claims from difficult intubation has not changed significantly.1

Why is Advanced Airway Management important? There have been tremendous advances in airway management in recent years. Improvements in advanced airway management led to a documented decline in the incidence of airway–related perioperative morbidity in the surgical population.8 Similarly, application of advanced airway management can decrease or eliminate the case fatalities in obstetrical cases especially when the anesthesia practitioner is confronted with an airway crisis situation.

Because GA for CD is frequently reserved for true emergencies, these high level stress situations can lead to an inadequate airway assessment or preparation which can contribute to the risk of difficult or failed intubation. Since the medico-legal liability associated with airway -related adverse outcomes is high,1 it is essential that all anesthesia practitioners practicing obstetric anesthesia should acquire and maintain advanced airway management skills.

Training in Advanced Airway Management: General anesthesia in obstetric anesthesia has largely been replaced by the use of neuraxial techniques. The widespread adoption of the neuraxial techniques for labor analgesia and cesarean delivery has been prompted by a number of benefits but more importantly because of the concern to avoid the potentially difficult airway and the risk of aspiration in the obstetric patients. The phenomenon of the widespread utilization of neuaraxial techniques in the western countries has had a significant impact on the anesthesia trainees' experience in GA in the obstetrical patients.9, 10, 11 Because of the significant decline in the use of GA for CD the anesthesia trainees in USA and UK are getting minimal or no exposure to this important but necessary procedure during their anesthesia training.9, 10, 2

The importance of GA expertise in obstetrics is without question a necessity; because it remains a necessary choice in certain situations, such as, cord prolapsed; maternal hemorrhage; contraindications to neuraxial techniques e.g.; coagulopathy; a perceived lack of time; and patient refusal. Because fewer CD are being performed under GA; there is a growing concern that current and future anesthesia practitioners, particularly the anesthesia trainees, will have minimum or no opportunities to learn and maintain critical skills for managing the airway.12, 10, 9 The difficult intubation rate in obstetrics can vary from 1:1500,13 1:300 to 1:250.14, 15, 16, 2 In addition to the basic airway skills, advanced airway management skills are also necessary.

Approaches to advanced airway management training: Advanced airway management with emphasis on difficult airway management must be a mandatory and critical aspect of anesthesiology. The US residency programs surveyed with a response rate of 79% showed that two-thirds of the responding programs acknowledged their lack of a difficult airway teaching rotation. Further, less than 20% of residency programs that have a formal airway teaching rotation, do not have a requirement that a resident be evaluated to have successfully performed a "required number" of procedures to demonstrate competence.17

Training for difficult airway management in an obstetrical situation: Ideally residents should train with obstetrical clinical scenarios and be able to apply their knowledge, judgement, technical and non-technical skills, in real-time simulation of those clinical situations. The training course should start with 1) A dedicated structured airway rotation in the general operating room (a prerequisite that they have successfully performed a " required number" of procedures); 2) Systematic practice and repetition with various individual airway devices and tools to facilitate intubation; 3) High-fidelity simulation-based practice of a clinical obstetrical difficult airway situation in which the individual resident must attempt to manage in "real time" the various limbs of the ASA algorithm including cricothyroidotomy in a "Cannot Intubate – Cannot Ventilate" situation; 4) An assessment of technical and nontechnical skills in a high –fidelity simulated obstetrical difficult airway situation; 5) Reassessment in six months to one year, to gauge the retention of cognitive, psychomotor and nontechnical affective skills by the anesthesia trainee with high fidelity simulation of the same obstetrical difficult airway situation.

In conclusion, there should be strong emphasis in addressing overall education, advanced airway management skills acquisition, and management of the difficult airway in obstetrical patients, similar to the aviation industry, with standardized simulation and crew resource management, and crisis resource management methods incorporated into the obstetrical anesthesia curriculum of all anesthesiology residents.

Key Points:

1. Anesthesia-related maternal mortality has decreased significantly; it ranks seventh among the leading causes of maternal mortality.
2. There has been a significant decline in the use of general anesthesia for cesarean delivery such that anesthesia trainees in USA and UK are getting minimal or no experience in this important but yet necessary procedure during anesthesia training.
3. Ideally residents should acquire advanced airway management skills and should train with obstetrical clinical scenarios and apply their knowledge, technical, nontechnical and judgement to obstetrical airway crisis situation.

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Implementation of Early Warning Systems - United Kingdom

Roshan Fernando, M.B., Ch.B.

Objectives:

1. The participant will obtain an overview about early warning systems, especially the Modified Early Obstetric Warning Score (MEOWS), in relation to obstetric anesthesia.
2. The participant will have a better knowledge of the advantages and challenges of implementing MEOWS into clinical practice.

Recent confidential enquiries into maternal deaths in the UK have recommended the implementation of a national early obstetric warning score (MEOWS) in all pregnant or postpartum women who become unwell and need obstetric or gynecology services. These are usually in the form of a chart. Such charts are in use in most hospitals in the UK on the general wards but special charts need to be available which take into account the physiological changes of pregnancy. Standard parameters on non-obstetric early warning systems (EWS) are well established, but in view of the normal physiological changes in pregnancy, these parameters do not apply to the pregnant population since they would trigger a large number of false positives. Many believe that special charts specific for obstetric use such as MEOWS charts should be used on all women so as to pick up those cases of deterioration, which may otherwise be missed. Currently MEOWS are used on high-risk women and not on all women admitted to an obstetric unit.

There are examples of MEOWS charts on the Obstetric Anaesthetists' Association as well as on the CMACE (Centre for Maternal and Child Enquiries, the body responsible until 2011 for the UK confidential enquiries into maternal deaths) websites. These use periodic observations of selected vital signs ("track") together with predetermined criteria ("trigger") for summoning expert help. The initial response does not always demand critical care or define a particular type of treatment. The charts are simply a tool to aid early recognition and management of a patient who is deteriorating.

Typical physiological parameters recorded on a MEOWS chart include respiratory rate, O2 saturations, temperature, heart rate, systolic BP, diastolic BP, urine output, and a neurological response (e.g. alert, responds to voice / pain or no response). Certain areas of the chart are usually coloured yellow and red, which relate to level of abnormality of the physiological parameter being recorded. An example of a MEOWS chart used in the UK is given below. For example a heart rate between 100 and 120 beats/ min would trigger a yellow response and one above 120 beats/min would trigger a red response. The similar system would apply to other selected vital signs. A patient that triggers 2 yellow responses or 1 red response should cause the obstetric nurse to call a physician immediately.

Although MEOWS have been recommended for use in the UK, there is not enough evidence that such early warning systems (EWS) can clinical influence outcomes. Early warning of deterioration is only of value if outcome can be altered, and outcome can only be improved if there is an effective early warning response involving clinicians with appropriate training, skills, experience and resources. It remains to be seen if MEOWS can indeed fulfil its intended objectives.

Key Points:

1. Implementation of MEOWS charts has been recommended by successive reports into maternal deaths in the UK.
2. Currently these charts are being used for high-risk patients such as those following cesarean delivery, but may in the future be used for all women entering an obstetric unit.
3. Although there is little data on the reliability, validity and utility of MEOWS, most obstetric units in the UK have or will soon implemented them.

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CHAPTER 19 ANNEX A

OBSTETRIC EARLY WARNING CHART.

FOR MATERNITY USE ONLY

NHS Forth Valley

NAME: _____ **DOB:** _____

CHI: **WARD:**

CONTACT DOCTOR FOR EARLY INTERVENTION IF PATIENT TRIGGERS ONE RED OR TWO YELLOW SCORES AT ANY ONE TIME

	Date :																		
	Time :																		
RESP (write rate in corresp. box)	>30																		>30
	21-30																		21-30
	11-20																		11-20
	0-10																		0-10
Saturations	90-100%																		90-100%
	<90%																		<90%
O2 Conc.	%																		%
Temp	39																		39
	38																		38
	37																		37
	36																		36
	35																		35
HEART RATE	170																		170
	160																		160
	150																		150
	140																		140
	130																		130
	120																		120
	110																		110
	100																		100
	90																		90
	80																		80
	70																		70
	60																		60
	50																		50
	40																		40
Systolic blood pressure	200																		200
	190																		190
	180																		180
	170																		170
	160																		160
	150																		150
	140																		140
	130																		130
	120																		120
	110																		110
	100																		100
	90																		90
	80																		80
	70																		70
	60																		60
	50																		50
Diastolic blood pressure	130																		130
	120																		120
	110																		110
	100																		100
	90																		90
	80																		80
	70																		70
	60																		60
	50																		50
	40																		40
Passed Urine	Y or N																		Y or N
Lochia	Normal																		Normal
	Heavy / Foul																		Heavy / Foul
Proteinuria	2+																		2+
	> 2+																		>2+
Liquor	Clear / Pink																		Clear/Pink
	Green																		Green
NEURO RESPONSE (√)	Alert																		Alert
	Voice																		Voice
	Pain / Unresponsive																		Pain /Unresponsive
Pain Score (no.)	2-3																		2-3
	0-1																		0-1
Nausea (√)	YES (√)																		YES (√)
	NO (√)																		NO (√)
Looks unwell	YES (√)																		YES (√)
Looks unwell	NO (√)																		NO (√)
Total Yellow Scores																			
Total Red Scores																			

CEMACH apologises to Drs Fiona McIlveney, Chris Cairns and their colleagues at Stirling Royal Infirmary for not acknowledging their important role in its development in the original Report. Requests for copies of the original chart in MS Excel format may be made to Dr Fiona McIlveney at: Fiona.McIlveney@tvah.scot.nhs.uk

Clinical Update - JCAHO Alert/Patient Safety/Improving Outcomes

Crisis Resource Management - United States

Jill M. Mhyre, M.D.

Objectives: Upon completion of this presentation, participants will be able to 1) describe basic principles of crisis resource management (CRM) 2) appreciate the role that CRM training and principles can play in improving both patient safety and organizational outcomes.

Summary: CRM-based team training was adapted from aviation into medicine twenty years ago.1 It is a personnel management system that seeks to capitalize on the ability of each team member to see, analyze, and react to both routine and non-routine situations in ways that reduce the potential for error.2 Multiple vendors have developed and validated training programs in CRM, with evidence of improved knowledge, skills, and attitudes among learners.3 Team STEPPS, MedTeams, the Veterans Health Administration Medical Team Training Program, and Team Performance Plus are some of the most widely available.4-8 Common training modules include structured communication techniques (e.g., closed-loop, two-challenge rule), situation monitoring and awareness (e.g., shared mental model, seeking information from all available sources), mutual support (e.g., peer workload monitoring, feedback, task assistance), and leadership (e.g., active workload monitoring and distribution, briefings and debriefings, role clarity). CRM principles are often taught and reinforced using simulation-based techniques, but CRM is distinct from simulation and may be more efficiently taught in electronic modules or a classroom setting. Multiple studies suggest that multidisciplinary simulations of obstetric emergencies improve knowledge, skills and attitudes among participants, as well as processes of care, regardless of whether or not training is informed by CRM.9

Training teams of providers in CRM does not by itself improve patient safety.2 However, CRM-based team training may be an effective strategy to engage multidisciplinary teams of providers in ongoing quality improvement, that in turn leads to better patient and organizational outcomes.10-14 Grunebaum et al. recently reported striking reductions in sentinel events, compensation payments, and obstetric liability premiums, more than covering the cost of a comprehensive obstetric patient safety program that included CRM training.13 The Veterans Health Administration developed a Surgical Quality Improvement Program based on Medical Team Training; participating hospitals experienced lower surgical mortality.15 To realize such benefits, substantial organizational commitment and effort are required to integrate CRM principles into local work processes and the culture of care.10-15

Key Points:

1. Training teams of providers in CRM does not by itself improve patient safety as measured by the Adverse Outcome Index.
2. CRM-based team training may be an effective strategy to change the culture of care, and to engage teams of care providers in ongoing quality improvement leading to improved patient and organizational outcomes.

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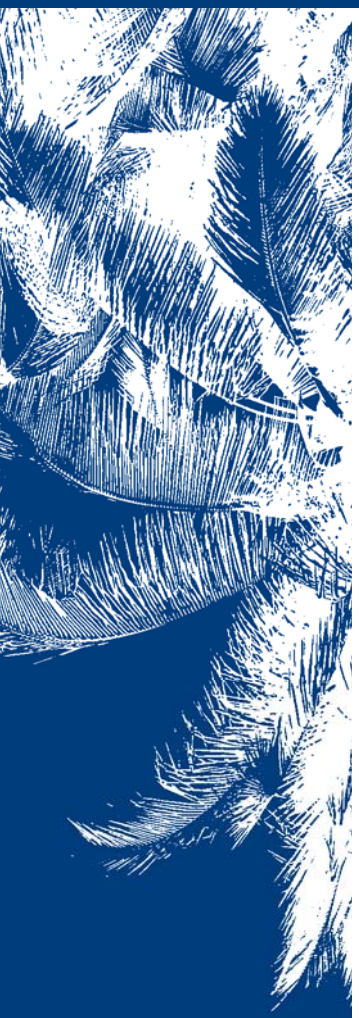


Educational Session Materials

Friday, April 15, 2011

Opportunities for Questions and Answers will be provided at the conclusion of each presentation.

Loews North Parking Lot	6:15 a.m. - 7:30 a.m.	Wellness Walk / Fun Run Onsite at Loews Lake Las Vegas Resort
Medinas Foyer	6:30 a.m. - 1:30 p.m.	Registration
Casablanca FGH South/ Baraka Room	6:30 a.m. - 7:30 a.m.	Breakfast, Exhibits, and Poster Viewing
Casablanca ABCDE North	7:30 a.m. - 8:30 a.m.	Special Lecture: "Health Care Reform: Impact on Physicians and Practice" Valerie A. Arkoosh, M.D., M.P.H. Introduction: David Wlody, M.D.
Casablanca ABCDE North	8:30 a.m. - 10:00 a.m.	Oral Presentation Session #1 (6 Abstracts) Moderator: John Sullivan, M.D.
Casablanca FGH South/ Baraka Room	10:00 a.m. - 10:30 a.m.	Coffee Break, Exhibits, and Poster Viewing
Casablanca ABCDE North	10:30 a.m. - 11:30 a.m.	What's New in Obstetrics: Critical Care Management of the Parturient Aaron B. Caughey, M.D., Ph.D. Introduction: Linda Polley, M.D.
Casablanca ABCDE North	11:30 a.m. - 12:30 p.m.	Fred Hehre Lecture William Camann, M.D. Introduction: Lawrence C. Tsen, M.D.
	12:30 p.m.	Plenary Session Concludes
Casablanca ABCDE North	12:45 p.m. - 3:00 p.m.	Resident & Medical Student Forum *(By Invitation)* Welcome/Lunch Buffet

Breakout location assignments will be announced onsite

Breakout Rooms: Casablanca ABCDE North, Asilah Boardroom, Safi, Fez A, Fez B, Kenitra A, Kenitra B, Rabat A, Rabat B, The Club Room

All participants will start at 12:45 p.m. in *Casablanca ABCDE North for lunch and then proceed to breakouts as assigned*

Coordinators: Jeanette Bauchat, M.D.; Shobana Chandrasekhar, M.D.; David M. Hatch, M.D.; Paloma Toledo, M.D.

Update - ACGME Approval of OB Anesthesia Fellowship
Alan Santos, M.D.; Rita M. Patel, M.D.
Introduction: Paloma Toledo, M.D.

Judges: Patricia Dalby, M.D.; Laura Dean, M.D.; Stephanie Goodman, M.D.; Bhavani Kodali, M.D.; Latoya Mason, M.D.; Jill Mhyre, M.D.; Arvind Palanisamy, M.D.; Linda Polley, M.D.; Richard Smiley, M.D.; Paloma Toledo, M.D.; Ashley Tonidandel, M.D.; Manuel C. Vallejo Jr., M.D.; Ivan Velickovic, M.D.; Jon Waters, M.D.; Richard Wissler, M.D.; David Wlody, M.D.

Moderators: Michaela K. Farber, M.D.; Helene Finegold, M.D.; Ashraf Habib, M.B., B.Ch..; Nicole Higgins, M.D.; Allison J. Lee, M.D.; Alice L. Oswald, M.D.; Jessica N. Rock, M.D.; Joan E. Spiegel, M.D.

1:00 p.m. - 5:30 p.m.	Optional Tour #2 - Vegas Then and Now City Tour ($55 fee)
Evening	Dine Around - Las Vegas Strip - Reservations are now closed; additional/new reservations may no longer be accepted.

Special Lecture

Health Care Reform: Impact on Physicians and Practice

Valerie A. Arkoosh, M.D., M.P.H.

Objective: Upon completion of this presentation, participants will be able to list the key components of the Patient Protection and Affordable Care Act of 2010 and describe how the Affordable Care Act will impact their patients, and their practice.

Summary: The Affordable Care Act was signed into law on March 23, 2010. When fully implemented in 2014 the law will:

- Expand access to health insurance coverage to most Americans.
- For those who do not have health insurance through their employer, create a new way to buy health insurance: state-based Health Insurance Exchanges.
- Increase regulation of private health insurance companies including:
  - Mandatory coverage of pre-existing conditions.
  - Elimination of annual and life-time caps on benefits.
  - Require that insurance companies spend 80 to 85% of insurance premiums on health care, rather than administrative costs.
  - Eliminate the practice of charging women higher premiums than men.
- Close important gaps in the Medicare program.
- Implement numerous policies that encourage preventive care.
- Implement policies to encourage more physicians to choose practice in primary care.
- Encourage payment paradigms that move away from the current fee-for-service approach, which rewards volume of care, to payment structures that reward quality of care such as Accountable Care Organizations.

Resources:

HealthCare.gov: www.healthcare.gov
- HHS website has most current implementation information and an insurance finder that is a preview of the health insurance exchanges. Ideal site for patients.

1. National Physicians Alliance: www.npalliance.org
   - Download free patient and physician information sheets
   - View a previously recorded version of this presentation
   - View 15 min presentations on specific aspects of the ACA
2. HealthReformGPS: http://www.healthreformgps.org/
   - Project of George Washington University's Hirsh Health Law and Policy Program and the Robert Wood Johnson Foundation
3. The Henry J. Kaiser Family Foundation (no relationship with Kaiser Permanente): http://healthreform.kff.org/
   - Great resource for state level information
   - Comprehensive timeline: http://healthreform.kff.org/timeline.aspx

Oral Presentation Session #1

Abstract # 83

Epidemiology of Pregnancy-Related ICU Admissions in Maryland: 1999-2008

Abstract Type: Original Research
Poster Type: Oral or Poster
Jonathan P. Wanderer, M.D.[1]; Brian T. Bateman, M.D.[1]; Jill M. Mhyre, M.D.[2]; Lisa R. Leffert, M.D.[1]
Massachusetts General Hospital[1]; University of Michigan Health System[2]

Introduction: Severe maternal morbidity and mortality is a significant public health problem in the United States (US); recent data suggests the US has amongst the highest incidence of maternal mortality in the developed world[1]. Intensive care unit (ICU) utilization during the peripartum period is a well established measure of severe maternal morbidity. There are few recent population based data examining ICU utilization in the US.

Methods: Data were derived from the Maryland State Inpatient Database which was collected as part of the Healthcare Cost and Utilization Project of the Agency for Healthcare Research and Quality. We identified all antepartum, postpartum, and delivery admissions from 1999-2008 using appropriate International Classification of Diseases, 9th revision-Clinical Modification (ICD-9 CM) codes. ICU utilization was directly recorded in the database. Indication for ICU admission was determined using ICD-9 CM codes. Outcomes for obstetric-related ICU admissions were compared with those of non-obstetric ICU admissions to women aged 15-44 years. Categorical variables were compared using chi-square analysis and trends were assessed using logistic regression.

Results: We identified 2,909 ICU admissions from 741,920 admissions for antepartum, delivery, or postpartum conditions (rate of ICU admission was 444.5 per 100,000 deliveries and 392.1 per 100,000 obstetric-related admissions). Leading indications for ICU admission included hypertensive diseases (101.5 ICU admissions per 100k obstetric-related admissions), postpartum hemorrhage (50.1 per 100k), trauma (48.7 per 100k), heart failure (46.0 per 100k), infectious pneumonia (35.2 per 100k), antepartum hemorrhage (31.8 per 100k), sepsis (25.4 per 100k), cerebrovascular accident (24.6 per 100k), pulmonary embolism (14.8 per 100k), aspiration pneumonia (10.5 per 100k), and status asthmaticus (8.0 per 100k). We assessed for trend in each of these indications and found rising rates of hypertensive disease (93.6 per 100k in 1999-2000 to 131.9 in 2007-2008, $p<0.001$), heart failure (39.2 to 66.6, $p<0.001$), and sepsis (20 to 45.4, $p<0.001$). The overall rate of pregnancy-related ICU admission and the rates for other indications remained relatively stable. Compared with non-ICU pregnancy-related admissions, ICU patients were more likely to be African-American (46.7% vs. 32.4%, $p<0.001$), <20 years old (21.3% vs. 9.9%, $p<0.001$) and >39 years old (5.7% vs. 3.2%, $p<0.001$).

Pregnancy-related ICU admissions accounted for 5.8% of all ICU admissions for women age 15-44 years old. Pregnancy-related ICU admissions had a lower rate of in-hospital mortality (1.7% vs. 4.4%, $p<0.001$).

Conclusion: Between 1999 and 2008, approximately 4.5 per 1,000 deliveries in Maryland were complicated by ICU admission. Episodes of intensive care increased for hypertensive disorders of pregnancy, heart failure, and sepsis.

Reference
[1] Hogan MC et al. Lancet. 2010 May 8;375(9726):1609-23.

Abstract # 84

Efficacy of Combined Spinal-Epidural Labor Analgesia in Women with Prior Discectomy Surgery

Abstract Type: Original Research
Poster Type: Oral or Poster
Nirav K. Shah, B.A., B.S., M.D.; Jeanette R. Bauchat, M.D.; Amy I. Lee, M.D.; Robert J. McCarthy, Ph.D.; Tyler Koski, M.D.; Cynthia A. Wong, M.D.
Northwestern University Feinberg School of Medicine

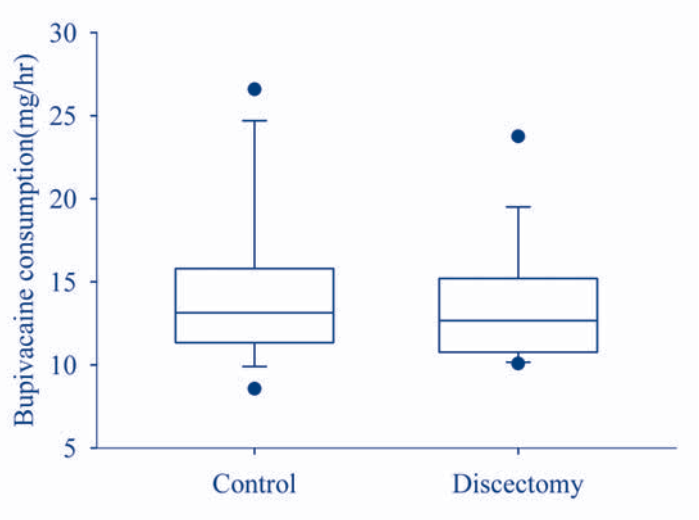
Introduction: Discectomies are the most common neurosurgical procedure; symptoms related to acute herniated nucleus pulposus resolve faster with surgery than conservative therapy.1 Data suggest that neuraxial analgesia in patients with prior back surgery have failure rates ranging from 8.2-50%. 2,3,4 This prospective observational case-matched study compares local anesthetic consumption as a marker of analgesic efficacy in parturients who had discectomy surgery with a cohort control.

Methods: Informed consent was obtained for this IRB-approved study. All parturients who had a discectomy (DISC) requesting neuraxial analgesia qualified. The control group (CONT) was case-matched for anesthesia provider and was recruited shortly after combined spinal-epidural (CSE) placement in the DISC group. 84 women were needed to detect a 2.2 mg/h difference in bupivacaine usage. All women received CSE analgesia followed by PCEA (spinal: bupivacaine 2.5 mg + fentanyl 15 µg; epidural: basal infusion 15 mL/h bupivacaine 0.625%+ fentanyl 2 µg/mL, demand 5mL q10 min prn). For breakthrough pain, 15 mL bupivacaine 0.125% was administered, followed by increasing the bupivacaine infusion concentration to 0.11%. Secondary outcomes included number of interspaces attempted, need to increase infusion concentration, epidural replacement and analgesic failures. Groups were compared using $\chi 2$ or Mann-Whitney U tests. $P < 0.05$ was significant.

Results: There were no analgesic failures in DISC (N=44) or CONT (N=48). There was no difference in bupivacaine consumption between DISC (12.7 mg/h) and CONT (13.1 mg/h)(Figure). Gravidity, parity, BMI, time to delivery, mode of delivery and infant wt were not different. Women were older in DISC (34 y (IQR 31-38)) vs CONT (31 y (IQR 28-34)) (P=0.003). There were no differences in interspaces attempted, epidural replacements or number of women requiring an increase in epidural infusion concentration (DISC (20.5%) vs CONT (25.5%)).

Conclusion: Consistent with the population at risk for disc herniation, women in DISC were older than CONT. We found no difference in bupivacaine consumption per hour between DISC and CONT suggesting that CSE provides labor analgesia as effective in women with prior history of discectomy as without prior back surgery.

1 Chou R et al. Spine 2009; 34:1094–1109.
2Smith PS et al. IJOA 2002; 212:17-22.
3Villevieille T et al. Ann Fr Anesth Reanim 2003; 22:91-5.
4Sharrock NE et al. Br J Anaesth 1990; 65:237-39.



Abstract # 85

Carbetocin at Elective Cesarean Delivery: A Dose-Finding Study

Abstract Type: Original Research
Poster Type: Oral or Poster
Daniel Cordovani, M.D.; Dan Farine, M.D.; Mrinalini Balki, M.D.; Gareth Seaward, M.D., M.Sc.; Jose CA Carvalho, M.D., Ph.D.
Mount Sinai Hospital, University of Toronto

Introduction: Carbetocin is a synthetic oxytocin analogue that binds to oxytocin receptors with higher affinity. It lasts 4-7 times longer than oxytocin, with a similar side effect profile and greater apparent efficacy (1). Its onset time and duration after IV injection are 2 and 60 minutes respectively (1, 2). The Society of Obstetricians and Gynecologists of Canada (SOGC) recommends a single IV bolus dose of carbetocin 100 μg at elective cesarean delivery (CD) in lieu of oxytocin regimens (3).However, there is no published data on how this dose was determined. The goal of this study is to determine the minimum dose of carbetocin required to produce appropriate uterine contractility in 95% of women undergoing elective CD.

Methods: With REB approval and informed consent, we conducted a double blind, randomized, dose-finding study. We recruited patients at low risk for PPH undergoing elective CD under spinal anesthesia. Patients were allocated to receive a bolus of 80, 90, 100, 110 or 120 μg of carbetocin upon delivery. The efficacy of the uterine contraction was evaluated by the obstetrician. If unsatisfactory, oxytocin infusion was initiated and additional uterotonics were administered as necessary. The primary outcome was satisfactory uterine contraction at two minutes after delivery. Secondary outcomes included the use of additional uterotonics within the first two hours, the estimated blood loss based on hematocrit variation, and side effects.

Results: Twenty-eight patients out of the planned 80 have been recruited from November 17, 2010 to January 14, 2011. Overall 24 (85.7%) of the patients have presented satisfactory uterine contraction within two minutes of carbetocin administration. However, only 2 (7.1%) required additional oxytocin infusion within the first two hours. The average estimated blood loss was 499.1 ± 419.9 ml. The incidence of side effects is presented in the table.

Discussion: The response to carbetocin was as expected for the dose range used and the ED95 will be calculated at the end of recruitment. Side effects were similar to those observed with oxytocin, however the incidence of flushing seems lower. Blood loss was comparable to previous data.

References: 1) Eur J Obstet Gynecol Reprod Biol 2009;147:15-20; 2) Cochrane Database of Systematic Reviews 2007;(3):CD005457; 3) J Obstet Gynecol Can 2009; 31:980-93.

Side effects	After carbetocin administration n (%)
Hypotension	14 (50.0)
Flushing	9 (32.1)
Nausea	8 (28.6)
Tachycardia	3 (10.7)
Hypertension	2 (7.1)
Vomiting	1 (3.6)
Chest pain	1 (3.6)

Oral Presentation Session #1

Abstract # 86

Effect of OPRM1 and COMT Genotypes on Response to Intravenous Followed by Intrathecal Fentanyl During Labor Analgesia

Abstract Type: Original Research
Poster Type: Oral or Poster

Ruth Landau[1]; Clemens Ortner, M.D.[1]; Shih Kai Liu, M.D.[1]; Jean-Louis Blouin, Ph.D.[2]; Scott Harder, M.D.[3]; Brendan Carvalho, M.D.[3]
University of Washington[1]; University of Geneva[2]; Stanford University School of Medicine[3]

Introduction: The analgesic response to intrathecal (IT) fentanyl during labor is affected by polymorphisms of the μ-opioid receptor gene (OPRM1) (1). The combined effect of A118G polymorphism of OPRM1 and that of Val158Met of COMT gene on labor analgesia has not been examined. We evaluated the response to intravenous (IV) and IT fentanyl according to OPRM1 and COMT genotypes in women requesting early labor analgesia.

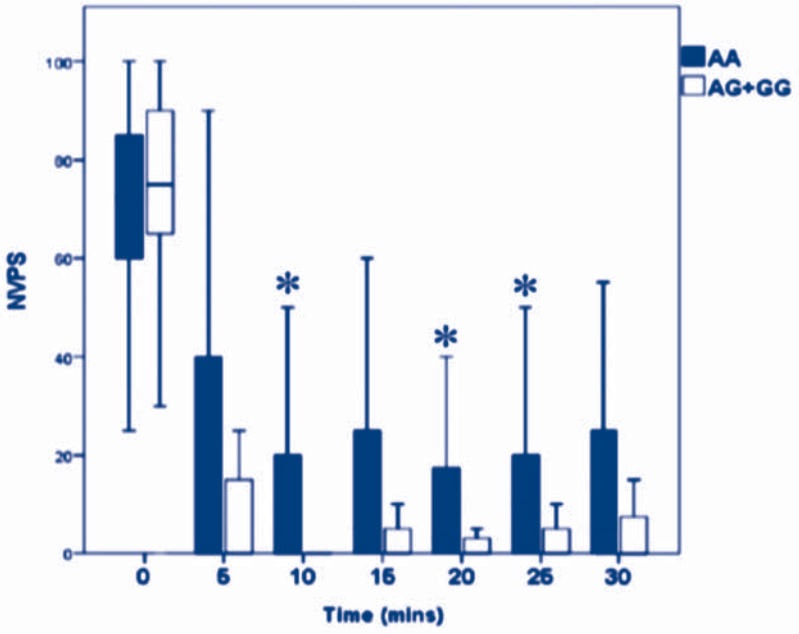
Methods: Labor analgesia was initiated with IV fentanyl 1.5mcg/kg. Primary outcome was 'IV analgesic success' determined 15 min after IV dose and was defined by NVPS ≤10/100. Women requesting additional analgesia after receiving IV fentanyl were offered a CSE with 20mcg IT fentanyl. Secondary analgesic outcome was 'IT analgesic success' defined as NVPS ≤10/100 at 30 and 60 min post-IT fentanyl. Analgesic and side-effect outcomes were compared according to OPRM1 and COMT genotypes.

Results: 106 women were enrolled and received IV fentanyl. IV analgesic success rate was 20%. Homozygosity for Met158 of COMT (MM, N=34) predicted a lower IV analgesic success (9% vs 25%; OR 3.54, 95% CI 0.9-13.1). Overall, OPRM1 genotype did not influence IV fentanyl response, although it failed to provide successful analgesia in all G118 homozygotes (n=5). IT analgesic success rate was not significantly affected by OPRM1 or COMT genotypes in the 73 women that went on to receive a CSE. However, the IT fentanyl analgesic effect was inferior in women A118 homozygous for OPRM1 (AA, N=59) with significantly higher pain scores at 10, 20 and 25 min post-IT dose (Figure). Lower maternal age, prior IV analgesic success and 'MM not AA' predicted a lower pain score after IT-dose (R2=0.017; p=006).

Discussion: OPRM1 and COMT genotypes appear to influence the effect of labor analgesia with IV and IT fentanyl. The allelic combination with the weakest response to IV fentanyl was AAMM (18% of women in this cohort). Our findings that IT analgesia was superior in women with the G118 allele of OPRM1 supports previous work. In addition this study demonstrates for the first time that the response to IT fentanyl is best in women 'MM not AA' (14% of women in this cohort). Further studies in larger cohorts are needed to confirm these Results that have potentially useful clinical implications, such as not offering IV fentanyl in early labor to women who will most likely not benefit from it.

1. Pain, 2008 139:5-14

Figure. NVPS after IT fentanyl according to *OPRM1* genotype



Box-plots of number represent NPVS at each measuring points after starting IT fentanyl administration. Median presented as solid line, with box representing 25th and 75th and whiskers representing lower of minimum value and greater of maximum value.
* $p < 0.05$.

NVPS: numerical verbal pain score (0=no pain, 100=worse pain imaginable)
OPRM1: A118G polymorphism (A=A118; G=G118)

Oral Presentation Session #1

Abstract # 87

Improving Pain Relief for Those Who Need It Most After Cesarean Delivery

Abstract Type: Original Research
Poster Type: Oral or Poster
Robert N. Fish, M.D.; Peter H. Pan, M.D.; James C. Eisenach, M.D., Ph.D.; Lynnette C. Harris, B.S.N.
Wake Forest University

Background: Severity of acute pain following delivery predicts pain and depression at 2 months postpartum.(1) We previously developed a 3-question pre-op survey to predict patients with post cesarean(C/S) pain in the top 20th percentile.(2) This double-blind randomized control trial tests whether a multimodal analgesic given to patients determined to be at risk for having high post-op pain will reduce pain in the hospital as well as persistent pain and depression at 2 months.

Methods: After IRB approval and informed consent, 60 women undergoing elective C/S, predicted by the 3-question pre-op survey to be in the top 20th percentile for post-op pain are randomized to receive either 150µg intrathecal(IT) morphine and oral placebo every 6 hrs for 24 hrs(control group), or 300µg IT morphine and 1g oral acetaminophen every 6 hrs for 24 hrs(study group). All patients receive spinal anesthesia with 12mg hyperbaric bupivacaine and 15-20µg of fentanyl, oral ibuprofen 800mg every 6 hrs, and IV PCA morphine. Edinburg and CES-D depression scales are assessed pre-op and at 2 months postpartum. Primary outcomes are VAS pain scores with movement at 24 hrs and secondary outcomes are pain and depression at 2 months postpartum. A group size of 60 is needed to show a 33% reduction in VAS of pain with movement between groups(power=0.8 and α=0.05). Unpaired t-tests and Chi-squares are used as appropriate. P<0.05 is considered significant.

Results: To date, 39 of 60 patients have been enrolled(21 study group, 16 control group, 2 excluded for protocol violation). Demographics, pre-op predictive scores, side effects, and 24 hr PCA morphine use were similar between groups. VAS pain scores at rest, with movement, and average pain over the first 24 hrs were all significantly lower in the study group (Table 1, P<0.05). 2 month persistent pain and depression data are being collected with Results forthcoming.

Conclusion: This study represents the first time a simple pre-op test has been used to adjust dosing for C/S. The preliminary data suggests higher than standard doses and additional analgesics reduce acute pain in patients at risk for severe pain after C/S. If forthcoming 2 month data shows a significant reduction in pain and depression, such an approach would not only improve acute pain, but also important long term health outcomes representing significant public health burdens.

1 Eisenach et al. Pain 2008;140:87-94
2 Pan et al. Anesthesiology 2006;104:417–25

Visual Analog Pain Score (VAS) (0-100 mm)	150ug PF-Morphine + Placebo (Control Group - N = 16)	300ug PF Morphine + Acetaminophen (Study Group - N = 21)	*P- value
Resting at 24hr			
Average ± SD	23.4 ± 20.8	9.0 ± 15.9	0.02
Range	0 – 61	0 – 58	
Median	26	4.0	
Mode	0	0	
Movement at 24hr			
Average ± SD	50.6 ± 22.9	30.5 ± 18.4	0.01
Range	8 – 86	0 – 63	
Median	59.5	27	
Mode	32	0	
Average 24hrs			
Average ± SD	42.0 ± 18.5	22.4 ± 15.2	0.001
Range	9 – 72	0 – 67	
Median	46	23	
Mode	32	23	
Worst in 24hrs			
Average ± SD	65.1 ± 24.4	55.7 ± 20.7	NS
Range	10 – 100	17 – 80	
Median	70	64	
Mode	63	73	
Side Effects			
% of Pruritus & Required treatment	44%	62%	NS
% Nausea or Vomit & Required treatment	44%	48%	NS

Table 1. Visual Analog Pain Score Assessment and Side Effects for the First 24 Hours after Cesarean Delivery. (*Unpaired t-tested and Chi-squares used for comparing VAS pain scores and side effects between groups, respectively. P<0.05 considered significant.)

Oral Presentation Session #1

Abstract # 88

Marked Decrease in Compliance in Myometrium of SmAV-hypomorph Mouse

Abstract Type: Original Research
Poster Type: Oral or Poster
Yunping Li, M.D.[1]; Maya Reznichenko[1]; Elizabeth J. Luna, Ph.D.[2]; Kathleen G. Morgan, Ph.D.[3]
Beth Israel Deaconess Medical Center, Harvard Medical School[1]; University of Massachusetts Medical School[2]; Sargent College Boston University[3]

No organ in the human body is as compliant as the pregnant uterus. Similar to other types of smooth muscles, stretching the uterine smooth muscle (USM) triggers a myogenic contraction.1-3 Few studies have been performed to understand how USM can accommodate the stretch from fetal growth without causing premature contraction (i.e. mechanoadaptation). Smooth muscle archvillin (SmAV) is a newly identified regulator of the ERK pathway,4 that was implicated as an adaptor protein in uterine focal adhesion (FA) signaling.2 We hypothesize that SmAV regulates mechanoadaptation and USM compliance via FA signaling.

SmAV-hypomorph mice were obtained from EJ Luna, UMass Medical School. They have impaired reproduction with smaller litter sizes and far fewer second and third offspring litters (Personal communication, Elizabeth Luna). By using non-pregnant USM from SmAV-hypomorph mice and Bl/6 wild-type mice from which they were derived, we demonstrate that USM of SmAV-hypomorph mice is significantly more stiff (less compliant) than control USM when stretched to 2x slack length in the organ bath. Treatment with 10μM of the Src inhibitor PP2 significantly increases the compliance of USM of wild type mice, but not of SmAV-hypomorph mice. To investigate the relationship between SmAV and USM compliance, screening by anti-phosphotyrosine immunoblotting reveals a significant increase in the densitometry of tyrosine phosphorylated bands at 130kD and 125kD in response to stretch in USM from Bl/6 mice, but not from SmAV-hypomorph mice. PP2 prevents stretch-induced tyrosine phosphorylation. The 130kD and 125kD bands were identified as Cas (a scaffolding protein) and focal adhesion kinase (FAK) by Western blotting with protein-specific antibodies. However, by using a phospho-Y165 Cas antibody, we demonstrate that stretch is able to induce a significant increase in Cas pY-165 phosphorylation both in USM from Bl/6 and SmAV-hypomorph mice. Pretreatment with PP2 markedly suppresses the stretch-induced increase in Cas tyrosine phosphorylation. Significant stretch-induced and Src-dependent phosphorylation of FAK pY-925, a site involved in downstream ERK signaling, but not FAK 397 is observed in USM of wild-type Bl/6 mice. The USM of SmAV-hypomorph mice, in contrast, fails to show stretch-induced FAK tyrosine phosphorylation at either site, consistent with a role for SmAV in the regulation of FA signaling.

Here, we demonstrate that SmAV and Src regulate USM compliance and FA signal transduction in response to stretch. An incomplete understanding of the mechanism of USM mechanoadaptation during pregnancy has hindered the development of effective treatments for preterm labor. Targeting Src kinase and USM compliance may render a novel approach for the development of drugs to prevent preterm labor.

1. Li Y, et al. J Cell Biochem 2007;100:129-40.
2. Li Y, et al. PLoS One 2009;4:e7489.
3. Kasai Y, et al. J Physiol 1995;486:373-84.
4. Gangopadhyay SS, et al. J Biol Chem 2009

The Cesarean Epidemic: Etiologies, Outcomes and Potential Solutions

Aaron B. Caughey, M.D., Ph.D.

Objective: Upon completion of this presentation, participants will be able to assess the current state of the cesarean rate in the U.S. and related morbidity and mortality, discuss etiologies for the rise in cesareans, and be able to incorporate approaches to reduce the cesarean rates in their own health systems.

Summary: The rate of cesarean delivery has risen more than 50% over the past fifteen years up to 33% in 2009. Cesarean deliveries are associated with maternal morbidity and mortality, in particular: wound infections, postpartum hemorrhage, surgical injuries to bowel, bladder, and other organs, endomyometritis, VTEs. In subsequent pregnancies, more than 90% of women with a prior cesarean will have a recurrent cesarean. These pregnancies are also at increased risk for stillbirth, uterine rupture (particularly during labor), being more challenging surgically, and abnormal placentation. On this last front, placenta previa and accreta are both increased with increasing number of prior cesareans.

The increased rate likely has multifactorial causes including changing maternal demographics, changing maternal and clinician preferences, and the medical-legal and practice climates that clinicians are practicing within. Maternal characteristics such as obesity and increased maternal age are occurring at increased rates. However, we see that cesareans are increasing in each strata of these risk groups. While maternal preferences towards cesarean delivery has received a lot of attention in the press, estimates of its occurrence are difficult to obtain and it seems unlikely that it is having a systematic effect across the country. Physician preferences, however, may be influenced by the climate in which they practice. The hostile medical-legal climate is likely leading to increased rates of cesareans. The pressure on busy providers from a time perspective may lead to impatience with labor that is outside of the norms established 50 years ago which do not likely apply any longer.

The cesarean delivery rate was quite high in the late 1980s, but we actually decreased the rates nationally through 1995, thus we should be able to do it again. Simple techniques for lowering the rates of cesarean deliveries include:

- Trial of labor after cesarean
- External cephalic version of breech fetuses
- Manual rotation of OP/OT fetuses
- The use of operative vaginal delivery: forceps and vacuums
- Patience in the first stage of labor
- Patience in the second stage of labor
- Changing the climate/culture of labor and delivery units

Key Points:

1. Cesarean deliveries are associated with morbidity and mortality
2. The rise in cesarean deliveries is due to both biologic reasons such as the changes in rates of obesity, but also cultural reasons such as physician work schedule and rates of malpractice cases.
3. We can lower the rate of cesarean delivery.

Key References:

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3. Silver RM, Landon MB, Rouse DJ. Maternal Morbidity Associated With Multiple Repeat Cesarean Deliveries. Obstet Gynecol 2006;107:1226–32
4. Solheim K, Esakoff TF, Little SE, Cheng YW, Sparks TN, Caughey AB. The effect of current cesarean delivery rates on the future incidence of placenta previa, placenta accreta, and maternal mortality. In Press, J Matern Fetal Neonatal Med. 2011
5. Rouse DJ, Owen J, Savage KG, Hauth JC. Active phase arrest: Revisiting the 2 hour minimum. Obstet Gynecol 2001;98:550-4.
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10. Yang YT, Mello MM, Subramanian SV, Studdert DM. Relationship between malpractice litigation pressure and rates of cesarean section and vaginal birth after cesarean section. Med Care. 2009;47:234-42.

Fred Hehre Lecture

The Blunt End of the Needle

William Camann, M.D.

Objectives: To explore the importance of, and challenges associated with, various modes of communication as they apply to the activities of the obstetric anesthesiologist.

Consider: "Every needle has a sharp end that goes into the patient and a blunt end that is attached to a health care provider. Anyone who thinks that all of the action occurs at the sharp end does not understand human behavior."

Summary: In delivering the 2006 Hehre Lecture at SOAP, David Chestnut said, "Good relationships with the nurses and staff are critically important. I have observed that recurrent conflict between an anesthesiology resident and a labor and delivery nurse is a predictor of future trouble. For that reason, I never tried to hire one of my residents who could not learn to get along with the labor and delivery nurses." This quote is not meant to speak poorly of either anesthesia residents or labor and delivery nurses, but rather to highlight that the L&D environment is an emotionally charged, professionally challenging environment for a variety of reasons. Some do better in that environment than others. This lecture will highlight a variety of scenarios where communication skills are challenged. L&D is a very different environment than the regular operating room setting, as our patients are virtually always wide awake, alert, not under the effects of sedatives or hypnotics, and are in the midst of an intimate life-changing event. Our obstetric patients know their health-care providers, they remember us, they are very aware of what we say to and around them. Many of the situations we encounter are influenced by personal, cultural, religious, consumer-directed, or other non-medical overtones. Consequently, the interpersonal skills of an obstetric anesthesiologist are challenged in ways not often encountered in other areas of anesthesia practice.

The following situations will be discussed in greater detail in the lecture:

1. Body language and greetings: Should physicians introduce themselves by first name (Hello, I'm Bill Camann, your anesthesiologist), or by Dr. Last-Name (Hello, I'm Dr. Camann, your anesthesiologist)? What do patients prefer? Does it matter? Should we sit down or stand up when talking to patients? Does it matter? The answers may surprise you!
2. How do the words we use influence patient's perception of painful procedures? Should we explain such procedures using harsh, explicit, pain-descriptive words, or by using more gentle reassuring, relaxing words? For example, even with simple procedures such as a skin wheal prior to an IV or regional anesthesia placement, should we say things like "This is like a big bee sting, it is the worst part of the procedure, it will burn and sting!" or should we say "This is a small pinch that will make you numb and comfortable"? The evidence for either approach will be presented, along with a discussion of the nocebo/placebo phenomenon.
3. It is not uncommon that physicians find themselves in the legal setting. The words used during testimony at trial are critical in convincing a jury to prevail in your favor. In 1982, Paul Newman starred in a movie that many claim is the finest acting performance of his career. "The Verdict" was nominated for many academy awards, including Best Picture, Best Actor, Best Director, Best Supporting Actor, and Best Screenplay. The movie is based on a real obstetric anesthesia malpractice case that occurred in Boston in the 1970's. A slick, high-powered law firm represents the anesthesiologist and prepares him for his testimony at trial. Several powerful scenes from this movie, indicating the preparation and importance of very particular words, will be shown.
4. Cultural influences in childbirth are common. The understanding of the importance of various cultural practices in the obstetric environment are critical for the successful obstetric anesthesiologist working with a diverse patient population. Some examples will be discussed.
5. Not every woman needs or wants pharmacologic pain relief for labor and birth. Various natural childbirth techniques are often encountered on the L&D unit. For example, hypnobirthing has become a common practice for those seeking to achieve an unmedicated childbirth. Many hypnobirthing classes emphasize the importance of using appropriately calm and reassuring words, such as "surge" rather than "contraction", "release" rather than "rupture", "breathing down" rather than "pushing", "blossoming" rather than "dilation", and others. The obstetric anesthesiologist must understand these techniques, and be comfortable and supportive practicing in a setting where the use of complementary and alternative methods is common. Many of the commonly used natural childbirth techniques, such hypnobirthing, or the employment of a doula, are entirely compatible with the concomitant use of epidural analgesia. Some examples will be discussed.
6. We have all heard of natural childbirth. Is there such a thing as the "natural cesarean"? With a cesarean delivery rate of approximately 30-40% or higher in many developed countries, some have advocated for efforts to make this experience a more natural, patient and family friendly experience. Examples will be discussed.

Key References:

1. Chestnut DH. Lessons Learned from Obstetric Anesthesia. The 2006 Fred Hehre Lecture. Int J Obstet Anesth 2008;17:137-145
2. Makoul G, Zick A, Green M. An Evidence-Based Perspective on Greetings in Medical Encounters. Arch Int Med 2007;167:1172-1176
3. Sitting Down on the Job. http://www.kumed.com/default.aspx?id=5350
4. Lang EV, Hatsipopoulou O, Koch T, et. al. Can words hurt? Patient-Provider interactions during invasive procedures. Pain 2005;114:303-309
5. Nguyen T, Slater P, Cyna AM. Open vs. specific questioning during anaesthetic followup after caesarean section. Anaesthesia 2009;64:156-160
6. Wang F, Shen X, Xu S, et. al., Negative words on surgical wards result in therapeutic failure of patient-controlled analgesia and further release of cortisol after abdominal surgeries. Minerva Anestesiologica 2008:74:353-65
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8. Varelmann D, Pancaro C, Cappiello EC, Camann WR. Nocebo-induced hyperalgesia during local anesthetic injection. Anesth Analg 2010; 110: 868-70
9. Leighton B. Why obstetric anesthesiologists get sued. Anesthesiology 2009; 110: 8-9
10. O'Sullivan G, Liu B, Hart D, et.al., Effect of food intake on obstetric outcome: A randomized controlled trial. Br Med J. 2009; 338: 784-6
11. Mitka M. Experts, Organization debate whether women in labor can safely eat and drink. J Am Med Assoc 2010;303:927-928.
12. De Souza DG, Doar LH, Mehta SH. Aspiration prophylaxis and rapid sequence induction for elective cesarean delivery: Time to reassess an old dogma? Anesth Analg 2010;110:1503-5
13. Arendt KA, Zhou J, Segal S, Camann W. Childbirth time selection based on

religious belief. Anesth Analg 2008;107:2096-7

14. Smith J, Plaat F, Fisk NM. The natural cesarean: A woman-centred technique. Br J Obstet Gynecol 2008;115:1037-42

15. Erlandsson K, Dsilna A, Fagerberg I, Christensson K. Skin-to-skin care with the father after cesarean birth and its effect on newborn crying and feeding behavior. Birth 2007;34:105-14.

Educational Session Materials

Saturday, April 16, 2011

Opportunities for Questions and Answers will be provided at the conclusion of each presentation.

Medinas Foyer	7:00 a.m. - 5:00 p.m.	Registration
South Hall	7:00 a.m. - 8:30 a.m.	Fellows Breakfast with the SOAP Board *(by invitation only)* Robert D'Angelo, M.D.
Casablanca H	7:00 a.m. - 8:30 a.m.	PBLD: Breakfast with the Experts Moderators: Ashutosh Wali, M.D., FFARCSI; David Campbell, M.D.
Baraka Room	7:30 a.m. – 8:30 a.m.	Hosted Continental Breakfast and Poster Viewing
Casablanca ABCDE North	8:30 a.m. - 10:00 a.m.	Best Paper Presentations (6 abstracts) Moderator: Barbara Scavone, M.D. Judges: Brendan Carvalho, M.D., B.Ch.; Paul R. Howell, F.R.C.A.; Jill M. Mhyre, M.D.; Linda S. Polley, M.D.; Barbara M. Scavone, M.D.; Ashutosh Wali, M.D.
Baraka Room	10:00 a.m. - 10:40 a.m.	Coffee Break and Poster Viewing
	10:30 a.m. - 3:30 p.m.	(Spouse/Guest) Tour #3 - Red Rock Canyon and Spurs Mountain Ranch Tour ($65 Fee)
Casablanca ABCDE North	10:40 a.m. - 11:40 a.m.	Debate: Urgent Cesarean Delivery for Failure to Progress in Labor: Patchy Block with Epidural – Plan is to Administer a Spinal Moderator: Joy Hawkins, M.D. *Pro: Barbara Leighton, M.D.* *Con: Brendan Carvalho, M.D.*
Casablanca ABCDE North	11:40 a.m. - 12:40 p.m.	Gerard W. Ostheimer Lecture - What's New in Obstetric Anesthesia? Paloma Toledo, M.D. Introduction: Jill Mhyre, M.D.
La Menzah Lawn, Baraka Room	12:45 p.m. - 1:45 p.m.	Hosted Lunch, Poster Viewing
Casablanca ABCDE North	1:45 p.m. - 3:15 p.m.	Oral Presentations Session #2 (6 Abstracts) Moderator: Dennis Shay, M.D.
Baraka Room	3:15 p.m. - 3:45 p.m.	Coffee Break and Poster Viewing
Casablanca ABCDE North	3:45 p.m. - 5:00 p.m.	Poster Review Session #2 Alexander Butwick, M.B., B.S., FRCA
Casablanca DE North	7:00 p.m. - 10:00 p.m.	SOAP 43rd Anniversary Celebratory Dinner with Awards Ceremony Onsite at Loews Lake Las Vegas Resort

Best Paper Presentations

Abstract # 140

Early Gestational Exposure to Isoflurane Results in Granule Cell Loss in the Dentate Gyrus in Adulthood

Abstract Type: Original Research
Poster Type: Oral or Poster
Arvind Palanisamy, M.B.B.S., M.D., F.R.C.A.[1]; Deirdre M. McCarthy, B.S.[2]; Pradeep G. Bhide, Ph.D.[2]; Gregory Crosby, M.D.[1]; Deborah J. Culley, M.D.
Brigham and Women's Hospital/ Harvard Medical School[1]; Massachusetts General Hospital/Harvard Medical School[2]

Introduction: Commonly used general anesthetic agents have adverse effects on neurodevelopment in rodents and primates. Vulnerability is high during synaptogenesis, with anesthetic exposure leading to neuronal loss and behavioral deficits in adulthood.(1) Whether the brain is similarly vulnerable during earlier stages of neurodevelopment is unclear and could be important because approximately 0.5-1.0% of pregnant women receive general anesthesia for non-obstetric surgeries and fetal surgical interventions. In this regard, we have demonstrated that 4 h of maternal anesthesia with isoflurane during early gestation leads to a deficit in spatial memory of male offspring in adulthood.(2) Because spatial memory is mediated by the hippocampus, we performed this study to test the hypothesis that early gestational exposure to isoflurane causes cell loss in the hippocampus.

Methods: Timed, pregnant Sprague-Dawley rats were assigned randomly to 4 h of general anesthesia with 1.4% isoflurane in 100% oxygen or 100 % oxygen alone on gestational day 14, which corresponds to the 2nd trimester in humans. The dams were recovered and monitored until delivery on day 22. Following delivery, the female pups were culled and the male pups were allowed to grow to adulthood. At 4 months of age, adult male rats (N = 10 and 13, control and isoflurane groups, respectively) were sacrificed for quantitative histology of hippocampal subregions. Sections were stained with cresyl violet and the total number of cells in the granular layer of the dentate gyrus and the pyramidal cell layer in the CA1 region were determined by a blinded observer using stereology and the optical fractionator method. Data were analyzed using two-way ANOVA with Bonferroni's correction; $P < 0.05$ was accorded statistical significance.

Results: Isoflurane anesthesia was physiologically well tolerated by the dams. There were no differences in the birth weight or litter size between the two groups. Stereological examination, however, revealed 9% fewer cells in the granular layer of the dentate gyrus of isoflurane-exposed adult rats compared to controls (545,914 ± 32,895 vs. 501,061 ± 42,434, respectively; Mean ± S.D, *P = 0.01). In contrast, there were no changes in the CA1 region.

Conclusions: Our results show that maternal isoflurane anesthesia in rodents causes region-specific cell loss in the hippocampus of adult male offspring. These changes may account for the behavioral deficits reported in animals exposed to isoflurane in utero and suggest that the developing brain may be vulnerable to isoflurane neurotoxicity during the 2nd trimester.

References:
1. Jevtovic-Todorovic, V., et al. Early exposure to common anesthetic agents causes widespread neurodegeneration in the developing rat brain and persistent learning deficits. J Neurosci (2003).
2. Palanisamy, A., et al. Rats exposed to isoflurane in utero during early gestation are behaviorally abnormal as adults. Anesthesiology (In Press, 2011)

Abstract # 141

In-Vitro Contractions of Pregnant Rat Myometrium Pretreated with Oxytocin: Comparison of Various Combinations of Uterotonic Agents

Abstract Type: Original Research
Poster Type: Oral or Poster
Mrinalini Balki, M.B.B.S., M.D.; Magda Erik-Soussi, M.Sc.; John Kingdom, M.D.; Jose CA Carvalho, M.D., Ph.D.
Mount Sinai Hospital, University of Toronto

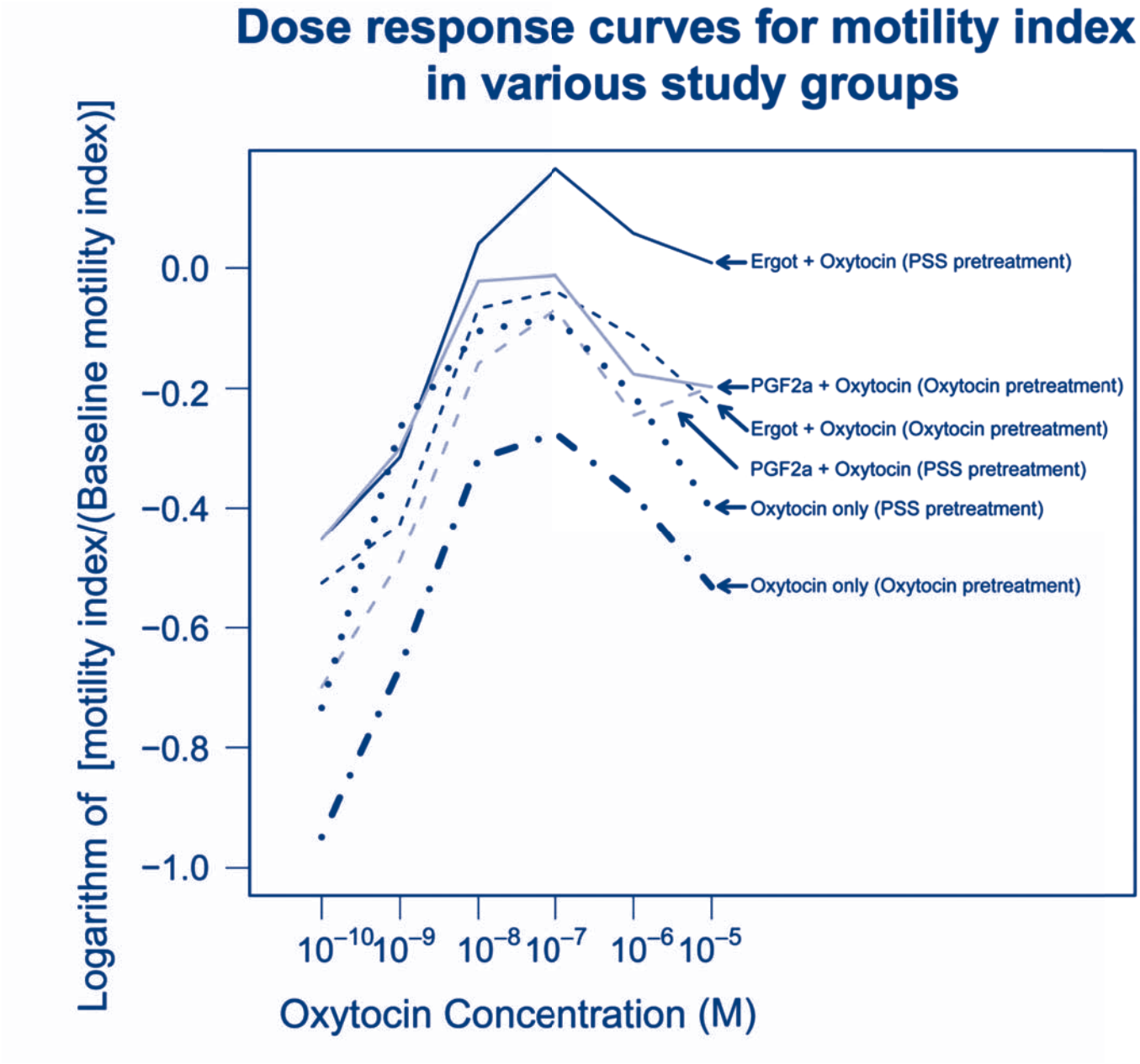
Introduction: Oxytocin receptors in both human and rat myometrial cells are desensitized by exposure to oxytocin, reducing the ability of cells to respond to subsequent administration of oxytocin. This desensitization phenomenon is confined to oxytocin, and does not affect the actions of ergonovine and prostaglandin (PG) F2α. Oxytocin is frequently used in association with ergonovine and carboprost in the clinical setting with inconsistent results. The objective of this study was to investigate the effects of the combination of oxytocin with either ergonovine or PGF2α in oxytocin pretreated rat uterus.

Methods: After approval by the Animal Care Committee, the study was conducted in 32 pregnant Wistar rats at 21-22 days of gestation. Four longitudinal myometrial strips were isolated from each animal and allowed to equilibrate in separate 10ml organ bath chambers containing physiological salt solution (PSS) at 1g tension. The myometrial strips were pre-treated with either oxytocin 10-8M (experimental group; n=59) or PSS (control group; n=51) for 1h, then subjected to a dose-response study with oxytocin (cumulative increase from 10-10 to 10-5M) alone or in the presence of a constant concentration (10-9, 10-7 or 10-5M) of either ergonovine or PGF2α. The amplitude, frequency and motility index (amp x freq) of contractions during the dose-response period were analyzed using mixed linear modeling and compared among the groups.

Results: The motility index of myometrial contractions during the dose-response period in comparison to baseline values for experimental and control groups are shown in Fig 1. Oxytocin pretreatment significantly suppressed the myometrial contractions when the strips were further subjected to oxytocin or its combination with either ergonovine or PGF2α. A combination of ergot-oxytocin without oxytocin pretreatment produced superior contractions as compared to all other groups, while oxytocin alone in oxytocin pretreated myometrial strips produced weakest contractions (p=0.05) (Fig 1).

Discussion: A combination of oxytocin with ergonovine produces superior contractions compared to oxytocin alone or in combination with PGF2α, especially when the myometrium is pretreated with oxytocin. Should these data be replicated in human myometrium, it will have important clinical implications in the management of postpartum hemorrhage.

References: Am J Obstet Gynecol 2003; 188: 497-502; Reprod Sci 2009; 16: 501-8; Reprod Sci 2010; 17: 269-77.



Best Paper Presentations

Abstract # 142

A Randomized Trial Comparing the Labor Room vs. Operating Room for Perimortem Cesarean Delivery During Simulated Cardiac Arrest

Abstract Type: Original Research
Poster Type: Oral or Poster
Steve Lipman, M.D.[1]; Kay Daniels, M.D.[1]; Julie Arafeh, R.N., M.S.N.[1]; Andrea Puck, R.N.[2]; Sheila Cohen, M.B.Ch.B., F.R.C.A.[1]; Brendan Carvalho, M.B.B.Ch., F.R.C.A.[1]
Stanford University School of Medicine[1]; Lucile Packard Children's Hospital[2]

Introduction: In the event of cardiac arrest during pregnancy (gestation > 20 weeks), the American Heart Association recommends incision within 4 min and delivery within 5 min to improve maternal survival. The study objective was to compare the labor (LDR) and operating room (OR) settings for perimortem cesarean delivery (CD) during simulated maternal arrests.

Methods: 14 multidisciplinary teams comprised of 4 nurses, 2 obstetricians, and 1 anesthesiologist were randomized (n=7 per group) to deliver in the LDR or OR during perimortem cesarean drills. The scenario utilized a manikin with an abdominal model overlay that allowed for simulated CD and began in the LDR with maternal cardiopulmonary arrest and fetal bradycardia. The primary outcome was time to incision rather than delivery because the abdominal model was quite thin. Secondary outcomes included times to important milestones, percentage of tasks completed and type of incision. Appropriate statistical tests were utilized with P<0.05 considered significant.

Results: The median (IQR) time from time zero to incision was 4:25 (3:59-4:50) min:secs in the LDR group and 7:53 (7:18-8:57) min:secs in the OR group (P=0.004). 57% of LDR teams and 14% of OR teams were able to deliver within 5 min. Times to other important milestones are in the table. Time (mean ± SD) required for transport to the OR was 50 ± 13 secs. A vertical incision was used in 86% of LDR and 43% of OR cases (P=0.094).

Discussion: Perimortem CD in the LDR was significantly faster than in the OR. Delivery within 5 min was challenging in either location despite optimal conditions (teams were familiar with simulation, knew the scenario mandated CD and were aware of being timed; the manikin was light and easily moved; and timing only started when the nurse was completely prepared). Our findings suggest that perimortem CD during an actual maternal arrest would require greater than 5 min, and support performing perimortem CD in the LDR rather than relocating to the OR.

References:
Circulation 2005;112;150
Am J Obstet Gynecol 2005;192:1916
Circulation 2010;122;Part 12.3,S833-38

Table: Time to Attain Key Milestones

Milestone	Group Times (min:secs)		P Value
	LDR (n=7)	OR (n=7)	
NICU called	1:34 (0:58-1:56)	3:30 (1:53-4:42)	0.337
CPR initiated	1:05 (0:57-1:16)	1:07 (0:37-1:36)	0.798
AED placed	2:29 (2:10-2:36)	2:50 (2:31-4:17)	0.096
CPR resumed	3:01 (2:53-3:17)	4:20 (3:20-6:53)	0.030
Intubation complete	4:05 (3:22-4:18)	4:48 (4:19-5:54)	0.064
Delivery	4:26 (4:18-5:39)	8:11 (7:38-9:47)	0.006

Best Paper Presentations

Abstract # 143

Responding to the ASRA (American Society of Regional Anesthesia) Challenge – Should Gowning be the Standard of Practice for Epidural Anesthesia: A Randomized Control Trial

Abstract Type: Original Research
Poster Type: Oral or Poster
Naveed T. Siddiqui, M.D.; Zeev Friedman, M.D.; Allison McGeer, M.D, F.R.C.P.C.; Jose CA Carvalho, M.D., Ph.D., F.A.N.Z.C.A., F.R.C.P.C.; Sharon Davies, M.D., F.R.C.P.C.
Mount Sinai Hospital, University of Toronto

Introduction: Recent data suggest that the incidence of infectious complications secondary to neuraxial anesthesia is higher than previously thought (1, 2), and breaches in aseptic technique during the procedure may be an important contributing factor. The American Society of Regional Anesthesia has identified a lack of randomized controlled trials on the topic, particularly in respect to gowning for the procedure. We hypothesized that contamination of epidural equipment and colonization of the epidural catheter will be increased if sterile gowns are not worn.

Methods: After REB approval and informed consent, pregnant women in labor requesting analgesia were randomized to undergo epidural catheter insertion with the anesthesiologist either wearing a sterile gown or not wearing a sterile gown. All the other components of aseptic technique, such as hand washing and the antiseptic solution (2% chlorhexidine with 70% alcohol), were standardized. A total of 5 cultures were obtained in each case: 2 from the operator's forearms after completion of the hand wash (either from the bare forearm or from the gown), 1 from a sterile Agar plate placed in the working area, and 2 from the epidural catheter after the delivery (one at 10 cm from the skin and one at the distal tip). The outcomes were the growth of any microorganism and the identification of the same pathogen at all the cultured sites. The microbiologists handling the specimens were blinded to the group allocation.

Results: Two hundred and forty patients were randomized. Physicians who were gowned had a significantly lower number of positive cultures from the forearms (<0.001). However, there were no significant differences in culture rates from either the catheter or the work area (Table). The most common microorganism isolated in both groups was coagulase negative Staphylococcus, followed by the Bacillus species. In most cases, the microorganisms identified on the epidural tip were not the same as those on the operator's forearm.

Discussion: Our results suggest that although the wearing of gowns may decrease the bacterial colonization of the forearms, it does not affect the contamination of the working area or growth on the epidural catheters. Much attention should be paid to hand washing techniques that may include the use of antiseptic and alcohol-based solutions on hands and forearms, extending up to the elbows.

References: 1)Anesth Analg 2007;104: 965–74; 2) Br J Anaesth 2002;89: 778–82

Table. Number and percentage of positive culture in the studied groups

	No Gown (n=109)	Gown (n=108)	p-value
Right Forearm	21 (19.3)	2 (1.9)	<0.001
Left Forearm	21 (19.3)	1 (0.9)	<0.001
Either Forearm	31 (28.4)	3 (2.8)	<0.001
Working Area	21 (19.3)	12 (11.1)	0.130
Tip of catheter	10 (9.2)	14 (13.0)	0.396
Proximal from tip	17 (15.6)	20 (18.5)	0.593
Anywhere on catheter	22 (20.2)	26 (24.1)	0.517
Any location	56 (51.4)	38 (35.2)	0.020

Best Paper Presentations

Abstract # 144

Improving Obstetric and Neonatal Care in Ghana Using a Multidisciplinary Approach and Continuous Quality Improvement

Abstract Type: Original Research
Poster Type: Oral or Poster

Medge Owen, M.D. [1]; Adeyemi Olufolabi, M.D. [2]; Vernon Ross, M.D. [1]; Emmanuel Srofenyoh, M.D. [3]; Thomas Ivester, M.D.[4]; Cyril Engmann, M.D.[4]
Wake Forest University[1]; Duke University Medical Center[2]; Ridge Regional Hospital[3]; University of North Carolina[4]

Introduction: Maternal and newborn mortality remain high in Africa because disparity exists between best practices and existing healthcare. Institutions lack trained staff, evidence-based treatments, medication, equipment, blood products, prompt cesarean delivery, multidisciplinary care and systems improvement strategies (1). Maternal and infant mortality are basic health indicators that reflect the overall adequacy of a healthcare system. In 2007 Kybele and the Ghana Health Service partnered to reduce maternal and neonatal death at a large urban hospital through the development of a quality improvement model.

Methods: Systems and patient care processes were analyzed and a model was created integrating continuous assessment, implementation, advocacy and outcomes. Key interventions were grouped within personnel-based, systems-management based, and service-quality based bundles (Figure). Implementation was evaluated tri-annually using a color-coded grading system and outcome data was collected. Statistical analysis was performed with Chi-square or Fischer's Exact test as appropriate ($p<0.05$).

Results: There has been a decrease in maternal death related to pre-eclampsia and hemorrhage at Ridge Regional Hospital despite an increase in patient volume (Table). Case fatality rates for pre-eclampsia and hemorrhage decreased from 3.1 to 1.1% and 14.8 to 1.9%, respectively. Still births have also been reduced by 36% since beginning the program in 2007. The maternal mortality ratio decreased from 496 maternal deaths/100,000 live births in 2007 to 328/100,000 in 2009 (p=NS).

Year	Total deliveries	Maternal deaths	Pre-Eclampsia		Hemorrhage		Still births	Still births/1000
			#cases	deaths	#cases	deaths		
2007	6049	30	321	10	54	8	55	9.0
2008	7465	29	581	8	99	5	40*	5.4
2009	8230	27	994	11*	319	6*	48*	5.8

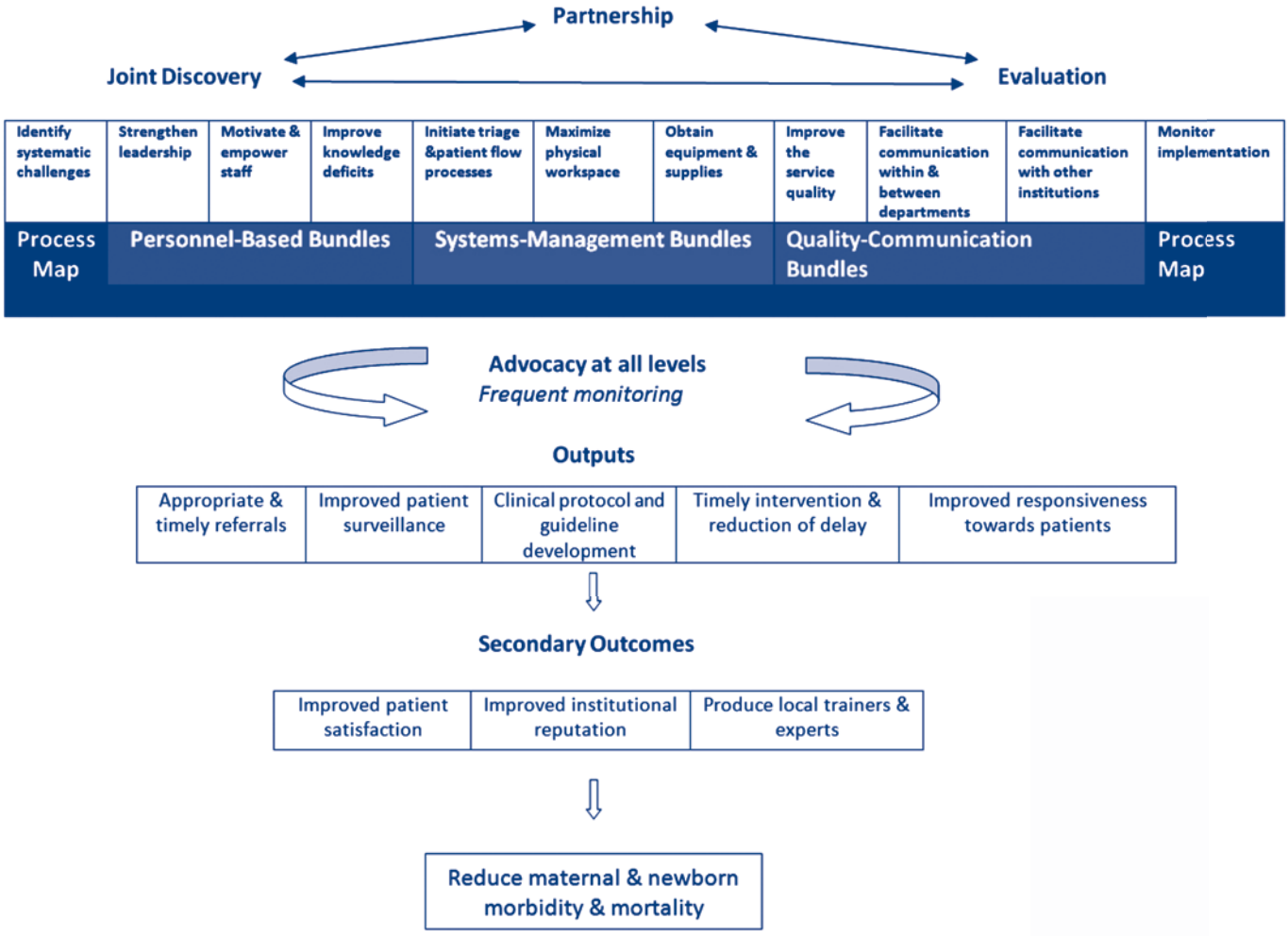


Table: Delivery and mortality trends at Ridge Regional Hospital in Accra, Ghana. *P < 0.05 for 2008 or 2009 compared to 2007.

Conclusion: Maternal and newborn mortality can be reduced in low-resource settings when appropriate models for continuous quality improvement are developed and employed.

Reference: 1) Soc. Sci. Med 1994; 38(8):1091-1110.

Acknowledgements: This work was supported by grants from the International Association for the Study of Pain (IASP) and the Lacy Foundation.

Abstract # 145

Peripartum Hysterectomy in the United States: Nationwide 14-Year Experience

Abstract Type: Original Research
Poster Type: Oral or Poster

Brian T. Bateman, M.D.[1]; Jill M Mhyre, M.D.[2]; William M. Callahan, M.D., M.P.H.[3]; Elena V. Kuklina, M.D., Ph.D.[3]
Massachusetts General Hospital[1]; University Of Michigan Health System[2]; Centers for Disease Control and Prevention[3]

Objective: Peripartum hysterectomy is associated with substantial maternal morbidity(1). The purpose of this study is to examine trends in the rate of peripartum hysterectomy in the United States (US) and the contribution of changes in maternal characteristics to these trends.

Methods: We performed a cross-sectional study of peripartum hysterectomy identified from hospitalizations for delivery recorded in the 1994-2007 Nationwide Inpatient Sample (NIS) of the Healthcare Cost and Utilization Project. The NIS is an administrative dataset that contains information regarding approximately 20% of all US hospitalizations. Logistic regression was used to examine trends and the contribution of changes in maternal and obstetric characteristics to these trends.

Results: The rate of peripartum hysterectomy increased by 15% from 1994-1995 to 2006-2007 (from 71.6 to 82.6 per 100,000 deliveries, p<.001). Rates of hysterectomy for abnormal placentation increased during the study period by 23% (from 32.9 to 40.5 per 100,000; p for linear trend<.001; odds-ratio [OR] 1.23; 95% CI 1.07 - 1.43, p<.001); adjustment for previous Cesarean delivery explained nearly all of this increase. The rate of hysterectomy for uterine atony following repeat Cesarean delivery increased nearly 4-fold (from 1.9 to 7.5 per 100,000; OR 3.94; 95% CI 2.62 - 5.91, p<.001), following primary Cesarean delivery approximately 2.5-fold (from 4.4 to 11.2 per 100,000; OR=2.55; 95% CIs=1.85 - 3.52, p<.001), and following vaginal delivery about 1.5-fold (from 4.9 to 7.1 per 100,000; OR=1.45; 95% CIs=1.07 - 1.97, p<.001). Adjustment for changes in the rates of recognized risk factors explained little of the increase in the rates of peripartum hysterectomy due to atony.

Conclusions: Rates of peripartum hysterectomy increased in the US from 1994-1995 to 2006-2007. The increase in hysterectomy from abnormal placentation was explained by the increasing rate of repeat Cesarean delivery. Increases in the rates of hysterectomy for uterine atony were unexplained and further study to elucidate the basis for this trend is merited.

(1)Wright JD. Obstet Gynecol 2010;115:1187-93.

Debate: Urgent Cesarean Delivery for Failure to Progress in Labor: Patchy Block with Epidural – Plan is to Administer a Spinal

Pro: Single-Shot Spinal

Barbara Leighton, M.D.

Objectives:

1. To understand which labor epidurals are likely to fail when dosed for cesarean delivery
2. To understand when and how it is safe to perform spinal anesthesia for cesarean delivery following a patchy block with a labor epidural

Summary: There are times when it is wise to do a spinal after a failed labor epidural and times when it is unwise to do so.

1. By far, the largest risk factor for a failed epidural after dosing for cesarean delivery is the need for frequent epidural top-ups and/or the requirement for large volumes of local anesthetic during labor. So, if the patient required frequent top-ups during labor, if the epidural was one-sided during labor, if there were missed segments during labor, if the patient did not have adequate pain relief during labor, do not try to use the epidural catheter for cesarean delivery. Just remove the catheter and do a spinal anesthetic. It is rare to have a high spinal if one has not tried to dose for cesarean delivery through the epidural catheter.(1)
2. Dr. Gaiser recommends spinal anesthesia as long as the volume of epidural local anesthetic given for cesarean does not exceed 20 mL but admits that a high block is possible. His table reviews most of the case reports on the topic, and if you review his table, blocks high enough to require intubation have been reported after 15-20 mL of local anesthetic. But that is rare.
3. I believe it is generally wise to do a spinal after a failed epidural if the epidural block covered few dermatomes. I greatly reduce my spinal dose or do a general anesthetic instead if I have an extensive epidural block with sacral sparing or an extensive epidural block with just one critical missed dermatome.
4. Dr. Pan, et al. point out that the incidence of high block after dosing of a labor epidural for cesarean delivery is similar to the incidence of high block after spinal anesthesia after failure of dosing of a labor epidural for cesarean delivery. So, everything in life has risks.

Annotated Reference List:

1. Visser WA, et al. Spinal anesthesia for intrapartum cesarean delivery following epidural labor analgesia: a retrospective cohort study. Can J Anesth 2009;56:577-583. This is an excellent article. In addition, it references almost of the important case reports and case series of spinal after epidural anesthesia for cesarean delivery.
2. http://www.usuhs.mil/ane/resident/pbls/csxepifail.pdf. This is an excellent review of the topic by Robert R. Gaiser, MD. Highly recommended.
3. Pan PH, Bogard TD, Owen MD. Incidence and characteristics of failures in obstetric neuraxial analgesia and anesthesia: A retrospective analysis of 19,259 deliveries. Int J Obstet Anesth 2004;13:227-33.

Debate: Urgent Cesarean Delivery for Failure to Progress in Labor: Patchy Block with Epidural – Plan is to Administer a Spinal

CON: Single-Shot Spinal

Brendan Carvalho, M.B., B.Ch.

Objectives

Upon completion of this presentation, participants will be able to:

1. Appreciate potential predictors of failed epidural "top-up" for cesarean delivery.
2. Describe the potential hazards of performing a full-dose single-shot spinal (high spinal, cardiovascular collapse) and concerns of under-dosing with a reduced-dose single-shot spinal anesthetic in this setting.
3. Discuss the benefits and limitations of various options (epidural, combined-spinal epidural (CSE), single-shot spinal, continuous spinal anesthetic, general anesthesia) for managing a failed epidural "top-up" for cesarean delivery.

Summary: The reported incidence of block failure following a "top-up" of a labor epidural for cesarean delivery is 1.7 - 8%.[1-5] This block failure rate may be much higher in the urgent/emergent setting.[6] The Royal College of Anaesthetists guidelines state that the conversion rate from regional to general anesthesia should be < 1% for elective cesarean delivery and < 3% for non-elective cesarean delivery. The most consistent predictor of failed "top-up" of labor epidurals for cesarean delivery is prior requests for boluses to treat inadequate labor analgesia.[1-5] Other less consistent predictors are duration of labor and patient factors including height, weight, and younger parturients. The use of CSE has been found to lower the incidence of block failure following "top-up" of labor epidurals for cesarean delivery. Non-obstetric anesthesiologists have higher rates of general anesthesia in this setting compared with obstetric anesthesiologists.

In the setting of a failed epidural "top-up" for cesarean delivery options include: manipulate or replace epidural, single-shot spinal, CSE, continuous spinal, general anesthesia or performing the cesarean delivery with local anesthetic.[7] Factors affecting the anesthetic decision include the urgency of surgery, fetal and maternal condition, presence of a non-reassuring fetal heart trace, maternal airway and BMI, extent of block failure and surgical requirements.

Removing the epidural after a failed "top-up" and performing single-shot spinal anesthesia for cesarean delivery has a number of potential problems. The ideal dose of spinal local anesthetic in this setting is difficult to predict. Too small a dose will result in patient discomfort, block failure and later conversion to general anesthesia. Studies show that an adequate initial block height to pin-prick obtained with low spinal doses does not guarantee adequate surgical anesthesia. Too large a dose will result in adverse maternal effects (high spinal, hypotension and nausea). There are a number of case reports of high spinals in the setting of a single-shot spinal after a failed epidural "top-up" as well as after standard labor epidurals without a prior "top-up". The incidence of high spinals in this setting ranges from 0.8% to as high as 11%.[8,9] In the SOAP SCORE database, 12/23 (52%) of reported high spinals were associated with spinal anesthesia after failed epidurals. Although techniques to avoid high spinal in this setting (no epidural boluses 30 min preceding spinal, reduced spinal dose and patient left sitting for 2 min) have been proposed,[10] the safety of any of these modifications are unproven. In my opinion, patients undergoing cesarean delivery after failed epidural "top-up" of their labor epidural are ill-suited for a single-shot spinal anesthetic technique. Preferably, any spinal dose should be used as part of a catheter-based technique (e.g. CSE technique). My preference would be to use a CSE neuraxial technique in this setting. The CSE technique allows adequate surgical anesthesia to be obtained initially with a reduced spinal dose AND the ability to extend the block later (with additional boluses of local anesthetic via the epidural catheter).

Key Points:

1. A full-dose single-shot spinal anesthesia for cesarean delivery after failed epidural "top-up" has a number of potential hazards related to either a dose reduction (patient discomfort, block failure and conversion to general anesthesia) or to excessive dosing (high spinal, hypotension and nausea).
2. A CSE technique allows the initial spinal dose to be reduced without concern for block failure and facilitates neuraxial blockade extended if required.

Key References:

1. Pan PH, Bogard TD, Owen MD: Incidence and characteristics of failures in obstetric neuraxial analgesia and anesthesia: a retrospective analysis of 19,259 deliveries. Int J Obstet Anesth 2004; 13: 227-33
2. Riley ET, Papasin J: Epidural catheter function during labor predicts anesthetic efficacy for subsequent cesarean delivery. Int J Obstet Anesth 2002; 11: 81-4
3. Lee S, Lew E, Lim Y, Sia AT: Failure of augmentation of labor epidural analgesia for intrapartum cesarean delivery: a retrospective review. Anesth Analg 2009; 108: 252-4
4. Halpern SH, Soliman A, Yee J, Angle P, Ioscovich A: Conversion of epidural labour analgesia to anaesthesia for Caesarean section: a prospective study of the incidence and determinants of failure. Br J Anaesth 2008
5. Orbach-Zinger S, Friedman L, Avramovich A, Ilgiaeva N, Orvieto R, Sulkes J, Eidelman LA: Risk factors for failure to extend labor epidural analgesia to epidural anesthesia for Cesarean section. Acta Anaesthesiol Scand 2006; 50: 793-7
6. Kinsella SM: A prospective audit of regional anaesthesia failure in 5080 Caesarean sections. Anaesthesia 2008; 63: 822-32
7. Portnoy D, Vadhera RB: Mechanisms and management of an incomplete epidural block for cesarean section. Anesthesiol Clin North America 2003; 21: 39-57
8. Visser WA, Dijkstra A, Albayrak M, Gielen MJ, Boersma E, Vonsee HJ: Spinal anesthesia for intrapartum Cesarean delivery following epidural labor analgesia: a retrospective cohort study. Can J Anaesth 2009; 56: 577-83
9. Furst SR, Reisner LS: Risk of high spinal anesthesia following failed epidural block for cesarean delivery. J Clin Anesth 1995; 7: 71-4
10. Dadarkar P, Philip J, Weidner C, Perez B, Slaymaker E, Tabaczewska L, Wiley J, Sharma S: Spinal anesthesia for cesarean section following inadequate labor epidural analgesia: a retrospective audit. Int J Obstet Anesth 2004; 13: 239-43

The 2011 Gerard W. Ostheimer Lecture
What's New in Obstetric Anesthesia?

Paloma Toledo, M.D., M.P.H.

This syllabus represents the top 150 articles relevant to obstetric anesthesia. Seventy-five journals were hand-searched from January 2010 to December 2010 to find articles relevant to anesthesiology/obstetric anesthesia, obstetrics, perinatology, general medicine, and health services research. In addition, key word searches were conducted through Pubmed and ISI Web of Knowledge, to identify additional articles not found in the preliminary search.

A total of 1,115 articles were identified on initial review. The articles were reviewed for quality and interest to the practicing obstetric anesthesiologist. Articles considered for the Ostheimer syllabus were scored using a modified NIH scoring system. Scores were assigned using a nine-point scale with 1 being exceptional and 9 being poor in each of the following categories:

Significance: The importance of the hypothesis or study purpose relative to the respective field in which the article was published. Articles for obstetrical anesthesia, obstetrics, perinatology, general medicine, and health services research were scored separately.

Innovation: This area evaluated the article's ability to present new theoretical concepts or challenge current practice paradigms. New methodology (i.e. for simulation research) was evaluated as well.

Approach/Methodology: The overall strategy, methodology, and analyses were evaluated to determine if they were well conducted and appropriate for the dataset presented. Randomized controlled trials were scored for quality separately using the Chalmers quality assessment tool (Greenfield MVH. Anesthesia & Analgesia 2009; 108: 1916-1921). Quality scores > 75% are reported as high quality and scores between 50% and 75% are moderate quality.

Overall Impact Score for obstetrical anesthesiology: An overall score was assigned to each article that accounted for the individual score in each area, as well as the overall impact to obstetric anesthesiology.

List of Journals:

Anesthesiology and Critical Care Journals

1. Acta Anaesthesiologica Scandinavica
2. Acta Anesthesiologica Belgica
3. Anaesthesia
4. Anaesthesia and Intensive Care
5. Anesthesia & Analgesia
6. Anesthesiology
7. Anesthesiology Clinics of North America
8. American Society of Anesthesiology Newsletter
9. British Journal of Anaesthesia
10. Canadian Journal of Anaesthesia
11. Critical Care Medicine
12. Current Opinion in Anesthesiology
13. European Journal of Anesthesiology
14. European Journal of Pain
15. International Anesthesiology Clinics
16. International Journal of Obstetric Anesthesia
17. Journal of Clinical Anesthesia
18. Journal of Pain
19. Obstetric Anesthesia Digest
20. Pain
21. Regional Anesthesia and Pain Medicine
22. Resuscitation

Obstetrics & Gynecology Journals:

1. Acta Obstetrica et Gynecologica Scandinavica
2. American Journal of Obstetrics & Gynecology
3. Australian and New Zealand Journal of Obstetrics & Gynaecology
4. Birth
5. British Journal of Obstetrics and Gynaecology
6. Clinical Obstetrics and Gynecology
7. Current Opinion in Obstetrics and Gynecology
8. European Journal of Obstetrics & Gynecology and Reproductive Biology
9. Fertility and Sterility
10. Gynecologic and Obstetric Investigation
11. International Journal of Gynecology & Obstetrics
12. Journal of Midwifery & Women's Health
13. Journal of Perinatology
14. Journal of Women's Health
15. MCN: The American Journal of Maternal/Child Nursing
16. Midwifery
17. Obstetric Medicine: The Medicine of Pregnancy
18. Obstetrical & Gynecological Survey
19. Obstetrics & Gynecology
20. Obstetrics & Gynecology Clinics of North America
21. Obstetrics, Gynaecology & Reproductive Medicine
22. Placenta

Perinatology Journals:

1. BMC Pediatrics
2. Journal of Maternal-Fetal and Neonatal Medicine
3. Journal of Pediatrics
4. Journal of Perinatology
5. Pediatrics

General Medicine Journals:

1. Annals of Internal Medicine
2. British Medical Journal
3. Chest
4. Cochrane 2010
5. Critical Care Medicine
6. Journal of Patient Safety
7. Journal of the American College of Cardiology
8. Journal of the American Medical Association
9. Lancet
10. Morbidity and Mortality Weekly Report
11. Nature
12. New England Journal of Medicine
13. Science

Specialty Journals:

1. British Journal of Haemotology
2. Circulation
3. European Heart Journal
4. Heart

Health Services Research, Epidemiology, and Simulation:

1. American Journal of Epidemiology
2. Health Affairs
3. Health Services Research
4. Morbidity and Mortality Weekly Report
5. Quality and Safety in Health Care
6. Journal of Clinical Epidemiology
7. Journal of Patient Safety
8. Simulation in Healthcare
9. Social Science and Medicine

Table of Contents:

For each of the items in the syllabus, I have included a short synopsis. If I misinterpreted any findings, I accept full responsibility for the error. If I did not include an article that you find of great interest to the field (or that you wrote), I sincerely apologize! Due to the limited number of articles that I could present, I could not include hundreds of deserving articles, including many case reports and review articles. I truly enjoyed the opportunity to conduct this in-depth review of the 2010 literature. I hope that this syllabus helps faciliate your research and clinical work, and helps us collectively improve the care of our patients.

Table of Contents (cont.):

Maternal Issues

Maternal Coexisting Disease:

Aging:

1. Yogev Y, Melamed N, Bardin R, Tenenbaum-Gavish K, Ben-Shitrit G, Ben-Haroush A. Pregnancy outcome at extremely advanced maternal age. Am J Obstet Gynecol 2010; 203: 558 e1-7.

Retrospective cohort study comparing pregnancy outcomes in women in 4 age groups: 20-29 (n=1,770), 30-39 (n=1,770), 40-44(n=1,770) and >45 years of age (n=177) demonstrating that with increasing age, parturients are at increased risk for adverse medical outcomes (GDM, hypertensive disorders), operative deliveries, abnormal placentation, and fetal risk (neonatal ICU admission and trend towards higher rate of fetal death).

Cardiac Disease:

2. Tanous D, Siu SC, Mason J, et al. B-type natriuretic peptide in pregnant women with heart disease. J Am Coll Cardiol 2010; 56: 1247-1253.

Longitudinal study of 66 women with structural heart disease and 12 healthy controls evaluating changes in B-type natriuretic peptide (BNP) response to pregnancy and possible association with adverse maternal cardiac events (arrhythmias, heart failure, cardiac arrest or death) in pregnancy. BNP levels increased during pregnancy in patients with structural heart disease, whereas it did not increase in the control patients. A BNP>100 pg/mL had a negative predictive value of 100% for identifying cardiac events during pregnancy and a specificity of 70%.

3. Yap SC, Drenthen W, Pieper PG, et al. Pregnancy outcome in women with repaired versus unrepaired isolated ventricular septal defect. BJOG 2010; 117: 683-689.

Case-control study where 147 women with ventricular septal defects (VSD), (104 unrepaired, 43 repaired) were compared to 9,967 healthy controls, evaluating the risks of pregnancy complications due to VSD. Both VSD groups had low rates of cardiac events; however, patients with unrepaired VSDs had a higher risk of preeclampsia compared to controls. Patients with repaired VSDs had a higher risk of premature delivery and SGA births compared to unrepaired VSDs, yet these findings may be due to confounding by indication.

4. Drenthen W, Boersma E, Balci A, et al. Predictors of pregnancy complications in women with congenital heart disease. Eur Heart J 2010; 31: 2124-2132.

Retrospective medical record review of 1,302 pregnancies in women with congenital heart disease (CHD), designed to identify patient characteristics associated with adverse pregnancy outcomes. In a multivariable logistic regression model, in addition to traditional risk factors, four new factors for maternal cardiac complications were identified: mechanical valve replacement, systemic or pulmonary atrioventricular valve regurgitation, and cyanotic heart disease.

5. van Spaendonck-Zwarts KY, van Tintelen JP, van Veldhuisen DJ, et al. Peripartum cardiomyopathy as a part of familial dilated cardiomyopathy. Circulation 2010; 121: 2169-2175.

Two-part study evaluating whether familial clustering of peripartum cardiomyopathy in families with dilated cardiomyopathy exists. Six percent of families with dilated cardiomyopathy (DCM) had evidence of a family member with peripartum cardiomyopathy (PPCM). Candidate gene approach identified 1 mutation in the gene encoding cardiac troponin C (TNNC1). While confirmatory studies are needed, this is one of the first studies to confirm that there may be a relation between PPCM and familial DCM, and that there may be a genetic component to PPCM. If confirmed, this may mean that first-degree family members of DCM patients should be monitored more closely peripartum for PPCM development.

Accompanying editorial: Anderson JL, Horne BD. Birthing the genetics of peripartum cardiomyopathy. Circulation 2010; 121: 2157-2159.

Hypertensive Disorders in Pregnancy, Including Preeclampsia:

6. Roberts JM, Myatt L, Spong CY, et al. Vitamins C and E to prevent complications of pregnancy-associated hypertension. N Engl J Med 2010; 362: 1282-1291.

High quality randomized controlled trial (n=10,154) which randomized nulliparous women at low-risk for preeclampsia to vitamin C and E therapy vs. placebo, and evaluated the risk of maternal and neonatal adverse outcomes related to pregnancy-associated hypertension. Vitamin therapy did not reduce the rate of adverse maternal or perinatal outcomes related to pregnancy-associated hypertension.

7. Xu H, Perez-Cuevas R, Xiong X, et al. An international trial of antioxidants in the prevention of preeclampsia (INTAPP). Am J Obstet Gynecol 2010; 202: 239.e1-239.e10.

High quality multicenter RCT (n= 2,363) evaluating the effectiveness of daily vitamins C and E (n=1,167) compared to placebo (n=1,196) in reducing the incidence of gestational hypertension in low- and high-risk nulliparous women. Antioxidant therapy did not decrease the incidence of gestational hypertension in either subgroup. Of concern, there was a higher incidence of PROM, PPROM, and the composite outcome of fetal loss or perinatal death in the antioxidant group, leading the authors to conclude that vitamin C and E supplementation using the studied doses can not be recommended to pregnant women for prevention of hypertensive disorders in pregnancy.

Letter to the editor: Talaulikar V, Manyonda I. The myth of vitamins C and E for the prevention of preeclampsia: just when will the penny drop? Am J Obstet Gynecol 2010; 203: e7-8; author reply e8.

The authors call for an end to the studies of vitamin therapy to prevent preeclampsia given that it is not biologically plausible that antioxidant therapy would prevent defective trophoblastic invasion.

8. Hofmeyr GJ, Lawrie TA, Atallah AN, Duley L. Calcium supplementation during pregnancy for preventing hypertensive disorders and related problems. Cochrane Database Syst Rev 2010: CD001059.

Meta-analysis of 13 studies of moderate quality (n=15,730) concluding that calcium supplementation during pregnancy halves the risk of preeclampsia, reduces the risk of preterm birth, and reduces the occurrence of a composite outcome of death or serious morbidity.

9. Geelhoed JJ, Fraser A, Tilling K, et al. Preeclampsia and gestational hypertension are associated with childhood blood pressure independently of family adiposity measures: the Avon Longitudinal Study of Parents and Children. Circulation 2010; 122: 1192-1199.

Retrospective analysis of data from 6,343 mother-infant dyads evaluating the association between hypertensive disorders of pregnancy and offspring blood pressure at 9 years of age. Children of women with preeclampsia or gestational hypertension had higher systolic and diastolic blood pressures than children of women without hypertensive disorders of pregnancy. This association remained significant even after controlling for measures of familial adiposity (parental BMI and infant birth weight) and other common confounders associated with increased blood pressure.

See also: Palmsten K, Buka SL, Michels KB. Maternal pregnancy-related hypertension and risk for hypertension in offspring later in life. Obstet Gynecol 2010; 116: 858-864.

Retrospective evaluation of longitudinal data evaluating the relationship between maternal pregnancy-related hypertension and hypertensive disease in adult offspring (aged 34-44 years), n=1,556. There was almost a two-times greater odds of offspring hypertensive disease, even after controlling for sex, BMI, race, diabetes and socioeconomic status.

10. Chang JJ, Muglia LJ, Macones GA. Association of early-onset pre-eclampsia in first pregnancy with normotensive second pregnancy outcomes: a population-based study. BJOG 2010; 117: 946-953.

Population-based retrospective cohort study (n=12,835) evaluating pregnancy outcomes in patients whose first pregnancy was complicated by preeclampsia, but had a normotensive second pregnancy. Despite having a normotensive second pregnancy, patients with a history of early-onset preeclampsia in their first pregnancy had a greater odds of preterm delivery, delivering an SGA infant, fetal demise, and cesarean delivery in the second pregnancy, even after controlling for confounding variables, relative to women with late-onset preeclampsia in the first pregnancy.

11. Schwarz EB, McClure CK, Tepper PG, et al. Lactation and maternal measures of subclinical cardiovascular disease. Obstet Gynecol 2010; 115: 41-48.

Cross-sectional analysis of 297 women aged 45-58 years, with one live birth in the Study of Women Across the Nation-Heart Study. Multivariable linear and logistic regressions evaluated whether self-reported lactation and the duration of lactation was associated with measures of sub-clinical cardiovascular disease assessed by CT and ultrasound. Even after controlling for socioeconomic status and cardiac risk factors, there was an increased risk of coronary artery and aortic calcification in women who had not breastfed. This adds to the growing body of literature supporting improved maternal health secondary to breastfeeding.

Gestational Diabetes Mellitus:

12. Hyperglycaemia and Adverse Pregnancy Outcome (HAPO) Study: associations with maternal body mass index. BJOG 2010; 117: 575-584.

Secondary analysis of prospective cohort data (n=23,316) investigating whether higher BMI, independent of maternal glycemia, was predictive of adverse pregnancy outcomes. In a multivariable logistic regression model, high BMI, even after controlling for several confounders, including fasting glucose level and mean arterial blood pressure, was associated with an increased incidence of fetal birth weight >90th percentile, increased rate of cesarean delivery, and increased incidence of preeclampsia.

13. Facco FL, Grobman WA, Kramer J, Ho KH, Zee PC. Self-reported short sleep duration and frequent snoring in pregnancy: impact on glucose metabolism. Am J Obstet Gynecol 2010; 203: 142.e1-5.

Secondary analysis of data from a prospective cohort of 189 healthy, nulliparous women who participated in a sleep study with the objective of evaluating the effect of short sleep duration and frequent snoring on impaired glucose metabolism in pregnancy. Both short sleep duration and frequent snoring were associated with development of gestational diabetes mellitus, even after controlling for important cofounders such as age, race/ethnicity, and maternal BMI. While confirmatory studies are necessary, this study suggests that treatment of sleep-disordered breathing may be a novel target for reducing GDM and improving pregnancy outcomes.

Hematologic Disorders:

14. Grandone E, Tiscia G, Colaizzo D, et al. Role of the M2 haplotype within the annexin A5 gene in the occurrence of pregnancy-related venous thromboembolism. Am J Obstet Gynecol 2010; 203: 461.e1-5.

Case-control study of 83 women with pregnancy-related venous thromboembolism and 195 healthy controls investigating the relationship between the M2 haplotype of annexin A5 (ANXA5) and venous thromboembolism. ANXA5 is a potent antithrombotic protein, and the presence of the M2 haplotype reduces the in vivo activity of ANXA5. The authors found that patients with the M2 haplotype had 3-times higher odds of VTE than non-carriers.

15. Ngo C, Kayem G, Habibi A, et al. Pregnancy in sickle cell disease: maternal and fetal outcomes in a population receiving prophylactic partial exchange transfusions. Eur J Obstet Gynecol Reprod Biol 2010; 152: 138-142.

Retrospective case-control study of 128 women with sickle cell disease (SSD) who underwent prophylactic red blood cell transfusions and 128 healthy controls without hemoglobinopathies. Starting at 22 weeks, sickle cell patients received transfusions every three weeks to maintain hemoglobin concentrations above 9 g/dL and HbS <40%. Despite prophylactic transfusions, patients with sickle cell disease had a higher incidence of preeclampsia, IUGR, and cesarean delivery, compared to controls, and a similar number of pain crises as described in the literature.

Obesity:

16. Ludwig DS, Currie J. The association between pregnancy weight gain and birthweight: a within-family comparison. Lancet 2010; 376: 984-990.

Population-based cohort of births in Michigan and New Jersey between 1989 and 2003 (n=513,501 women and 1,164,750 offspring) evaluating the association between maternal weight gain and birth weight. The authors used a within-subject design (to control for genetic confounding), and with linear regression modeling controlling for several known confounders of increased birth weight, found that for each kg increase in maternal weight gain, birth weight rose by 7.35 g. Given the significant association between birth weight and adult adiposity, weight reduction during pregnancy may be one strategy to curb the obesity epidemic.

Accompanying editorial: Halfon N, Lu MC. Gestational weight gain and birthweight. Lancet 2010; 376: 937-938.

17. Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999-2008. JAMA 2010; 303: 235-241.

Using the National Health and Nutrition Examination Survey (NHANES) 2007-2008 data set, the national prevalence estimates for overweight and obesity combined (BMI > or = 25 kg/m2) were 68.0% (95% CI, 66.3%-69.8%).

See also: CDC BRFSS obesity data http://www.cdc.gov/obesity/data/trends.html

The CDC has released data from the 2006-2008 Behavioral Risk Factor Surveillance System (BRFSS). The data show that more than 30% of all adults in the United States are now obese. While data on pregnancy are not included in this dataset, it is likely that a similar trend exists for pregnant patients.

18. Kominiarek MA, Vanveldhuisen P, Hibbard J, et al. The maternal body mass index: a strong association with delivery route. Am J Obstet Gynecol 2010; 203: 264.e1-7.

Retrospective cohort using data from the Consortium on Safe Labor (n=228,668) evaluating the effect of increasing BMI on the rate of cesarean delivery. The risk

of cesarean delivery increased linearly with increasing BMI. This article adds to the existing literature by providing cesarean delivery rates for class I-III obesity as defined by the World Health Organization.

19. Gilboa SM, Correa A, Botto LD, et al. Association between prepregnancybodymassindexandcongenitalheartdefects.AmJ Obstet Gynecol 2010; 202: 51.e1-10.

Case-control study of infants with congenital heart disease (CDH) (n=6,440) and infants without birth defects (n=5,673) who were enrolled in the National Birth Defects Prevention study between 1997 and 2004. There was a linear increase in the odds of delivering an infant with a congenital heart defect across increasing obesity strata. The authors also demonstrated an association between certain CHD phenotypes (RVOT and conotruncal defects) and obesity.

20. Vricella LK, Louis JM, Mercer BM, Bolden N. Anesthesia complicationsduringscheduledcesareandeliveryformorbidlyobese women. Am J Obstet Gynecol 2010; 203: 276.e1-5.

Retrospective cohort study of women undergoing elective cesarean delivery (n= 142 morbidly obese, 251 overweight and obese, and 185 normal-weight women). Only women in the morbidly obese group experienced anesthetic complications. Using a composite outcome of anesthesia complications (failure to establish neuraxial anesthesia, failed neuraxial anesthesia requiring conversion to GA, and other serious morbidities and mortality) the authors found that pre-pregnancy BMI >40 kg/m2 and delivery BMI >45 kg/m2 were predictive of anesthetic complications.

Infection:

21. WorldHealthOrganization:Antiretroviraldrugsfortreatingpregnant womenandpreventingHIVinfectioninginfants(2010revision).http:// www.who.int/hiv/pub/mtct/guidelines/en/ Accessed 1.14.11

Updated guidelines by the World Health Organization calling for elimination of mother-to-child transmission of HIV as a public health goal.

See also: PMTCT Strategic Vision 2010–2015. Preventing mother-to-child transmission of HIV to reach the UNGASS and Millennium Development goals: moving towards the elimination of paediatric HIV. Geneva: World Health Organization, 2010. (http://www.who.int/hiv/pub/mtct/strategic_vision.pdf.). Accessed 1.14.11

World Health Organization publication outlining strategic vision for elimination of mother-to child HIV as part of the 2015 Millennium Development goals.

22. LockmanS,HughesMD,McIntyreJ,etal.Antiretroviraltherapiesin womenaftersingle-dosenevirapineexposure.NEnglJMed2010; 363: 1499-1509.

Randomized controlled study in which HIV-infected women were randomized to receive nevirapine (n=121) or ritonavir-boosted lopinavir (n=120) at least 6 months after having received a single dose of nevirapine during labor. The ritonavair-boosted lopinavir group had fewer virologic failures (measured using plasma HIV-1 RNA) and fewer maternal deaths at two years than the nevirapine-only group. This is significant because in resource-poor countries, HIV-infected women are given a single dose of nevirapine during labor, which halves the risk of peripartum transmission, but selects for nevirapine-resistant mutations thereby making future treatment more difficult.

23. Siston AM, Rasmussen SA, Honein MA, et al. Pandemic 2009 influenzaA(H1N1)virusillnessamongpregnantwomenintheUnited States. JAMA 2010; 303: 1517-1525.

Population surveillance of 2009 influenza A (H1N1) among pregnant women reported to the Centers for Disease Control and Prevention (CDC) between April and December 2009. Seven hundred and eighty eight pregnant women were reported, of which 5% died. Early antiviral treatment was associated with fewer ICU admissions and fewer deaths.

See also: Creanga AA, Johnson TF, Graitcer SB, et al. Severity of 2009 pandemic influenza A (H1N1) virus infection in pregnant women. Obstet Gynecol 2010; 115: 717-726.

Case control study of all hospitalized pregnant women in New York City (n=62) and reproductive age non-pregnant controls (n=74) with 2009 H1N1 influenza. Pregnant women had a higher hospitalization rate than non-pregnant controls. Women who delivered with severe illness had more severe neonatal outcomes (ICU admission or death) than those who delivered with moderate illness. Similar to Siston (above), early treatment was associated with less morbidity for pregnant women.

Neurologic Disorders:

24. AlmeidaC,CoutinhoE,MoreiraD,SantosE,AguiarJ.Myasthenia gravisandpregnancy:anaestheticmanagement--aseriesofcases. Eur J Anaesthesiol 2010; 27: 985-990.

Case series describing the management of 17 parturients with myasthenia gravis with maternal and fetal outcomes. Anesthetic management of myasthenia gravis is discussed.

Psychiatric Disorders:

25. MelvilleJL,GavinA,GuoY,FanMY,KatonWJ.Depressivedisorders during pregnancy: prevalence and risk factors in a large urban sample. Obstet Gynecol 2010; 116: 1064-1070.

Prospective cohort study (n=1,888) evaluating the prevalence and risk factors for depressive disorders in pregnancy. The prevalence of depressive disorders was 9.9%. Psychosocial stress, domestic violence, chronic medical conditions, and race (African American or Asian) were associated with increased odds of depression in a multivariable logistic regression model adjusting for age and medical conditions. Identification of patients with antenatal depression is important because they are more likely to have postpartum depression.

Substance Abuse:

26. ACOGCommitteeOpinionNo.462:Moderatecaffeineconsumption during pregnancy. Obstet Gynecol 2010; 116: 467-8.

Due to new evidence, ACOG has revised its opinion to state that moderate caffeine consumption (less than 200 mg/day) is not associated with spontaneous miscarriages or preterm delivery.

27. RobinsonM,OddyWH,McLeanNJ,etal.Low-moderateprenatal alcohol exposure and risk to child behavioural development: a prospective cohort study. BJOG 2010; 117: 1139-1150.

Prospective cohort study of 2,370 children evaluating the effects of prenatal alcohol exposure on fetal development and childhood behavior. Compared to children of mothers who did not drink during pregnancy, children of mothers who drank lightly during their first trimester had worse behavioral scores and behavioral problems.

28. BieringK,AagaardNohrE,OlsenJ,NyboAndersenAM,JuhlM. Smokingandpregnancy-relatedpelvicpain.BJOG2010;117:1019-1026.

Nested case-control study evaluating the association between smoking and pregnancy-related pelvic pain. Women with pelvic pain (n=2,302) were compared to patients without pelvic pain (n=2,692). Using a multivariable logistic

regression model that controlled for age, BMI, socio-economic status, and strenuous work, the authors found that smokers had slightly increased odds of having pelvic pain in pregnancy (OR 1.2) compared to non-smoking controls.

The First Trimester:

29. Pasternak B, Hviid A. Use of proton-pump inhibitors in early pregnancy and the risk of birth defects. N Engl J Med 2010; 363: 2114-2123.

Retrospective cohort study (n=840,000 births) evaluating the association between first trimester PPI use and major birth defects. In a logistic regression accounting for a large number of confounders, exposure to PPIs (particularly omeprazole) was not associated with an increased risk of major birth defects.

Accompanying editorial: Mitchell AA. Proton-pump inhibitors and birth defects--some reassurance, but more needed. N Engl J Med 2010; 363: 2161-2163.

30. Jentink J, Loane MA, Dolk H, et al. Valproic acid monotherapy in pregnancy and major congenital malformations. N Engl J Med 2010; 362: 2185-2193.

Two part study: (1) a literature review was conducted to identify congenital malformations associated with valproic acid use. (2) A population-based case-control study comparing the odds of developing the 14 malformations identified in the literature review in patients exposed to valproic acid compared to two control groups, the first being a group with major malformations, and the second being a group with chromosomal abnormalities. While this study confirmed what was already known about the use of valproic acid in pregnancy, the absolute risks for malformations were lower than what had previously been reported. This information could be useful for obstetricians counseling patients who may need to continue valproic acid for clinical reasons.

Letter to the editor: Vajda F, O'Brien T. Valproic acid use in pregnancy and congenital malformations. N Engl J Med 2010; 363:1771; author reply 1771-1772.

Obstetric Management:

Preterm Delivery:

31. ACOG Committee Opinion No. 455: Magnesium Sulfate Before Anticipated Preterm Birth for Neuroprotection. Obstet Gynecol 2010; 115: 669-671.

New opinion from the American Congress of Obstetricians and Gynecologists (ACOG). The committee recommends consideration be given to magnesium therapy prior to anticipated delivery in early preterm births, as most evidence suggests a reduced risk of cerebral palsy.

32. Burd I, Breen K, Friedman A, Chai J, Elovitz MA. Magnesium sulfate reduces inflammation-associated brain injury in fetal mice. Am J Obstet Gynecol 2010; 202: 292.e1-9.

Using a murine model of preterm birth, mice exposed to lipopolysaccharide (LPS) or normal saline (NS) were randomized to receive intraperitoneal magnesium (Mg) or normal saline (NS), (n=12, 3 rats per group (LPS+MG, LPS+NS, NS+Mg, NS+NS). There were morphologic changes consistent with inflammation in the LPS+NS group that were prevented by magnesium in the LPS+Mg group, suggesting one potential mechanism by which magnesium protects against cerebral palsy.

Erratum: Am J Obstet Gynecol 2010; 202: 603.

33. Dolinsky BM, Ippolito DL, Tinnemore D, Stallings JD, Zelig CM, Napolitano PG. The effect of magnesium sulfate on the activity of matrix metalloproteinase-9 in fetal cord plasma and human umbilical vein endothelial cells. Am J Obstet Gynecol 2010; 203: 371 e371-375.

In-vitro study evaluating the effect of magnesium on the activity of matrix metalloproteinase-9 (MMP-9) in umbilical cord blood samples collected from 6 term parturients undergoing elective cesarean delivery. MMP-9 is an enzyme that has been shown to be elevated in preterm labor and may cause cytokine-mediated neural injury. Addition of physiologic doses of magnesium reduced active MMP-9 by 25%, suggesting another possible mechanistic explanation for the cerebroprotective effects seen with magnesium.

34. Vaisbuch E, Romero R, Mazaki-Tovi S, et al. The risk of impending preterm delivery in asymptomatic patients with a nonmeasurable cervical length in the second trimester. Am J Obstet Gynecol 2010; 203: 446.e1-9.

Retrospective cohort study of singleton pregnancies with a sonographically nonmeasurable cervix detected at 14-28 weeks of gestation (n=78). The median diagnosis-to-delivery interval was approximately 3 weeks, with shorter diagnosis-to-delivery intervals in those identified at an earlier gestational age. Seventy-five percent of patients delivered before 32 weeks gestation.

Letter to the editor: Berghella V. Every 30 seconds a baby dies of preterm birth. What are you doing about it? Am J Obstet Gynecol 2010; 203: 416-417.

Letter describing the possible role of transvaginal ultrasound to measure cervical length and how this technology may change which patients are candidates for cerclage or progesterone therapy.

Termination of Pregnancy:

35. Lavand'homme PM, Roelants F. Evaluation of pregabalin as an adjuvant to patient-controlled epidural analgesia during late termination of pregnancy. Anesthesiology 2010; 113:1186-1191.

High quality RCT. Healthy women undergoing late termination of pregnancies with epidural analgesia were randomized to receive pregabalin (n=24) or prazepam (n=24). Pregabalin reduced total ropivacaine consumption and the need for rescue analgesia. Postulated mechanisms are discussed.

Induction of Labor:

36. Ehrenthal DB, Jiang X, Strobino DM. Labor induction and the risk of a cesarean delivery among nulliparous women at term. Obstet Gynecol 2010; 116: 35-42.

Retrospective analysis of a population-based cohort (n=7,804) evaluating the association between induction of labor and cesarean delivery. Induction of labor was associated with an almost two-times higher odds of cesarean delivery, even after adjustment for maternal demographic characteristics, medical risk, and pregnancy complications. Term elective inductions have a 20% attributable risk of cesarean delivery, suggesting that one strategy to reduce the cesarean delivery rate would be to reduce the number of elective inductions.

Accompanying editorial: Signore C. No time for complacency: labor inductions, cesarean deliveries, and the definition of "term." Obstet Gynecol 2010; 116: 4-6.

37. Osmundson SS, Ou-Yang RJ, Grobman WA. Elective induction compared with expectant management in nulliparous women with a favorable cervix. Obstet Gynecol 2010; 116: 601-605.

Retrospective cohort study (n=294) evaluating labor outcomes between nulliparous women with a favorable cervix induced at 39 weeks vs. those who were expectantly managed. There were no differences in maternal outcomes, including cesarean delivery rate or neonatal outcomes, between the two groups. As expected, the induction patients had a longer labor and received more oxytocin, therefore resulting in increased use of resources.

38. Zhang X, Joseph KS, Kramer MS. Decreased term and postterm birthweight in the United States: impact of labor induction. Am J Obstet Gynecol 2010; 203: 124 e121-127.

Epidemiologic study using data from National Vital Statistics System of the National Center for Health Statistics evaluating trends in birth weights over an 11-year period. There was a decrease in the mean birth weight of 37g, a 3-day decrease in the mean gestational age, and a 25% decrease in the rates of macrosomia. Using multiple-linear regression, induction of labor seemed to be the primary driver of the decreasing birth weight. Given the potential risks associated with earlier term and late preterm births (see references 39-41), further study is warranted to ensure we are not causing undue iatrogenic injury with elective labor inductions.

Timing of Delivery and Related Outcomes:

39. Bailit JL, Gregory KD, Reddy UM, et al. Maternal and neonatal outcomes by labor onset type and gestational age. Am J Obstet Gynecol 2010; 202: 245 e241-245 e212.

Retrospective cohort from deliveries in the Consortium on Safe Labor between 2002 and 2008 (n=115,528) evaluating maternal and neonatal outcomes by labor onset type and gestational age. Unlabored cesarean deliveries were associated with the worst neonatal outcomes in all categories and higher rates of maternal ICU admission. Most neonatal outcomes improved with delivery after 39 weeks gestation, regardless of labor onset type.

40. Bates E, Rouse DJ, Mann ML, Chapman V, Carlo WA, Tita AT. Neonatal outcomes after demonstrated fetal lung maturity before 39 weeks of gestation. Obstet Gynecol 2010; 116: 1288-1295.

Retrospective cohort study comparing neonatal outcomes in infants delivered between 36 and 38 6/7 weeks gestation with documented fetal lung maturity (n=459) compared to infants delivered between 39 and 40 6/7 weeks (n=13,339). Using a composite outcome (9 outcomes including perinatal death), the authors found a higher risk of adverse outcomes at all gestational ages prior to 39 weeks, despite documented fetal lung maturity.

41. Wilmink FA, Hukkelhoven CW, Lunshof S, Mol BW, van der Post JA, Papatsonis DN. Neonatal outcome following elective cesarean section beyond 37 weeks of gestation: a 7-year retrospective analysis of a national registry. Am J Obstet Gynecol 2010; 202: 250e251-258.

Retrospective cohort study using the Netherlands Perinatal Registry (n=20,973) evaluating the timing and outcomes of term elective cesarean deliveries. Over half of the deliveries occurred prior to 39 weeks gestation. With delivery <39 weeks, there was an increase in the composite outcome of neonatal morbidity and mortality, compared to infants delivered after 39 weeks.

See also: The Joint Commission Manual. Perinatal care measure 1 (PC-01). http://manual.jointcommission.org/releases/TJC2010A/MIF0166.html. Accessed 1.14.11

The Joint Commission issued a new performance measure indicating that elective deliveries (vaginal and cesarean) should not occur prior to 39 weeks gestation due to the increasing evidence of neonatal harm with earlier elective inductions.

42. Robinson BK, Grobman WA. Effectiveness of timing strategies for delivery of individuals with placenta previa and accreta. Obstet Gynecol 2010; 116: 835-842.

Decision analysis modeling the optimal timing for delivery in patients with placenta previa and ultrasonographic evidence of placenta accreta. The preferred delivery strategy was delivery at 34 weeks gestation. Amniocentesis did not improve outcomes at any gestational age. While this study may not change the timing of delivery in patients with placenta accreta, it will likely decrease or stop the use of routine amniocentesis in these patients prior to delivery.

Progress of Labor:

43. Zhang J, Troendle J, Mikolajczyk R, Sundaram R, Beaver J, Fraser W. The natural history of the normal first stage of labor. Obstet Gynecol 2010; 115: 705-710.

Retrospective study evaluating the labor curves of 26,838 term parturients who delivered vaginally between 1959 and1966. Labor curves for the first stage of labor were constructed through mathematical modeling. There were several key findings: 1) Nulliparas may not have a clear transition to active labor; 2) the active stage of labor may not start until after 5cm cervical dilation in multiparas, or even later in nulliparas; and 3) a 2-hour threshold for diagnosing arrest of labor may be too short if applied before 6cm cervical dilation, but 4 hours may be too long after 6cm. This study was also validated in a modern cohort (see reference #44 below). These two studies will hopefully lead to re-evaluation of thresholds for intervening in prolonged labors.

Letters to the editor: Zimerman A, Smolin A. The natural history of the normal first stage of labor. Obstet Gynecol 2010; 116: 193; author reply 193.
Letter calling for a standardized methodology for assessing cervical progression in labor.

Cohen, Wayne R. The natural history of the normal first stage of labor. Obstet Gynecol 2010; 116: 772; author reply 772-3.

Letter questioning the validity of the modeling techniques used by Zhang et al.

44. Zhang J, Landy HJ, Branch DW, et al. Contemporary patterns of spontaneous labor with normal neonatal outcomes. Obstet Gynecol 2010; 116: 1281-1287.

Secondary data analysis of the Consortium on Safe Labor data (n=62,415 deliveries with normal perinatal outcomes) with the objective of describing labor patterns and estimating the duration of labor through mathematical modeling. Key findings included: 1) prior to 6 cm cervical dilation, nulliparas and multiparas progressed at a similar rate of cervical dilation, 2) the 95% percentile for the second stage of labor is 3.6 and 2.8 hours in nulliparous women with and without epidural analgesia, respectively, and 3) allowing labor to continue for a longer duration if the cervix is dilated < 6cm may help reduce the cesarean delivery rate.

Cesarean Delivery:

45. Zhang J, Troendle J, Reddy UM, et al. Contemporary cesarean delivery practice in the United States. Am J Obstet Gynecol 2010; 203: 326.e1-10.

Observational cohort study (n=228,668) describing contemporary cesarean delivery practices in the United States over a six-year period (2002 - 2008). The overall CD rate was 30.5%. Three key findings: 1) repeat cesarean deliveries were the leading cause of CDs and contributed approximately 30% to the overall total CD count, 2) only 28.7% of all women with a previous cesarean delivery attempted a vaginal trial of labor, with a 57.1% success rate, and 3) half of all CDs for dystocia were performed before 6cm cervical dilation.

46. WylieBJ,GilbertS,LandonMB,etal.Comparisonoftransverseand vertical skin incision for emergency cesarean delivery. Obstet Gynecol 2010; 115: 1134-1140.

Secondary analysis of delivery data from the NICHD MFMU network 1999-2000 (n=37,112) comparing the incision-to-delivery (ITD) interval and maternal and fetal outcomes by skin incision in emergent cesarean deliveries using transverse or vertical skin incisions. In the vertical incision group, neonatal delivery occurred 1 minute faster for primary CD's and two minutes faster for repeat CD's, yet despite the shortened ITD time, the neonatal outcomes were worse in this group than in the transverse incision group.

Letter to the editor: Suzuki S. Comparison of transverse and vertical skin incision for emergency cesarean delivery. Obstet Gynecol 2010; 116: 773; author reply 773.

Antibiotic Prophylaxis for Cesarean Delivery:

47. ACOGCommitteeOpinionNo.465:AntimicrobialProphylaxisfor CesareanDelivery:TimingofAdministration.ObstetGynecol2010; 116: 791-2.

New committee statement recommending antimicrobial prophylaxis be administered for all cesarean deliveries within 60 minutes of the start of the surgery, unless the patient is already receiving appropriate antibiotics (e.g. for treatment of chorioamnionitis). If antibiotics can not be administered within 1hr of surgical incision, they should be administered as soon as possible.

Vaginal Birth after Cesarean Delivery (VBAC):

48. NationalInstitutesofHealthConsensusDevelopmentConference statement:vaginalbirthaftercesarean:newinsightsMarch8-10, 2010. National Institutes of Health Consensus Development Conference Panel. Obstet Gynecol 2010; 115 :1279-95. Also availableat:http://consensus.nih.gov.ezproxy.galter.northwestern.edu/2010/vbacstatement.htm (Accessed: 1.13.11)

Multidisciplinary panel convened by the NIH to evaluate the current state of evidence surrounding vaginal births after previous cesarean deliveries. The panel concluded that VBACs are a safe choice for most women and urged professional societies to reconsider the recommendation for "immediate availability" of anesthesia and surgical personnel which is limiting access to care for patients desirous of a vaginal trial of labor, because many institutions can not meet the "immediate availability" requirement.

See also: ACOG Practice Bulletin no. 115. Vaginal birth after previous cesarean delivery. Obstet Gynecol 2010; 116: 450-63.

Updated practice bulletin summarizing the risks and benefits of trial of labor in various clinical situations and providing guidelines for management. The new guidelines identify additional categories of women for whom VBAC is a safe choice.

See also: Guise JM, Denman MA, Emeis C, et al. Vaginal birth after cesarean: new insights on maternal and neonatal outcomes. Obstet Gynecol 2010; 115: 1267-1278.

Systematic review of 203 high and moderate quality studies that concluded that vaginal birth after cesarean delivery is a reasonable and safe choice for the majority of women with a prior cesarean delivery; however, further studies are necessary to identify women at increased risk for adverse outcomes.

49. CahillAG,TuuliM,OdiboAO,StamilioDM,MaconesGA.Vaginal birthaftercaesareanforwomenwiththreeormorepriorcaesareans: assessing safety and success. BJOG 2010; 117: 422-427.

Retrospective cohort (n=25,005) estimating the success and risk associated with vaginal trial of labor following 1-2 prior CDs, compared to >3 prior CDs. Of the 89 women with >3 previous CDs, there was no difference in the success of the VBAC, nor any increase in the composite outcome (uterine rupture, bladder/bowel injury, uterine artery laceration). One limitation of this study is that the authors provided no information on neonatal outcomes.

Letters to the editor: The following two letters identify additional study limitations:

Spencer C, Pakarian F. Vaginal birth after caesarean for women with three or more prior caesareans: assessing safety and success. BJOG 2010; 117: 1034; author reply 1034-1035.

Smith A. Can vaginal birth after caesarean be justified? BJOG 2010; 117: 1426-1427; author reply 1427-1428.

50. CahillAG,OdiboAO,AllsworthJE,MaconesGA.Frequentepidural dosingasamarkerforimpendinguterineruptureinpatientswho attemptvaginalbirthaftercesareandelivery.AmJObstetGynecol 2010; 202: 355.e1-5.

Nested case-control study within a multi-center retrospective cohort of 25,000 in which patients with uterine rupture (n=93) were compared to women without rupture (n=411) while undergoing a trial of labor with epidural analgesia. Cox-regression analysis revealed a dose-response relationship between the number of epidural doses and uterine rupture risk. Be aware that the authors never define "dose," although it is likely given the findings that each dose is fractionated injection of local anesthetic. The range of "doses" was 1-16 in the 90 minutes preceding uterine rupture.

51. BujoldE,GauthierRJ.Riskofuterineruptureassociatedwithan interdeliveryintervalbetween18and24months.ObstetGynecol 2010; 115: 1003-1006.

Secondary analysis of a retrospective cohort study of women undergoing a vaginal trial of labor after cesarean delivery comparing risk of uterine rupture with 3 interdelivery intervals (IDD): <18 m, 18-24 m, and >24 m. Women with IDD <18 months had a 3-times higher odds of uterine rupture compared to controls. While these women should not be excluded from vaginal trials of labor, providers should be aware of the increased risk in these patients.

Intrapartum Fetal Monitoring:

52. WesterhuisME,VisserGH,MoonsKG,etal.Cardiotocographyplus ST analysis of fetal electrocardiogram compared with cardiotocographyonlyforintrapartummonitoring:arandomized controlled trial. Obstet Gynecol 2010; 115: 1173-1180.

Randomized controlled trial (n=5,681) in which laboring women with a high-risk singleton gestation were randomized to fetal monitoring using cardiotocography with ST analysis or cardiotocography alone. The addition of ST analysis did not reduce the incidence of metabolic acidosis or adverse fetal outcomes.

53. ElliottC,WarrickPA,GrahamE,HamiltonEF.Gradedclassification offetalheartratetracings:associationwithneonatalmetabolic acidosisandneurologicmorbidity.AmJObstetGynecol2010;202: 258.e1-8.

Development and testing of a software tool to grade fetal heart rate tracings and validation of a five-tier system using electronic fetal monitoring tracings of 2,472 infants born >35 weeks gestation with one of three outcomes (neonatal encephalopathy and UA base deficit >12 mmol/L, no neonatal encephalopathy and UA base deficit >12 mmol/L, and infants with normal blood gases). As expected, both the degree and duration of tracing abnormalities were related to fetal outcomes.

Letter to the editor: Schifrin BS. Graded classification of fetal heart rate tracings: association with neonatal metabolic acidosis and neurologic morbidity. Am J Obstet Gynecol 2010; 202: e11; author reply e11-12.

Obstetric Complications:

Amniotic Fluid Embolism:

54. Knight M, Tuffnell D, Brocklehurst P, Spark P, Kurinczuk JJ. Incidence and risk factors for amniotic-fluid embolism. Obstet Gynecol 2010; 115: 910-917.

Nested case-control analysis using the UK Obstetric Surveillance System estimating the incidence of AFE and describing risk factors, management, and outcomes. Sixty women with AFE were identified over the four-year period. Incidence of AFE was 2 per 100,000 (95% CI: 1.5-2.5/100,000). AFE was associated with induction of labor, multiple pregnancy, older, and ethnic minority women. There was an increased mortality for women of ethnic minority groups.

55. Roberts CL, Algert CS, Knight M, Morris JM. Amniotic fluid embolism in an Australian population-based cohort. BJOG 2010; 117: 1417-1421.

A seven-year population based cohort study of over 600,000 deliveries reporting an incidence of AFE of 3.3 per 100,000 (95% CI, 1.9–4.7/100,000), with maternal and perinatal mortality rates of 35% and 32% respectively. Newly identified risk factors included induction with vaginal prostaglandin and manual removal of the placenta.

Postpartum Hemorrhage:

Predictors of Postpartum Hemorrhage:

56. Stafford IA, Dashe JS, Shivvers SA, Alexander JM, McIntire DD, Leveno KJ. Ultrasonographic cervical length and risk of hemorrhage in pregnancies with placenta previa. Obstet Gynecol 2010; 116: 595-600.

Prospective cohort study of patients with placenta previa (n=68) evaluating the relationship between 3rd trimester cervical length and the risk of postpartum hemorrhage. A short cervix, defined as cervical length <30 mm, was associated with an increased risk of vaginal bleeding and preterm birth. While these findings need validation, cervical length may become a prognostic tool for antepartum hemorrhage and preterm delivery.

Letter to the editor: Ghi T, Youssef A. Ultrasonographic cervical length and risk of hemorrhage in pregnancies with placenta previa. Obstet Gynecol 2010; 116: 1458; author reply 1458-1459.

Epidemiology of Postpartum Hemorrhage:

57. Callaghan WM, Kuklina EV, Berg CJ. Trends in postpartum hemorrhage: United States, 1994-2006. Am J Obstet Gynecol 2010; 202: 353.e1-6.

Population-based surveillance using the 1994-2006 National Inpatient Sample (NIS) datasets estimating the incidence and trends in postpartum hemorrhage (PPH). Over the 12-year period, the incidence of PPH increased by 26%. This increase was primarily driven by an increase in uterine atony. This increase in the incidence in PPH parallels that seen in Canada, the UK, and Australia.

58. Bateman BT, Berman MF, Riley LE, Leffert LR. The epidemiology of postpartum hemorrhage in a large, nationwide sample of deliveries. Anesth Analg 2010; 110: 1368-1373.

Using similar methodology, the authors of this study used the 1995-2004 NIS datasets. They too found an increase in the incidence of PPH over the time period. Logistic regression modeling identified age <20 or >40 years, cesarean delivery, hypertensive diseases of pregnancy, polyhydramnios, chorioamnionitis, multiple gestation, retained placenta, and antepartum hemorrhage as independent risk factors for PPH from uterine atony that resulted in transfusion.

Management of Postpartum Hemorrhage:

59. Levi M, Levy JH, Andersen HF, Truloff D. Safety of recombinant activated factor VII in randomized clinical trials. N Engl J Med 2010; 363: 1791-1800.

Industry funded meta-analysis of data from 35 randomized controlled trials (n=4,468) evaluating off-label use of recombinant activated factor VII. There was an increased risk of arterial, but not venous, thromboembolic events, with over half the events being coronary. Of note, none of these trials included pregnant women.

Accompanying editorial: Aledort LM. Off-label use of recombinant activated factor VII--safe or not safe? N Engl J Med. 2010 Nov 4; 363: 1853-1854.

A series of articles addressed strategies for reducing postpartum hemorrhage in low-resource settings or with medications not yet available in the United States. If interested, see:

Blum J, Winikoff B, Raghavan S, et al. Treatment of post-partum haemorrhage with sublingual misoprostol versus oxytocin in women receiving prophylactic oxytocin: a double-blind, randomised, non-inferiority trial. Lancet 2010; 375: 217-223.

Attilakos G, Psaroudakis D, Ash J, et al. Carbetocin versus oxytocin for the prevention of postpartum haemorrhage following caesarean section: the results of a double-blind randomised trial. BJOG 2010; 117: 929-936.

Winikoff B, Dabash R, Durocher J, et al. Treatment of post-partum haemorrhage with sublingual misoprostol versus oxytocin in women not exposed to oxytocin during labour: a double-blind, randomised, non-inferiority trial. Lancet 2010; 375: 210-216.

Widmer M, Blum J, Hofmeyr GJ, et al. Misoprostol as an adjunct to standard uterotonics for treatment of post-partum haemorrhage: a multicentre, double-blind randomised trial. Lancet 2010; 375: 1808-1813.

Regionalization of Care in Postpartum Hemorrhage:

60. Wright JD, Herzog TJ, Shah M, et al. Regionalization of care for obstetric hemorrhage and its effect on maternal mortality. Obstet Gynecol 2010; 115: 1194-1200.

Retrospective study evaluating the relationship between hospital volume (# hysterectomies per year) and mortality following peripartum hysterectomy (n=2,209). There was a linear decrease in mortality with increasing hospital volume, even after adjusting for important confounders such as patient race, insurance status, and hospital type. While the authors made an argument in support of regionalizing high-risk deliveries, such as accretas, I believe that due to the unpredictable nature of hemorrhage, this speaks to the importance for all hospitals to have guidelines for the management of postpartum hemorrhage.

Letter to the editor: Rosner M, Bernstein PS. Regionalization of care for obstetric hemorrhage and its effect on maternal mortality. Obstet Gynecol 2010; 116: 1222; author reply 1222-1223.

Letter detailing how the decision to perform a peripartum hysterectomy may vary based on hospital resources (i.e. low-volume centers may be more likely to perform an early hysterectomy due to lack of equipment and ancillary services) and how regionalization of care may lead to worse outcomes in low-volume centers.

Fertility Following Embolization for Postpartum Hemorrhage:

61. Sentilhes L, Gromez A, Clavier E, Resch B, Verspyck E, Marpeau L. Fertility and pregnancy following pelvic arterial embolisation for postpartum haemorrhage. BJOG 2010; 117: 84-93.

Retrospective cohort of women with uterine artery embolization comparing subsequent fertility in women who had embolization alone vs. embolization with uterine-sparing surgery (vessel ligation or uterine compression). There was no difference in success for repeat pregnancies in either of the two groups, as the thirty women who desired repeat pregnancies had a 100% success rate. Of concern, repeat PPH occurred in 61% of the patients.

See also: Hardeman S, Decroisette E, Marin B, et al. Fertility after embolization of the uterine arteries to treat obstetrical hemorrhage: a review of 53 cases. Fertil Steril 2010; 94: 2574-2579.

Case series of 53 patients who had undergone uterine artery embolization for post-partum hemorrhage evaluating subsequent fertility using mixed methods. Embolization did not alter subsequent fertility in the patients who desired additional children.

Pulmonary Complications After Cesarean Delivery:

62. Meira MN, Carvalho CR, Galizia MS, et al. Atelectasis observed by computerized tomography after Caesarean section. Br J Anaesth 2010; 104: 746-750.

Prospective cohort of women who had delivered vaginally with CSE analgesia (n=10) and women who had a cesarean delivery under spinal anesthesia (n=10) evaluating atelectasis using computerized tomography 2 hours postpartum. The percentage cross-sectional area of atelectasis was 3.95% in the vaginal delivery group vs. 14.1% in the cesarean group. While there were no pulmonary complications in this small sample, the results highlight the potential for pulmonary complications in patients with pre-existing lung disease.

Maternal Mortality and Near-Misses:

63. Berg CJ, Callaghan WM, Syverson C, Henderson Z. Pregnancy-related mortality in the United States, 1998 to 2005. Obstet Gynecol 2010; 116: 1302-1309.

Retrospective population-based cohort from the Pregnancy Mortality Surveillance System from 1998-2005. The aggregate pregnancy related mortality was 14.5 per 100,000 live births, which is the highest it has been in 20 years. There continues to be a racial disparity in maternal mortality, with African American women having a four-fold higher rate of death than White women. Seven conditions contributed almost equally to maternal mortality: hemorrhage, thrombotic pulmonary embolism, infection, hypertensive disorders of pregnancy, cardiomyopathy, cardiovascular conditions, and noncardiovascular medical conditions

64. Hogan MC, Foreman KJ, Naghavi M, et al. Maternal mortality for 181 countries, 1980-2008: a systematic analysis of progress towards Millennium Development Goal 5. Lancet 2010; 375: 1609-1623.

Retrospective study evaluating rates and trends in maternal mortality (n=2,651 maternal deaths) from 181 countries from 1980-2008. Overall, maternal mortality has been decreasing since the 1980's; however, this decrease would be even larger in the absence of maternal deaths due to HIV, speaking to the worldwide need for improving treatment for HIV-infected mothers.

Letters to the editor: This article generated both controversy and praise from the readership, as there were 12 letters to the editor written in response to this article. General themes addressed were issues related to the validity of the dataset and methodological issues with the modeling techniques. Additionally, several articles called for additional mobilization of resources in specific countries to lower the maternal mortality rate. The letters to the editor and author replies can be found in the June issue Lancet 2010; 375: 1963-1968; the May issue 375: 1581-1582; and the October issue 376: 1389-90.

65. Souza JP, Cecatti JG, Parpinelli MA, et al. Maternal morbidity and near miss in the community: findings from the 2006 Brazilian demographic health survey. BJOG 2010; 117: 1586-1592.

Retrospective population based-cohort from the 2006 Brazilian Demographic Health Survey. The prevalence of near misses (defined as eclampsia, hysterectomy, blood transfusion, or ICU admission) was 21.1 per 100,000 live births. Risk factors for near misses in a multivariable logistic regression model included maternal age>40 years and low educational status.

66. Engmann C, Olufolabi A, Srofenyoh E, Owen M. Multidisciplinary team partnerships to improve maternal and neonatal outcomes: the Kybele experience. Int Anesthesiol Clin 2010; 48: 109-122.

Article summarizing how organizations such as Kybele are helping reduce the number of maternal and infant deaths, thereby helping meet the Millennium Development 2015 Goals.

Postpartum Care and Health Services Delivery:

Postpartum Depression:

67. Pauldon M, Palmer S, Hewitt C, Gilbody S. Screening for postnatal depression in primary care: cost effectiveness analysis. BMJ 2010; 339: b5203.

Comparative effectiveness study evaluating the cost-effectiveness of routine screening for postpartum depression vs. routine care alone in the primary care setting. The incremental cost effectiveness ratio (ICER) per quality adjusted life year for screening using the Edinburgh postnatal depression scale was $67,130 compared to routine care alone. Sensitivity analysis found that management of false negatives was a primary driver of the findings. The National Health Service (NHS) currently does not recommend screening for postpartum depression, however, review of this policy will likely happen in late 2010 (no findings published as of 1.14.11).

See also: Earls ME. Clinical report incorporating recognition and management of perinatal and postpartum depression into pediatric practice. Pediatrics 2010; 126: 1032-1039.

In contrast to the NHS, the American Academy of Pediatrics issued this report urging pediatricians to implement screening for postpartum depression during well-child visits, as postpartum depression presents a risk to not only to the mother, but the infant as well. The Patient Health Questionaire-2 (PHQ-2) or the Edinburgh Postnatal Depression scales are recommended as screening tools.

68. Moses-Kolko EL, Perlman SB, Wisner KL, James J, Saul AT, Phillips ML. Abnormally reduced dorsomedial prefrontal cortical activity and effective connectivity with amygdala in response to negative emotional faces in postpartum depression. Am J Psychiatry 2010; 167: 1373-1380.

Observational cohort, in which functional magnetic resonance imaging was performed on healthy postpartum women (n=16) and women with unmedicated postpartum depression (n=14) evaluating brain activity in response to negative emotional faces. Lesser amygdala activity correlated with the severity of postpartum depression. Decreased dorsomedial prefrontal cortical activity and diminished dorsomedial prefrontal cortical-amygdala connectivity may be a neural mechanism involved in postpartum depression, suggesting a site for future drug therapy.

See accompanying editorial: Leibenluft E, Yonkers KA. The ties that bind: maternal-infant interactions and the neural circuitry of postpartum depression. Am J Psychiatry 2010; 167: 1294-1296.

Health Services Utilization:

69. Thurman AR, Janecek T. One-year follow-up of women with unfulfilled postpartum sterilization requests. Obstet Gynecol 2010; 116: 1071-1077.

Retrospective study evaluating the pregnancy rates in 3 groups of women, those who requested and received post-partum tubal ligation (PPTL) (n=254), those who requested but did not receive a PPTL (n=92), and a control group that did not request or receive a PPTL (n=581) one year following an index delivery. Half of the patients who requested but did not receive a PPTL became pregnant within one year of the index delivery, compared to 22% of the control group. Healthcare delivery systems should evaluate their policies regarding post-partum tubal ligations to try to ensure patients can receive sterilizations and avoid undesired pregnancies.

70. Clark SL, Belfort MA, Dildy GA, et al. Emergency department use during the postpartum period: implications for current management of the puerperium. Am J Obstet Gynecol 2010; 203: 38 e31-36.

Retrospective study of emergency room admissions by postpartum women over a one-year period. In the first six weeks postpartum, 4.8% of women were seen in the emergency room, with 75% being seen within 3 weeks of hospital discharge. Most admissions were for infection (endometritis/wound infection, cholecystitis, or mastitis), but 16% were for evaluation of headache. As many of these conditions can be managed on an outpatient basis, the authors called for better education of patients, improving the systems of care so that all patients are assigned a primary care physician after discharge, and possibly changing the timing of the first postpartum visit.

Labor Analgesia:

Non-Pharmacologic Analgesic Methods:

71. Cho SH, Lee H, Ernst E. Acupuncture for pain relief in labour: a systematic review and meta-analysis. BJOG 2010; 117: 907-920.

Meta-analysis of 10 RCTs of limited to moderate quality (n=2,038) evaluating the effectiveness of acupuncture for labor analgesia. The evidence does not support the use of acupuncture for relief of labor pain.

Physiology and Pharmacology:

72. Ngan Kee WD, Ng FF, Khaw KS, Lee A, Gin T. Determination and comparison of graded dose-response curves for epidural bupivacaine and ropivacaine for analgesia in laboring nulliparous women. Anesthesiology 2010; 113: 445-453.

Randomized controlled trial (n=300) using blinded random allocation to characterize the dose-response curves for bupivacaine and ropivacaine. Laboring parturients were randomized to escalating doses of bupivacaine (10-40 mg) or ropivacaine (15-60 mg) for initiation of epidural labor analgesia. The potency ratio at the ED50 was similar to that previously reported in the literature (potency ratio R:B 0.75); however, at the ED90, there was no difference in potency between the two drugs.

73. Onuki E, Higuchi H, Takagi S, et al. Gestation-related reduction in lumbar cerebrospinal fluid volume and dural sac surface area. Anesth Analg 2010; 110: 148-153.

Prospective study (n=18) using magnetic resonance imaging to examine pregnancy-induced changes in the lumbosacral cerebrospinal fluid (CSF) volume and dural sac surface area. Each patient had an MRI performed in the pregnant and non-pregnant state, and the paired images were compared. CSF volume and dural sac surface area decreased significantly with pregnancy, which may in part explain the increased sensory levels achieved with neuraxial blockade in pregnant women.

74. Eisenach JC, Curry R, Tong C, Houle TT, Yaksh TL. Effects of intrathecal ketorolac on human experimental pain. Anesthesiology 2010; 112: 1216-1224.

Prospective observational study. Intrathecal ketorolac was administered to 41 non-pregnant volunteers followed by two assessments: 1) assessment of noxious thermal stimuli on normal skin and 2) assessment of mechanical stimuli on skin sensitized by topical capsaicin or ultraviolet burn. Intrathecal ketorolac reduced areas of allodynia after exposure to ultraviolet burn, but did not affect the hypersensitivity from capsaicin or thermal stimuli. These results suggest that ketorolac failed to inhibit spinal cord cyclooxygenase, suggesting that spinally produced prostaglandins may have a more limited role in pain and hypersensitivity than predicted by animal models.

Accompanying editorial: Angst MS. Intrathecal cyclooxygenase inhibitors in humans: don't throw in the towel! Anesthesiology 2010; 112: 1082-1083.

Technique and Equipment:

Sterile Technique:

75. Bacterial meningitis after intrapartum spinal anesthesia - New York and Ohio, 2008-2009. MMWR Morb Mortal Wkly Rep 2010; 59: 65-69.

Case series describing two clusters of bacterial meningitis following intrapartum neuraxial procedures. In all of the cases, the anesthesiologists either did not wear masks or there were unmasked visitors at the time of initiation of spinal anesthesia, making the likely mechanism of infection droplet transmission. Four of the cases were confirmed to be infections with S. salivarius, a bacterium that is part of the normal mouth flora.

See also: Van de Beek D, Drake JM, Tunkel AR. Nosocomial bacterial meningitis. N Engl J Med 2010; 362: 146-154.
Review article describing the pathophysiology, diagnosis, and management of bacterial meningitis.

76. Darouiche RO, Wall MJ, Jr., Itani KM, et al. Chlorhexidine-alcohol versus povidone-iodine for surgical-site antisepsis. N Engl J Med 2010; 362: 18-26.

High quality RCT in which 849 participants were randomized to perioperative skin preparation with either chlorhexidine-alcohol scrub (n=409) or povidone-iodine (n=440). The incidence of surgical-site infections was significantly lower in the chlorhexidine-alcohol group (relative risk 0.59, 95% CI: 0.41-0.85), as were both superficial and deep incision infections. Of note, the new ASA practice advisory recommends the use of chlorhexidine (preferably with alcohol) for skin preparation prior to neuraxial procedures.

Accompanying editorial: Wenzel RP. Minimizing surgical-site infections. N Engl J Med 2010; 362: 75-77.

See also: Practice advisory for the prevention, diagnosis, and management of infectious complications associated with neuraxial techniques: a report by the American Society of Anesthesiologists Task Force on infectious complications associated with neuraxial techniques. Anesthesiology 2010; 112: 530-545.

Updated practice advisory addressing the prevention of infectious complications associated with neuraxial techniques, as well as the diagnosis and management of infectious complications.

77. Nevo I, Fitzpatrick M, Thomas R-E, et al. The efficacy of visual cues to improve hand hygiene compliance. Sim Healthcare 2010; 5: 325-331.

Randomized controlled trial of 150 healthcare workers (75 physicians, 75 nurses) randomized to one of five groups with different visual cues to encourage hand hygiene compliance (HHC) in a simulated patient encounter. In the control group, the hand sanitizer was in its usual location, and the rate of HHC was dismally low (37% prior to seeing the patient and 33% afterward). The most effective strategy for improving HHC was the use of a warning sign informing the healthcare provider that the room was under surveillance and failing to perform HHC would result in an alarm being triggered (93% pre- as well as post-patient encounter HHC).

Ultrasound:

78. Pysyk CL, Persaud D, Bryson GL, Lui A. Ultrasound assessment of the vertebral level of the palpated intercristal (Tuffier's) line. Can J Anaesth 2010; 57: 46-49.

Observational study (n=114) reporting that according to ultrasound, the palpated intercristal line in non-pregnant women was at or below L3-4 in 87% of participants.

79. Margarido CB, Arzola C, Balki M, Carvalho JC. Anesthesiologists' learning curves for ultrasound assessment of the lumbar spine. Can J Anaesth 2010; 57: 120-126.

Prospective cohort study (n=18) evaluating competency in identifying the intervertebral space, optimal insertion point, and depth to the epidural space using ultrasound, in participants who had undergone a one-day, hands-on, ultrasound training workshop. Through CUSUM analysis only 27% of participants achieved competence in determining the interspace, and none achieved competence in identifying the insertion point or depth to the epidural space, suggesting that limited hands-on education may not be sufficient for achieving competence.

80. Vallejo MC, Phelps AL, Singh S, Orebaugh SL, Sah N. Ultrasound decreases the failed labor epidural rate in resident trainees. Int J Obstet Anesth 2010; 19: 373-378.

Prospective randomized controlled trial in which 370 parturients were randomized to have their epidural catheter placed by first year anesthesia residents with or without prior ultrasound identification of the depth to the epidural space. The ultrasound group had fewer attempts at catheter placement and a higher rate of successful catheters than the control group (98.4% success in the ultrasound group compared to 94.5% in the control).

Other:

81. Segal S, Arendt KW. A retrospective effectiveness study of loss of resistance to air or saline for identification of the epidural space. Anesth Analg 2010; 110: 558-563.

Retrospective cohort study evaluating loss of resistance to air (n=489) or saline (n=440) and anesthetic outcomes. There was no difference in block success between the air or saline groups. Anesthesiologists' preference for loss-of-resistance medium was defined as >70% use of either air or saline. Use of anesthesiologist's preferred technique for LOR was associated with fewer attempts at placement, fewer paresthesias, and fewer unintentional dural punctures.

82. Varelmann D, Pancaro C, Cappiello EC, Camann WR. Nocebo-induced hyperalgesia during local anesthetic injection. Anesth Analg 2010; 110: 868-870.

Randomized controlled study, in which term parturients (n=140) requesting neuraxial analgesia were randomized to a placebo statement ("We are going to give you a local anesthetic… and you will be comfortable through the procedure") or nocebo statement ("You are going to feel a bee sting, this is the worst part of the procedure") at the time of local anesthetic skin wheal injection. Patients who received the placebo statement reported lower median verbal analog pain scores than those who received the nocebo statement, suggesting that anesthesiologists should consider using "gentler words" during invasive procedures.

83. Horlocker TT, Wedel DJ, Rowlingson JC, et al. Regional anesthesia in the patient receiving antithrombotic or thrombolytic therapy: American Society of Regional Anesthesia and Pain Medicine Evidence-Based Guidelines (Third Edition). Reg Anesth Pain Med 2010; 35: 64-101.

Updated guidelines from the American Society of Regional Anesthesia and Pain Medicine focusing on neuraxial and peripheral techniques. For the first time, the guidelines specifically address antithrombotic therapy and pregnancy.

Accompanying editorial: Fleischmann KH, Kuter DJ, Coley CM, Rathmell JP. Practice guidelines often fail to keep pace with the rapid evolution of medicine: a call for clinicians to remain vigilant and revisit their own practice patterns. Reg Anesth Pain Med 2010; 35: 4-7.

Maintenance of Analgesia:

84. Leo S, Ocampo CE, Lim Y, Sia AT. A randomized comparison of automated intermittent mandatory boluses with a basal infusion in combination with patient-controlled epidural analgesia for labor and delivery. Int J Obstet Anesth 2010; 19: 357-364.

High quality randomized controlled study (n=62) evaluating automated mandatory boluses with PCEA (AMB+PCEA) to basal infusion and PCEA for maintenance of labor analgesia using a single-pump delivery system. The AMB group had greater patient satisfaction and longer duration of effective analgesia despite decreased drug consumption.

85. Hawkins JL. Epidural analgesia for labor and delivery. N Engl J Med 2010; 362: 1503-1510.

Clinical vignette and review of current evidence and recommendations in obstetric anesthesia.

86. Nelson KE, Houle TT, Eisenach JC. Blood pressure, but not cerebrospinal fluid fentanyl concentration, predicts duration of labor analgesia from spinal fentanyl. Anesthesiology 2010; 112:174-180.

Exploratory observational study (n=52) evaluating the relationship between cerebrospinal fluid fentanyl concentration 1 minute after injection and the duration of intrathecal analgesia. While fentanyl concentrations were not predictive of increased analgesic duration, increased systolic blood pressure, decreased diastolic blood pressure, and lower parity were. The final model had poor predictive ability to identify patients at risk for short-duration of labor analgesia (64% sensitivity, 10% specificity). Future studies should incorporate a second fentanyl concentration at a different time point in order to better understand the relationship between fentanyl pharmacokinetics and duration of analgesia.

Disparities in Analgesic Utilization:

87. Liu N, Wen SW, Manual DG, Katherine W, Bottomley J, Walker MC. Social disparity and the use of intrapartum epidural analgesia in a publicly funded healthcare system. Am J Obstet Gynecol 2010; 202: 273.e1-8.

Population based surveillance (n=220,814 singleton vaginal deliveries) evaluating disparities in epidural analgesia utilization over a 2-year period. Neighborhood socioeconomic status was estimated based on census data for each postal (zip) code. Epidural analgesia use decreased with decreasing socioeconomic status as well as decreasing neighborhood educational levels.

Accompanying editorial: Dehlendorf C, Bryant AS, Huddleston HG, Jacoby VL, Fujimoto VY. Health disparities: definitions and measurements. Am J Obstet Gynecol 2010; 202: 212-213.

88. Shavers VL, Bakos A, Sheppard VB. Race, ethnicity, and pain among the U.S. adult population. J Health Care Poor Underserved 2010; 21: 177-220.

Excellent systematic review evaluating factors underlying racial and ethnic disparities in pain relief.

See also: Wynia MK, Ivey SL, Hasnain-Wynia R. Collection of data on patients' race and ethnic group by physician practices. N Engl J Med 2010; 362: 846-850.

Commentary explaining rationale for collection of patient race and ethnicity in order to ensure high-quality care.

Anesthesia for Cesarean Delivery:

Spinal Anesthesia

Assessment of Sensory Level:

89. Walsh P, Columb M, Russell R. A comparison of a Neuropen monofilament and ethyl chloride for assessing loss of touch sensation during combined spinal-epidural anaesthesia for caesarean section. Int J Obstet Anesth 2010; 19: 365-372.

Observational study (n=40) comparing Neuropen monofilament with ethyl chloride in the assessment of touch after initiation of spinal anesthesia for cesarean delivery. Both modalities were equivalent at assessing touch, although the authors caution that it is important to give the patient a reference as to what the stimulus they are testing for to obtain the most accurate determination of sensory level.

Management of Hypotension:

90. Allen TK, George RB, White WD, Muir HA, Habib AS. A double-blind, placebo-controlled trial of four fixed rate infusion regimens of phenylephrine for hemodynamic support during spinal anesthesia for cesarean delivery. Anesth Analg 2010; 111: 1221-1229.

High quality randomized controlled trial (n=101) in which term women undergoing elective cesarean deliveries were randomized to receive placebo or one of 4 fixed-rate phenylephrine infusions (25-100 µg/min) following spinal anesthesia. While the fixed-rate infusions did not reduce the number of physician interventions to maintain maternal SBP within 20% of baseline, or the accuracy of hemodynamic control controlled to placebo, they did reduce the incidence and severity of maternal pre-delivery hypotension, without any differences in secondary outcomes such as nausea or vomiting. The authors concluded that if fixed-rate infusions are used, lower rates are more clinically appropriate.

91. Stewart A, Fernando R, McDonald S, Hignett R, Jones T, Columb M. The dose-dependent effects of phenylephrine for elective cesarean delivery under spinal anesthesia. Anesth Analg 2010; 111: 1230-1237.

High quality randomized controlled trial in which term women (n=75) undergoing elective cesarean deliveries were randomized to receive one of 3 variable-rate phenylephrine infusions (starting dose: 25, 50 or100 µg/min) following spinal anesthesia. Cardiac output, stroke volume, and contractility were measured with suprasternal ultrasound. There was a dose-dependent decrease in heart rate and cardiac output, with a 20% reduction in the 100 µg/min group, suggesting using lower starting rates for phenylephrine infusions and avoiding maternal bradycardia during phenylephrine infusions.

See also: Dyer RA, Reed AR. Spinal hypotension during elective cesarean delivery: closer to a solution. Anesth Analg 2010; 111: 1093-1095.

92. George RB, McKeen D, Columb MO, Habib AS. Up-down determination of the 90% effective dose of phenylephrine for the treatment of spinal anesthesia-induced hypotension in parturients undergoing cesarean delivery. Anesth Analg 2010; 110:154-158.

An up-down sequential allocation study using the biased-coin design was used to estimate the ED90 of phenylephrine (n=66). The ED90 was estimated to be 147 µg (95% CI: 98-222µg) using a maximum likelihood estimation method.

See also: Pace NL, Stylianou MP. Advances in and limitations of up-and-down methodology: a precis of clinical use, study design, and dose estimation in anesthesia research. Anesthesiology 2007; 107: 144-152.

93. Banerjee A, Stocche RM, Angle P, Halpern SH. Preload or coload for spinal anesthesia for elective Cesarean delivery: a meta-analysis. Can J Anaesth 2010; 57: 24-31.

Meta-analysis of eight studies of varying quality (n=518) concluding there is no difference in the incidence of hypotension between patients that receive a fluid pre-load versus co-load. Of note, the authors of the meta-analysis did not use a standardized definition of hypotension, which weakens the strength of their conclusion.

See also: Klohr S, Roth R, Hofmann T, Rossaint R, Heesen M. Definitions of hypotension after spinal anaesthesia for caesarean section: literature search and

application to parturients. Acta Anaesthesiol Scand 2010; 54: 909-921.
Systematic review of the obstetric anesthesia literature (63 publications, n=7120) revealing 15 definitions for hypotension. The different definitions were applied to a prospective cohort of patients, and the incidence of hypotension ranged from 7% to 74%!

Postoperative Analgesic Requirements:

94. Carvalho B, Coleman L, Saxena A, Fuller AJ, Riley ET. Analgesic requirements and postoperative recovery after scheduled compared to unplanned cesarean delivery: a retrospective chart review. Int J Obstet Anesth 2010; 19: 10-15.

Retrospective cohort study (n=200) comparing postoperative analgesic consumption in women with scheduled compared to unplanned cesarean delivery following failed trial of labor. There were no differences in analgesic consumption between the two groups.

General Anesthesia:

95. Ueyama H, Hagihira S, Takashina M, Nakae A, Mashimo T. Pregnancy does not enhance volatile anesthetic sensitivity on the brain: an electroencephalographic analysis study. Anesthesiology 2010; 113: 577-584.

Observational study in which parturients undergoing cesarean delivery (n=15) and gynecologic surgery (n=15) underwent electroencephalographic evaluation using a bispectral index monitor during general anesthesia with sevoflurane. There were no significant differences in EEG parameters in pregnant and non-pregnant women. Caution is required in interpreting these results as the use of bispectral index monitors have not been validated in the pregnant population.

Complications of Analgesia/ Anesthesia:

Airway Changes:

96. Boutonnet M, Faitot V, Katz A, Salomon L, Keita H. Mallampati class changes during pregnancy, labour, and after delivery: can these be predicted? Br J Anaesth 2010; 104: 67-70.

Prospective observational study (n=87), in which Mallampati class was evaluated at four different time points in pregnancy (in the 8th month of pregnancy, at epidural placement during labor, immediately postpartum, and at 48 hours postpartum). There was a worsening in Mallampati class in 63% of patients. A logistic regression did not identify any factors predictive of changes in Mallampati class over time. Therefore, obstetric anesthesiologists should remain vigilant with regards to airway changes over the course of prolonged labors.

Aspiration:

97. Singata M, Tranmer J, Gyte GM. Restricting oral fluid and food intake during labour. Cochrane Database Syst Rev 2010: CD003930.

Meta-analysis of five studies of varying quality (n=3,130) concluding that oral intake should not be restricted during labor. The results of this meta-analysis should be interpreted with caution as most of the results are driven by one large study (O'Sullivan G, Liu B, Hart D, Seed P, Shennan A. Effect of food intake during labour on obstetric outcome: randomised controlled trial. BMJ 2009; 338: b784), and none of the studies was designed to evaluate the effect of eating/ drinking on maternal aspiration risk.

Local Anesthetic Systemic Toxicity:

98. Neal JM, Bernards CM, Butterworth JF 4th, et al. ASRA practice advisory on local anesthetic systemic toxicity. Reg Anesth Pain Med 2010; 35: 152-161 and The Association of Anaesthetists of Great Britain & Ireland. AAGBI Safety Guideline: Management of Severe Local Anaesthetic Toxicity, 2010.

With the accumulating number of case reports and animal evidence supporting the use of lipid emulsion in the setting of local anesthetic toxicity, both ASRA and the AAGBI have updated their guidelines to include lipid emulsion. Both recommend that lipid emulsion be administered immediately following initial management (airway management and seizure control) regardless of whether circulatory arrest is present.

99. Di Gregorio G, Neal JM, Rosenquist RW, Weinberg GL. Clinical presentation of local anesthetic systemic toxicity: a review of published cases, 1979 to 2009. Reg Anesth Pain Med 2010; 35: 181-187.

Interesting case series in which 93 cases of local anesthetic systemic toxicity over a 30-year period are reviewed. Of note, epidural block was the most common anesthetic technique associated with local anesthetic systemic toxicity.

See also: Butterworth JF 4th. Models and mechanisms of local anesthetic cardiac toxicity: a review. Reg Anesth Pain Med 2010; 35: 167-176.
Review article describing the mechanism of local anesthetic toxicity.

See also: Mulroy MF, Hejtmanek MR. Prevention of local anesthetic systemic toxicity. Reg Anesth Pain Med 2010; 35: 177-180.
Review article summarizing strategies to reduce local anesthetic systemic toxicity.

100. Hiller DB, Di Gregorio G, Kelly K, et al. Safety of high volume lipid emulsion infusion: a first approximation of LD50 in rats. Reg Anesth Pain Med 2010; 35: 140-144.

Murine study (n=9) evaluating the LD50 of lipid emulsion using an up-down methodology. The maximum likelihood estimate for LD50 was 67.72 mL/kg. The upper recommended dose for humans is 10 mL/kg, which is well below the estimated LD50 in this murine model.

101. Harvey M, Cave G, Prince G, Lahner D. Epinephrine injection in lipid-based resuscitation from bupivacaine-induced cardiac arrest: transient circulatory return in rabbits. Anesth Analg 2010; 111: 791-796.

Animal study evaluating role of epinephrine co-administered with lipid emulsion in a rabbit model of bupivacaine-induced cardiac arrest. In the 4 groups of rabbits (n=5 per group), saline or escalating doses of epinephrine were administered after asystole, intubation, and chest compressions were initiated. In the absence of return of spontaneous circulation (ROSC) at 15 minutes, 100 µg/kg epinephrine was injected. ROSC was not seen in the lipid-only or low-dose epinephrine groups until after epinephrine was administered, however, animals in the high dose epinephrine groups experienced profound hemodynamic derangements. This suggests that epinephrine may be necessary for ROSC in this rabbit model, but that high-dose epinephrine should be avoided if possible.

Postdural Puncture Headache:

102. Hakim SM. Cosyntropin for prophylaxis against postdural puncture headache after accidental dural puncture. Anesthesiology 2010; 113: 413-420.

Randomized controlled trial (n=90) evaluating the efficacy of prophylactic cosyntropin vs. placebo on the incidence of postdural puncture headache (PDPH) in patients with inadvertent dural puncture. While the incidence of PDPH in the control group was high (69%), there was a significant reduction in PDPH in the cosyntropin group (33%). The discussion provides possible mechanisms to explain the efficacy of cosyntropin. Future randomized controlled trials are necessary to validate the findings of this study.

Lactation:

103. WilsonMJ,MacArthurC,CooperGM,BickD,MoorePA,ShennanA. Epiduralanalgesiaandbreastfeeding:arandomisedcontrolledtrial ofepiduraltechniqueswithandwithoutfentanylandanon-epidural comparison group. Anaesthesia 2010; 65: 145-153.

Case-control study using data on breastfeeding initiation and duration collected as part of the COMET study. Patients that received bupivacaine-only epidural analgesia were compared to two mobile epidural technique groups that included epidural fentanyl (n=1,054), and one non-epidural analgesia control group (n=351). In contrast to what is seen in the US, older patients, and those of non-White ethnicities, were most likely to initiate breastfeeding. Using logistic regression controlling for race/ethnicity, age, labor analgesia, and delivery mode, the authors found that there was no association between epidural fentanyl and breastfeeding initiation.

Letter to the editor: Uppal V, Young SJ. Smoking and ethnic group, not epidural use, determine breast feeding outcome. Anaesthesia 2010; 65: 652.

Letter describing retrospective review of institutional data (n=13,000) concluding that epidural fentanyl was not predictive of breastfeeding-intentions, but that smoking was, with non-smokers having a 3-times higher odds of intentions to breastfeed than smokers.

Medico-Legal Issues:

104. SzypulaK,AshpoleKJ,BogodD,etal.Litigationrelatedtoregional anaesthesia:ananalysisofclaimsagainsttheNHSinEngland1995-2007. Anaesthesia 2010; 65: 443-452.

Retrospective review of 366 claims related to regional anesthesia in the National Health Service Litigation Authority database. Approximately half of the claims were related to obstetric anesthesia. One-third of those cases were related to inadequate analgesia during labor, cesarean delivery, or in the post-partum period. In contrast to claims in the ASA Closed Claims Project, only 20% of claims reported in obstetric patients were related to temporary or permanent nerve injuries.

See accompanying editorial: Bedforth NM, Hardman JG. The hidden cost of neuraxial anaesthesia? Anaesthesia 2010; 65: 437-439.

Uterotonics:

105. George RB, McKeen D, Chaplin AC, McLeod L. Up-down determinationoftheED(90)ofoxytocininfusionsfortheprevention ofpostpartumuterineatonyinparturientsundergoingCesarean delivery. Can J Anaesth 2010; 57: 578-582.

An up-down sequential allocation method using the biased-coin design was used to estimate the ED90 of oxytocin infusions during cesarean deliveries to prevent uterine atony (n=40). The ED90 was estimated to be 0.29 IU/min (95% CI: 0.15-0.43 IU/min) using Firth's penalized likelihood estimation.

106. ButwickAJ,ColemanL,CohenSE,RileyET,CarvalhoB.Minimum effectivebolusdoseofoxytocinduringelectiveCaesareandelivery. Br J Anaesth 2010; 104: 338-343.

Randomized, placebo controlled, dose-finding study (n=75) evaluating the minimum effective bolus dose of oxytocin to produce adequate uterine tone during elective cesarean delivery. Due to the high prevalence of adequate uterine tone after placebo and 0.5 IU of oxytocin, the authors could not estimate the ED50 or ED95. The findings of this study add to the growing body of literature that supports the use of lower doses of oxytocin to prevent uterine atony.

Letters to the editor: Breeze E. Br J Anaesth 2010; 104: 783; author reply 783-785; Woo C, McGlennan A. Br J Anaesth 2010; 105: 91-92; author reply 92-93; Lohit M, Slater P. Br J Anaesth 2010; 105: 91; author reply 92-93.

107. JonssonM,HansonU,LidellC,Norden-LindebergS.STdepression atcaesareansectionandtherelationtooxytocindose.Arandomised controlled trial. BJOG 2010; 117: 76-83.

High quality RCT in which healthy parturients undergoing elective cesarean delivery were randomized to receive either 5 IU (n=52) or 10 IU of oxytocin (n=51). The primary outcome was ST segment depression, but troponin I levels were measured in all parturients. There was a significantly lower incidence of ST segment depressions in the low-dose oxytocin group (absolute risk reduction 13.9%). ST depressions occurred in 67% of patients with cardiac complaints (chest pain, shortness of breath, or chest heaviness). There was no difference in troponin I elevations between the two groups; however, 75% of the patients with troponin elevations had cardiac complaints. In conclusion, high doses of oxytocin for prevention of PPH are not supported by the literature, as the risks seem to outweigh the benefits.

Letter to the editor: Butwick A, Dyer R. ST depression at caesarean section and the relation to oxytocin dose. A randomised controlled trial. BJOG 2010; 117:1165; author reply 1165-1166.

Letter identifying methodological flaws in the study and discussing how future investigations should not administer more than 5 units of oxytocin as there is sufficient evidence that doses greater than that are associated with more risk than benefit.

108. KingKJ,DouglasMJ,UngerW,WongA,KingRA.Fiveunitbolus oxytocin at cesarean delivery in women at risk of atony: a randomized,double-blind,controlledtrial.AnesthAnalg2010;111: 1460-1466.

Prospective randomized controlled trial (n=143) evaluating whether 5 IU of oxytocin delivered as a bolus with an infusion was superior to infusion delivery alone in patients with at least one risk factor for uterine atony. There was no difference in the need for uterotonics in the first 24 hours, EBL, or need for transfusion between the two groups. While this was not designed to be an equivalence study, these findings suggest a bolus may not be necessary to achieve good clinical outcomes.

109. DyerRA,vanDykD,DresnerA.Theuseofuterotonicdrugsduring caesarean section. Int J Obstet Anesth 2010; 19: 313-319.

Excellent review article describing the mechanism of action, side effects, and limitations of currently available uterotonics.

Accompanying editorial: Tsen LC, Balki M. Oxytocin protocols during cesarean delivery: time to acknowledge the risk/benefit ratio? Int J Obstet Anesth 2010; 19: 243-245.

110. Balki M, Cristian AL, Kingdom J, Carvalho JC. Oxytocin pretreatment of pregnant rat myometrium reduces the efficacy of oxytocin but not of ergonovine maleate or prostaglandin F2alpha. Reprod Sci 2010; 17: 269-277.

Murine study in which myometrial samples from Wistar rats were pretreated with oxytocin or saline and then subjected to a dose-response study with oxytocin (n=28), ergonovine (n=16), or prostaglandin F2α (n=16). Pretreatment with oxytocin reduced the strength of myometrial contractions with subsequent treatment with oxytocin, but no evidence of desensitization was found with ergonovine or prostaglandin F2α (PGF2α). Despite the desentization that occurred with oxytocin, the strength of uterine contractions was greatest with oxytocin>(PGF2α)>ergonovine. If these results can be replicated in humans, it has implications for the treatment of postpartum hemorrhage in patients previously exposed to oxytocin during labor.

111. De Dreu CK, Greer LL, Handgraaf MJ, et al. The neuropeptide oxytocin regulates parochial altruism in intergroup conflict among humans. Science 2010; 328: 1408-1411.

Interesting experiment evaluating the role of intranasally administered oxytocin on altruism using 3 economic games. Participants who received oxytocin demonstrated more altruism to members of their own group, however, demonstrated more aggression to those on competing teams, suggesting oxytocin's role extends beyond just mother-infant bonding into more complex social interactions.

Accompanying editorial: Miller G. Psychology. The prickly side of oxytocin. Science 2010; 328: 1343.

Postpartum Analgesia:

Analgesia Following Vaginal Delivery:

112. Macarthur A, Imarengiaye C, Tureanu L, Downey K. A randomized, double-blind, placebo-controlled trial of epidural morphine analgesia after vaginal delivery. Anesth Analg 2010; 110: 159-164.

Randomized controlled trial (n=228) comparing the effect of 2.5 mg epidural morphine vs. epidural saline given 1hr after delivery on analgesic requirements in the first 24 hours after delivery. Epidural morphine reduced analgesic requirements by 78%. Additionally, morphine increased the time to first request for additional analgesics, without any increase in side effects. However, by one week postpartum, there was a trend towards more analgesic use in the morphine group. While this is an intriguing finding, evaluation of the cost-effectiveness of routine morphine administration is necessary due to the increased cost associated with the prolonged monitoring required following epidural morphine.

Analgesia Following Cesarean Delivery:

113. Kanazi GE, Aouad MT, Abdallah FW, et al. The analgesic efficacy of subarachnoid morphine in comparison with ultrasound-guided transversus abdominis plane block after cesarean delivery: a randomized controlled trial. Anesth Analg 2010; 111: 475-481.

High quality RCT (n=57) in which patients undergoing cesarean delivery with spinal anesthesia were randomized to receive intrathecal subarachnoid morphine or transversus abdominis plane block postoperatively. All patients received a standardized postoperative multimodal pain regimen. Patients in the morphine group had a longer duration to first request for additional analgesics, and better analgesia both at rest and with activity. This study adds to the growing body of literature that shows that transversus abdominis plane blocks are not as effective as neuraxial morphine for primary analgesia, but may have a role in patients who have breakthrough pain postoperatively or in patients who are not candidates for neuraxial morphine.

See also: Griffiths JD, Barron FA, Grant S, Bjorksten AR, Hebbard P, Royse CF. Plasma ropivacaine concentrations after ultrasound-guided transversus abdominis plane block. Br J Anaesth 2010; 105: 853-856.
Observational study (n=28) evaluating un-bound venous ropivacaine concentrations at 10 different time points over the first 24-hours following a bilateral transversus abdominis plane block using 3 mL/kg ropivacaine. Over one third of the patients exceeded the toxic threshold of 0.15 µg/mL, although none of those patients demonstrated signs or symptoms of local anesthetic systemic toxicity.

114. Carvalho B, Clark DJ, Yeomans DC, Angst MS. Continuous subcutaneous instillation of bupivacaine compared to saline reduces interleukin 10 and increases substance P in surgical wounds after cesarean delivery. Anesth Analg 2010; 111: 1452-1459.

Exploratory observational study (n=38) evaluating the effect of continuous local anesthetic induced tissue toxicity on the release of inflammatory and nociceptive mediators in cesarean delivery incisions. Using multiplex bead array immunoassay, 18 cytokines and inflammatory mediators were assayed. Bupivacaine infusion resulted in a decrease in IL-10 and an increase in substance P in wounds, suggesting a disruption of anti-inflammatory mechanisms.

Accompanying editorial: Buvanendran A, Kroin JS. Does manipulating local surgical wound cytokines improve surgical outcomes? Anesth Analg 2010; 111: 1335-1336.

115. Rackelboom T, Le Strat S, Silvera S, et al. improving continuous wound infusion effectiveness for postoperative analgesia after cesarean delivery. Obstet Gynecol 2010; 116: 893-900.

High quality RCT (n=56) in which women undergoing cesarean delivery were randomized to receive a 48-hour continuous wound infusion either above or below the fascia using ropivacaine and ketoprofene through a multi-orifice catheter. Analgesic consumption was reduced by almost half in the sub-facial wound catheter group.

Chronic Postpartum Pain:

116. Kainu JP, Sarvela J, Tiippana E, Halmesmaki E, Korttila KT. Persistent pain after caesarean section and vaginal birth: a cohort study. Int J Obstet Anesth 2010; 19: 4-9.

Survey sent to 600 women during the first postpartum year (73% response rate) evaluating the association between delivery mode and persistent pain (at the surgical site or vaginal pain). The incidence of pain was higher than that previously reported in obstetrical anesthesia studies (18% for cesarean delivery patients, 10% for vaginal deliveries).

Accompanying editorial: Lavand'homme P. Chronic pain after vaginal and cesarean delivery: a reality questioning our daily practice of obstetric anesthesia. Int J Obstet Anesth 2010; 19:1-2.

117. Sia AT, Sng BL, Lim EC, Law H, Tan EC. The influence of ATP-binding cassette sub-family B member -1 (ABCB1) genetic polymorphisms on acute and chronic pain after intrathecal morphine for caesarean section: a prospective cohort study. Int J Obstet Anesth 2010; 19: 254-260.

Prospective cohort (n=620) investigating the association between ABCB1 polymorphisms and the effect of intrathecal morphine administered during spinal

anesthesia for cesarean delivery. ABCB1 polymorphisms were not associated with differences in morphine consumption in the first postpartum day. Women with the T allele of C3435T polymorphism showed a trend towards a higher risk of developing persistent postoperative pain.

118. WongCA,McCarthyRJ,BlouinJ,LandauR.Observationalstudyoftheeffectofmu-opioidreceptorgeneticpolymorphismonintrathecalopioidlaboranalgesiaandpost-cesareandeliveryanalgesia.IntJObstet Anesth 2010; 19: 246-253.

Two-part study evaluating whether the single nucleotide polymorphism of the μ-opioid receptor gene (OPRM1:c.304A>G) modifies either the duration of intrathecal fentanyl labor analgesia (n=190) or the supplemental analgesic consumption after intrathecal morphine administration for cesarean delivery (n=103). The authors found no association between intrathecal opioid analgesia and the OPRM1 304A/G polymorphisms.

Analgesic Management of External Cephalic Version:

119. WeinigerCF,GinosarY,ElchalalU,SelaHY,WeissmanC,EzraY.Randomizedcontrolledtrialofexternalcephalicversioninterm multiparaewithorwithoutspinalanalgesia.BrJAnaesth2010;104:613-618.

Randomized controlled trial of healthy term multiparous women undergoing an external cephalic version (ECV) with spinal analgesia (bupivacaine 7.5 mg) (n=31) compared with no analgesia (n=33). Spinal analgesia was associated with higher ECV success (87% compared to 57% in the control group) and higher maternal satisfaction.

120. YoshidaM,MatsudaH,KawakamiY,etal.Effectivenessofepiduralanesthesiaforexternalcephalicversion(ECV).JPerinatol2010;30:580-583.

Retrospective cohort study (n=84) evaluating the success of ECV in women who had epidural anesthesia versus no analgesia/anesthesia. Epidural anesthesia was initiated with 13 mL of 0.25% bupivacaine. Version success rates were 79% in the epidural group versus 56% in the control group. No adverse maternal or neonatal events were reported; however, versions were performed at 35-36 weeks of gestation, which is earlier than the typical gestational age at which versions are attempted in the United States.

Accompanying editorial: Caughey AB, El-Sayed YY. Regional anesthesia for external cephalic version: its time has come. J Perinatol 2010; 30: 569-570.

121. LavoieA,GuayJ.Anestheticdoseneuraxialblockadeincreasesthesuccessrateofexternalfetalversion:ameta-analysis.CanJAnaesth2010; 57: 408-414.

Meta-analysis of seven studies of varying quality (n=681) concluding that anesthetic dose neuraxial blockade (as opposed to analgesic dosing) increases the success rate of ECV.

Postpartum Tubal Ligation:

122. PanniMK,GeorgeRB,AllenTK,etal.Minimumeffectivedoseofspinalropivacainewithandwithoutfentanylforpostpartumtuballigation. Int J Obstet Anesth 2010; 19: 390-394.

Two prospective up-down sequential allocation studies were performed to determine the MLAC of ropivacaine with and without fentanyl for postpartum tubal ligation. ED95 was estimated using probit regressions. In the first study (n=24), the ED95 of hyperbaric ropivacaine was estimated to be 21.9 mg. The ED95 with the addition of 10 μg fentanyl (n=17) was estimated to be 21.3 mg. As both sample sizes were small, future studies are necessary to better estimate the ED95.

Fetus/Newborn:

Growth and Development:

123. OlsenIE,GrovemanSA,LawsonML,ClarkRH,ZemelBS.Newintrauterinegrowthcurvesbasedon UnitedStatesdata.Pediatrics2010; 125: e214-224.

Using a contemporary and racial/ethnically diverse prospective cohort of 391,681 infants, new intrauterine growth curves were created and validated. The new curves were compared to the currently used Lubchenco curves, and both small-for-gestational age and large-for-gestational age classifications differed significantly. Further work is needed to determine if these new definitions will have better sensitivity at identifying high-risk infants.

Preterm Delivery:

124. HibbardJU,WilkinsI,SunL,etal.Respiratorymorbidityinlatepreterm births. JAMA 2010; 304: 419-425.

Retrospective study comparing respiratory morbidity (resuscitation, respiratory support, and respiratory diagnoses) for late preterm births (n=17,474) compared with term births (n=164,589) admitted to the NICU with respiratory compromise. Multivariate logistic regression analysis compared infants at each gestational week, controlling for factors that influence respiratory outcomes. For neonates born at 34 weeks, the odds of respiratory distress syndrome were 40-fold higher than for an infant born at 39-40 weeks, with a linear decrease as gestational age increased.

125. SUPPORTStudyGroupoftheEunice KennedyShriverNICHDNeonatalResearchNetwork.EarlyCPAPversussurfactantinextremelypreterminfants.NEnglJMed2010;362:1970-1979.

High quality randomized, multi-center trial (n=1,316), in which infants born between 24 and 27 6/7 weeks gestation were randomized to intubation and surfactant or CPAP initiated in the delivery room. There was no reduction in the primary outcome (death or bronchopulmonary dysplasia) at 36 weeks; however, benefits of CPAP included less need for intubation, fewer days on mechanical ventilation, and increased likelihood of one-week survival, supporting the use of CPAP as an alternative to routine intubation and steroid treatment in preterm infants.

126. MercierJC,HummlerH,DurrmeyerX,etal.Inhalednitricoxideforpreventionofbronchopulmonarydysplasiainprematurebabies(EUNO):arandomisedcontrolledtrial.Lancet2010;376:346-354.

High quality randomized controlled study (n=800) in which preterm infants delivered between 24 weeks and 28 6/7 weeks requiring CPAP or surfactant for respiratory distress were randomized to receive inhaled nitric oxide or placebo gas for 7-21 days. There was no improvement in the incidence of bronchopulmonary dysplasia (BPD) or survival at 36 weeks postmenstrual age, suggesting inhaled nitric oxide is not an effective preventive strategy for BPD.

Accompanying commentary: Sosenko IR, Bancalari E. NO for preterm infants at risk of bronchopulmonary dysplasia. Lancet 2010; 376: 308-310.

Postterm Delivery:

127. MosterD,WilcoxAJ,VollsetSE,MarkestadT,LieRT.Cerebralpalsy among term and postterm births. JAMA 2010; 304: 976-982.

Population-based cohort of term and postterm births (EGA: 37-44 weeks), n=1,682,441, born between 1967 and 2001 evaluating the relationship of timing of delivery to the incidence of cerebral palsy. Delivery at 40 weeks was associated with the lowest risk of CP, and as expected, there was a linear increase in the incidence with lower gestational ages. However, there was also an increase in the incidence with births >42 weeks gestation. It is unclear if changing the timing of delivery would change the risk of CP. As there was also a U-shaped risk of congenital anomalies with gestational age, it is possible that changing the timing of delivery would not influence the underlying risk of CP. Further research is needed to understand the biological mechanisms for these patterns in term and postterm births.

Transient Tachypnea of the Newborn:

128. Tutdibi E, Gries K, Bucheler M, Misselwitz B, Schlosser RL, GortnerL.Impactoflaboronoutcomesintransienttachypneaofthe newborn:population-basedstudy.Pediatrics2010;125:e577-583.

Population-based cohort study evaluating effect of labor on the risk and course of transient tachypnea of the newborn (TTN). There were 1,423 term singleton newborns born diagnosed with TTN over the four-year study period. Elective cesarean delivery in the absence of labor increased both the incidence and severity of TTN.

Cerebral Palsy and Therapeutic Hypothermia:

129. Simbruner G, Mittal RA, Rohlmann F, Muche R. Systemic hypothermiaafterneonatalencephalopathy:outcomesofneo. nEURO.network RCT. Pediatrics 2010; 126: e771-778.

High quality RCT. Term infants with perinatal hypoxic-ischemic encephalopathy (HIE) were randomized to therapeutic hypothermia with a cooling blanket for 72 hours (n=53) or a normothermia control group (n=58). The rates of death or severe disability were lower in the hypothermia group than the control (51% vs. 83% respectively).

Accompanying editorial: Laptook AR. The neo.nEURO.network Hypothermia Randomized Controlled Trial. Pediatrics 2010; 126: e965-966.

130. EdwardsAD,BrocklehurstP,GunnAJ,etal.Neurologicaloutcomes at18monthsofageaftermoderatehypothermiaforperinatalhypoxic ischaemicencephalopathy:synthesisandmeta-analysisoftrialdata. BMJ 2010; 340: c363.

Meta-analysis of 3 high quality studies (n=767 infants) evaluating whether moderate hypothermia after hypoxic-ischemic encephalopathy improves survival and neurologic outcome at 18 months. Hypothermia reduced the rate of the composite outcome of death and severe disability (number needed to treat, NNT=9), increased the survival rate with normal neurological function (risk ratio 1.53), and reduced the rates of cerebral palsy in survivors.

Accompanying editorial: Higgins RD, Shankaran S, Laptook AR. Hypoxic ischaemic encephalopathy in infants. BMJ 2010; 340: c397.

See also: Perlman JM, Davis P, Wyllie J, Kattwinkel J. Therapeutic hypothermia following intrapartum hypoxia-ischemia. An advisory statement from the Neonatal Task Force of the International Liaison Committee on Resuscitation. Resuscitation 2010; 81:1459-1461.

New recommendations from the Neonatal Task Force of the International Liaison Committee on Resuscitation (ILCOR) recommending that infants born at term or near-term with evolving moderate to severe hypoxic-ischemic encephalopathy should be offered therapeutic hypothermia using either whole-body cooling or selective head cooling.

Neonatal Resuscitation:

131. DawsonJA,KamlinCO,VentoM,etal.Definingthereferencerange foroxygensaturationforinfantsafterbirth.Pediatrics2010;125: e1340-1347.

Using a prospective cohort of 468 infants and 61,650 SpO2 measurements, reference ranges (3rd-97th percentiles) were constructed for the first 10 minutes of life for term and preterm infants.

132. SUPPORTStudyGroupoftheEuniceKennedyShriverNICHD NeonatalResearchNetwork.Targetrangesofoxygensaturationin extremelypreterminfants.NEnglJMed2010;362:1959-1969.

High quality randomized controlled trial (n=1,316) in which two target ranges of oxygen saturation were evaluated for infants delivered between 24 0/7 and 27 6/7 weeks gestation. The incidence of the composite outcome (severe retinopathy or death) was not different between the two groups; however, the SpO2 85-89% group had a higher mortality than the SpO2 91-95% group, suggesting that caution should be used in targeting low range oxygen saturations in preterm infants.

Accompanying editorial: Morley CJ. CPAP and low oxygen saturation for very preterm babies? N Engl J Med 2010; 362: 2024-2026.

133. Perlman JM, Wyllie J, Kattwinkel J, et al. Part 11: Neonatal resuscitation2010:Internationalconsensusoncardiopulmonary resuscitationandemergencycardiovascularcarescience with treatmentrecommendations. Circulation2010;122(suppl2): S516-S538andRichmondS,WyllieJ.EuropeanResuscitation CouncilGuidelinesforResuscitation2010Section7.Resuscitation of babies at birth. Resuscitation 2010; 81: 1389-1399.

Updated guidelines. Both organizations now recommend air for resuscitation of term infants at birth. Oxygen should be administered only in the setting of inadequate oxygenation.

Patient Safety:

Checklists and Teamwork:

134. Neily J, Mills PD, Young-Xu Y, et al. Association between implementationofamedicalteamtrainingprogramandsurgical mortality. JAMA 2010; 304: 1693-1700.

Retrospective cohort of 74 hospitals that had received Team Training and 34 that had not in the Veterans Health Administration system. Differences in surgical mortality over a 2-year period were evaluated between hospitals, and compared to baseline mortality. There was an 18% reduction in mortality in the hospitals that had received Team Training. Propensity score matching of trained and non-trained groups demonstrated a 50% greater reduction in annual mortality in the trained group.

Accompanying editorial: Pronovost PJ, Freischlag JA. Improving teamwork to reduce surgical mortality. JAMA 2010; 304: 1721-1722.

135. de Vries EN, Prins HA, Crolla RM, et al. Effect of a comprehensive surgical safety system on patient outcomes. N Engl J Med 2010; 363: 1928-1937.

Prospective observational study evaluating the effect of implementing surgical safety checklists (11 checklists spanning the pre-op to discharge period) on the rate of complications in six high-performing hospitals compared to control hospitals without the checklists. There was a decrease in the absolute number of complications and surgical mortality in the hospitals that used the checklists, suggesting at least short term improvement in patient outcomes with checklist-driven care.

Accompanying editorial: Birkmeyer JD. Strategies for improving surgical quality--checklists and beyond. N Engl J Med 2010; 363:1963-1965.

See also: ACOG Committee Opinion No. 464. Patient Safety in the Surgical Environment. Obstet Gynecol 2010; 116: 786-90.

This opinion outlined strategies to reduce preventable error such as the use of a time-out prior to starting a procedure and checklists when possible.

Cardiopulmonary Resuscitation:

136. Lipman SS, Daniels KI, Carvalho B, et al. Deficits in the provision of cardiopulmonary resuscitation during simulated obstetric crises. Am J Obstet Gynecol 2010; 203: 179. e1-5.

Observational study evaluating the management of a simulated maternal amniotic fluid embolus and subsequent cardiac arrest. Eighteen multi-disciplinary teams participated in the simulations. All participants were ACLS certified. Performance was evaluated using a non-validated checklist. None of the teams properly performed all of the checklist tasks. This study highlights the need for interval re-training or didactics on maternal resuscitation.

See also: Advanced cardiac life support in obstetric settings. Nurs Womens Health 2010; 14: 422-423.

New position statement from the Association of Women's Health, Obstetric, and Neonatal Nursing (AWHONN). While AWHONN does not mandate ACLS training for perinatal nurses, they support the guidelines of the American Academy of Pediatrics (AAP) and the American College of Obstetricians and Gynecologists (ACOG) stating that a postpartum patient should be observed in an appropriately staffed and equipped postanesthesia/analgesia care location after delivery until recovery from neuraxial or general anesthesia has occurred. AHWONN strongly urges hospitals to evaluate the availability of an ACLS-certified code team if needed for the resuscitation of a pregnant patient, prior to requiring nurses to receive ACLS training.

137. Voogdt KG, Morrison AC, Wood FE, van Elburg RM, Wyllie JP. A randomised, simulated study assessing auscultation of heart rate at birth. Resuscitation 2010; 81: 1000-1003.

Simulation study in which 61 midwives, nurses, and physicians performed 183 assessments of fetal heart rate during simulated newborn resuscitations. Assessment of FHR was inaccurate in 36% of all cases, with a tendency to overestimate the FHR during the incorrect assessments.

138. Bobrow BJ, Spaite DW, Berg RA, et al. Chest compression-only CPR by lay rescuers and survival from out-of-hospital cardiac arrest. JAMA 2010; 304: 1447-1454.

Prospective cohort study evaluating outcomes in patients who suffered out-of-hospital arrests that had either no cardiopulmonary resuscitation (CPR) (n=2,900), bystander administered conventional CPR with rescue breathing (n=666), or chest compression-only CPR (n=849). There was a modest increase in the likelihood of survival in the compression-only CPR group compared to the other two groups. There was no difference in the neurological status of survivors of compression-only CPR vs. conventional CPR. The new AHA guidelines now recommend compression-only CPR for bystanders not trained in CPR.

Accompanying editorial: Cone DC. Compression-only CPR: pushing the science forward.

JAMA 2010; 304:1493-1495.

See also: Highlights of the 2010 American Heart Association Guidelines for CPR and ECC. http://static.heart.org/eccguidelines/guidelines-highlights.html. Accessed 1.14.11

Summary document reviewing changes to AHA CPR guidelines and rationale for each revision.

139. Rea TD, Fahrenbruch C, Culley L, et al. CPR with chest compression alone or with rescue breathing. N Engl J Med 2010; 363: 423-433.

High quality randomized controlled trial in which dispatchers receiving 911 calls randomized callers to perform chest compression only CPR (n=981) or traditional CPR with rescue breathing (n=960). In contrast to the Bobrow study, there was no difference in survival or neurologic outcomes with chest-compression only CPR; however, there was a trend to increased survival in arrests secondary to a cardiac etiology.

Accompanying editorial: Weisfeldt ML. In CPR, less may be better. N Engl J Med 2010; 363: 481-483.

140. Hupfl M, Selig HF, Nagele P. Chest-compression-only versus standard cardiopulmonary resuscitation: a meta-analysis. Lancet 2010; 376: 1552-1557.

Meta-analysis of three studies (n=3,031) demonstrating that compression only CPR is associated with an increased risk of survival (risk ratio 1.22, 95% CI 1.01–1.43). While this effect size is small, given the poor survival outcomes associated with bystander administered CPR, this could represent major progress in improving patient outcomes.

Accompanying editorial: Nolan JP, Soar J. Dispatcher-assisted bystander CPR: a KISS for a kiss. Lancet 2010; 376: 1522-1524.

141. Sissakos D, Draycott TJ, Crofts JF, Hunt LP, Winter C, Fox R. More to teamwork than knowledge, skill, and attitude. BJOG 2010; 117: 1262–1269.

Simulation study evaluating multi-disciplinary team's performance (n=19 teams, 114 providers) during a simulated obstetric emergency (eclampsia). Neither knowledge, manual skills, or attitudes correlated with a team's performance suggesting further research is needed to understand drivers of team efficiency during obstetric emergencies.

Sleep:

142. Hayter MA, Friedman Z, Katznelson R, Hanlon JG, Borges B, Naik VN. Effect of sleep deprivation on labour epidural catheter placement. Br J Anaesth 2010; 104: 619-627.

Observational study of physicians at three levels of experience, novice residents (n=9), experienced residents (n=8), and attending anesthesiologists (n=12) evaluating the effect of sleep deprivation on epidural placement using a

quantitative hand motion analysis device, a validated checklist, and global rating scale. There was no difference among the groups on any of the measured items.

See also: New Accreditation Council for Graduate Medical Education (ACGME) guidelines http://acgme-2010standards.org/approved-standards.html (Accessed 1.14.11)

Two of the most controversial new changes include "strategic napping" during long shifts and that duty hours may not exceed 16 hours per shift for PGY-1 residents. These changes are scheduled to take effect July 2011.

143. DeGraffJP,VisserGHA,HukkelhovenC,etal.Increasedadverse perinatal outcome of hospital delivery at night. BJOG 2010; 117:1098–1107.

National registry based cohort study (n=108,445) evaluating whether night delivery is associated with adverse perinatal outcomes. There was an increase in perinatal mortality in both tertiary and non-tertiary hospitals with night deliveries. These results must be interpreted with great caution, as the authors did not conduct any regression analysis to control for important confounders.

Education:

144. ScavoneBM,ToledoP,HigginsN,etal.Arandomizedcontrolled trial of the impact of simulation-based training on resident performanceduringasimulatedobstetricanesthesiaemergency.Sim Healthcare 2010; 5: 320-324.

Simulation study (n=32) in which CA-2 residents were randomized to simulation-based training on general anesthesia for cesarean delivery vs. simulation training on a non-obstetric scenario. Posttest evaluation was performed 2 months later using a simulated emergency cesarean delivery requiring general anesthesia. Residents who had participated in obstetric simulation training had higher scores on a validated checklist evaluating performance.

145. ToledoP,McCarthyRJ,BurkeCA,GoetzK,WongCA,Grobman WA.Theeffectofliveandweb-basededucationontheaccuracyof blood-lossestimationinsimulatedobstetricscenarios.AmJObstet Gynecol 2010; 202: 400 e401-405.

Prospective observational study in which multi-disciplinary labor and delivery providers participated in live (n=231) or web-based (n=141) didactic training on blood loss estimation. There was a 34% improvement in blood loss estimation following training, with no difference between the two training modalities, which has implications for hospitals that do not have the resources to hold live blood loss training sessions.

146. MagillJC,BylMF,HindsMF,AgassounonW,PrattSD,HessPE.A novelactuatorforsimulationofepiduralanesthesiaandotherneedle insertion procedures. Sim Healthcare 2010; 5:179-84.

Development and testing of a haptic simulator for epidural placement. While perfect tissue fidelity has not been achieved, this is a promising new educational tool for teaching neuraxial techniques.

Miscellaneous:

Professionalism:

147. DesRochesCM,RaoSR,FromsonJA,etal.Physicians'perceptions, preparednessforreporting,andexperiencesrelatedtoimpairedand incompetent colleagues. JAMA 2010; 304: 187-193.

National survey of 2,938 anesthesiologists, cardiologists, general surgeons, internists, family medicine practitioners, pediatricians, and psychiatrists with a 64% response rate evaluating physicians' beliefs, preparedness, and actual experiences with impaired or incompetent physicians. Of the 17% that had dealt with an impaired colleague, only 67% reported the individuals. Factors associated with non-reporting included being a member of an under-represented minority group, being a graduate of a non-US medical school, and working in a non-University/medical school setting.

Accompanying editorial: Wynia MK. The role of professionalism and self-regulation in detecting impaired or incompetent physicians. JAMA 2010; 304: 210-212.

Transfer of Care:

148. Chang VY, Arora VM, Lev-Ari S, D'Arcy M, Keysar B. Interns overestimatetheeffectivenessoftheirhand-offcommunication. Pediatrics 2010; 125: 491-496.

Mixed-methods study evaluating the effectiveness of patient hand-offs by pediatric interns. Interns tended to overestimate the effectiveness of their hand-offs, and the most important piece of information was not reported 60% of the time. Of greater concern, hand-off quality did not improve over time, suggesting that increasing knowledge does not improve communication.

Transfusion:

149. SilvainJ,PenaA,CaylaG,etal.ImpactofredbloodcelltransfusiononplateletactivationandaggregationinhealthyvolunteersresultsofthetRANSFUSION study. Eur Heart J 2010; 31: 2816-2821.

In-vitro transfusions (n=45) in which leukocyte depleted red blood cells were added to fresh whole blood provided by healthy volunteers with evaluation of subsequent platelet aggregation. Increases in platelet reactivity were observed using 3 measures of adhesion.

150. SzaboE,RampalliS,RisuenoRM,etal.Directconversionofhuman fibroblaststomultilineagebloodprogenitors.Nature2010;468:521-526.

Ground-breaking study in which fibroblasts were injected with a gene (OCT4) and grown in a cytokine infusion to directly create multipotent hematopoietic progenitors (erythrocytes, megakaryocytes, granulocytes, and monocytes), thereby bypassing the pluripotent stem cell stage. While further translational work is needed, this discovery could potentially become an alternative to autologous blood donation.

BOOKS:

Gawande A. The Checklist Manifesto: How to Get Things Right. New York: Metropolitan Books, 2010.

Skloot R. The Immortal Life of Henrietta Lacks. New York: Crown Publishers, 2010.

Oral Presentations Session #2

Abstract # 146

Prophylactic Oxygen for the Prevention of Post-Cesarean Infectious Morbidity: A Randomized Controlled Trial

Abstract Type: Original Research
Poster Type: Oral or Poster
Barbara L. Leighton, M.D.[1]; Christina M. Scifres, M.D.[2]; Patricia J. Fogertey, R.N., M.S.N.[1]; George A. Macones, M.D.[1]; David M. Stamilio, M.D., M.S.C.E.[1]
Washington University in Saint Louis School of Medicine[1]; University of Pittsburgh School of Medicine[2]

Objective: To investigate whether supplemental oxygen during cesarean delivery and for two hours afterwards reduces the incidence of post-cesarean infectious morbidity.

Study Design: A randomized, controlled trial conducted at a single medical center from 2008-2010. Women undergoing cesarean delivery were randomized to receive either two liters of oxygen via nasal cannula during cesarean delivery only (standard care) or 10L oxygen via non-rebreathing mask (intervention group) during cesarean delivery and for two hours afterward. Women undergoing scheduled or intrapartum cesarean delivery were eligible. Demographic, intrapartum and delivery data were collected prospectively and women were followed for one month post-operatively. Our primary composite outcome was maternal infectious morbidity, including endometritis and wound infection. Bivariate analyses were conducted using the intent to treat principle. We estimated that 556 patients were needed to achieve 80% power to detect a 50% reduction in morbidity assuming a 0.05 α-error and 15% baseline morbidity rate.

Results: 585 women were included in the final analysis. Demographic data was similar between groups. Women in the intervention group were more likely to have had rupture of membranes (29.2 vs. 19.9%, p<0.01) or labor prior to cesarean delivery (40.0% vs. 32.7%, p=0.07). There was no significant difference in the rate of infectious morbidity between the standard care and intervention groups (RR 1.4, 95% CI 0.9-2.3). Analyses stratified on the occurrence of rupture of membranes or labor revealed no difference in morbidity between the study groups within strata. Infants of mothers in the intervention group were more likely to receive antibiotics after birth (p=0.03). The incidence of neonatal sepsis was similar between groups (p=0.19).

Conclusion: Increasing oxygen delivery from 2 liters via nasal cannula to 10 liters via non-rebreathing mask does not reduce the rate of post-cesarean infectious morbidity including endometritis and wound infection.

Abstract # 147

Determination of the ED90 of Metaraminol to Avoid Hypotension After Spinal Anesthesia for Elective Cesarean Delivery

Abstract Type: Original Research
Poster Type: Oral or Poster
Jefferson Clivatti, M.D.[1]; Americo M. Yamashita, M.D.[1]; Itamar S. Oliveira-Junior, M.D., Ph.D.[1]; Maria Angela Tardelli, M.D., Ph.D.[1]; Jose CA Carvalho, M.D., Ph.D.[2]
Universidade Federal de São Paulo[1]; Mount Sinai Hospital University of Toronto[2]

Background: Phenylephrine has become the vasopressor of choice to prevent/treat hypotension during cesarean delivery (CD) under spinal anesthesia; however,its use may induce bradycardia and decrease cardiac output. Metaraminol is less likely to induce bradycardia and may be advantageous. Metaraminol has been shown to be superior to phenylephrine when used in a continuous infusion (1), but there is no published dose-response study on metaraminol used as an intermittent bolus in CD.

Methods: After IRB approval and informed consent,term pregnant women undergoing elective CD under spinal anesthesia were recruited into this double-blinded study. Following standard spinal anesthesia (hyperbaric bupivacaine 0.5% 12.5mg,fentanyl 25µg and morphine 100µg),SBP and HR were assessed every minute until delivery,and a bolus dose of metaraminol was given whenever the SBP was < baseline. An adequate response was defined as the absence of hypotension (SBP<80% baseline) before delivery. The metaraminol dose was determined as per a biased coin up-down sequential allocation scheme to estimate the 90% effective dose (ED90). The initial dose was 25µg, and it was adjusted by 25µg increments or decrements in the subsequent patients. The stopping rule used was the development of hypertension (SBP>20% baseline),or the inclusion of 50 patients. In cases of treatment failure,a standard rescue dose of metaraminol 250 µg was used. The linearly interpolated ED90 estimator was calculated using Pool-Adjacent-Violators Algorithm (PAVA) isotonic regression,and 95% confidence intervals (CIs) were estimated using a parametric bootstrap routine (2).

Results: Forty-eight women were approached to participate,and 43 consented. The highest dose used was 325 µg. The ED90 of metaraminol was estimated at 314 µg (95% CI,282-321µg). The response of each subject to the treatment is shown in the figure. Two patients presented with bradycardia with doses of 150µg and 275µg. Only the last patient of the study exhibited hypertension (325µg).

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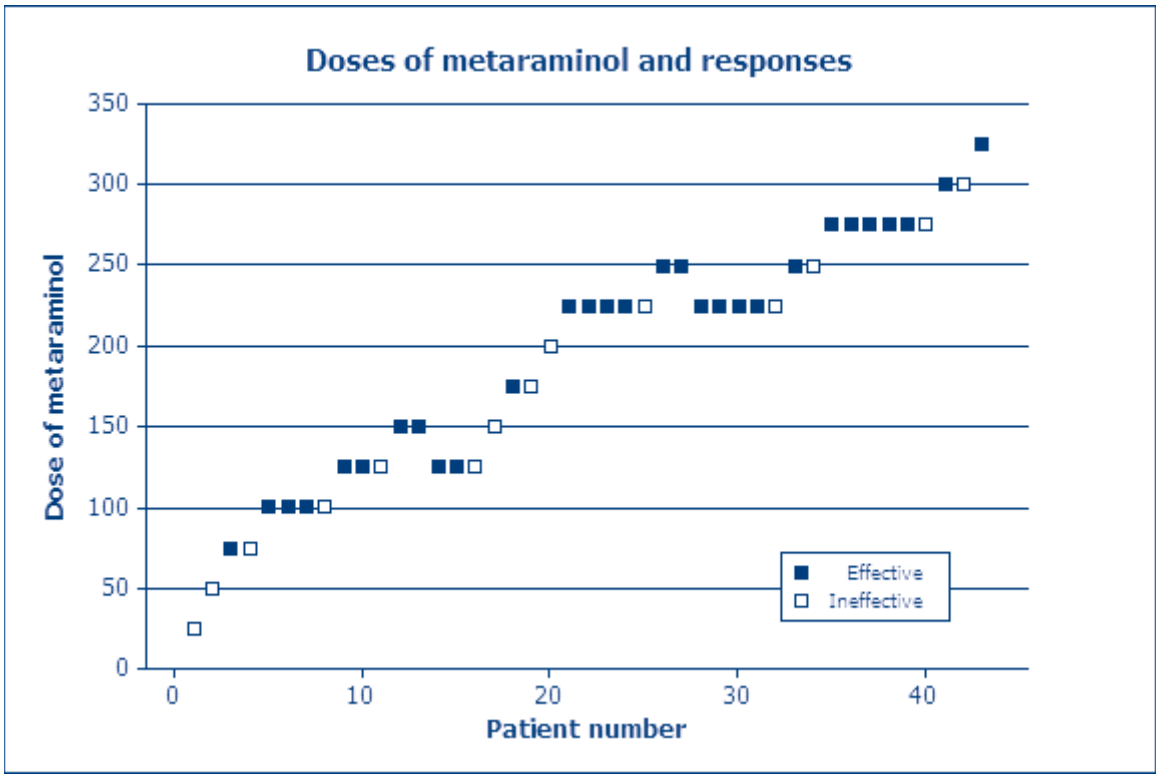
Discussion: This is the first dose-response study of metaraminol used in bolus doses in CD, and the ED90 is 314µg. The incidence of hypertension is much lower than that reported in a similar study with phenylephrine (3),and these results are encouraging. Further trials making a direct comparison between phenylephrine and metaraminol are warranted.

References: 1)Anaesthesia 2003;58:125–130; 2)Anesthesiology 2007;107:144–52; 3)Int J Obstet Anesth 2009;18:125-30.



Oral Presentations Session #2

Abstract # 148

The Effect of Gum Chewing on Postoperative Ileus After Cesarean Section

Abstract Type: Original Research
Poster Type: Oral or Poster
Ahia Garshasbi Associated professor[1]; Samira Behboudi MS of Midwifery[2]
Shahed University[1]; Tarbiat Modares University[2]

Introduction: Postoperative ileus is common after cesarean section and can delayed recovery and prolong hospital stay. Gum chewing, a type of sham feeding, may to stimulate gut motility via cephalic-vagal stimulation, and may accelerate return of bowel function and reduce morbidity and length of hospital stay. (1,2) This study aimed to determine whether gum chewing in the immediate postoperative period facilitated recovery from ileus following cesarean section.

Methods: During prospective randomized controlled trial five hundred pregnant women who underwent cesarean delivery were randomly divided into two groups: 1- gum-chewing group (N = 238), 2- control group (N = 262). Demographic data, duration of surgery, type of anesthesia, and time of discharge from hospital were recorded. Patients in the gum-chewing group chewed gum three times per day at least half an hour each time as soon as after surgery until the regular diet was initiated. Patient demographics, intra-operative, and postoperative care were the same for both group .The T test and Pearson chi-square test was used for statistical analysis.

Results: Chewing gum was well tolerated by all the patients immediately after cesarean section. Bowel sounds were heard earlier in the gum-chewing group (mean 13.6 hours) than in the control group (mean 18.4 hours). Median times to first postoperative passage of flatus (15.7 versus 21.4 hours), first bowel movement (19.8 versus 27.3 hours) were significantly shorter in gum-chewing group ($P < 0.001$). 2% of Patients in gum-chewing group had mild ileus in compare to 10% in control group. There was virtually no difference in either time-to hospital discharge between two groups.

Conclusion: The use of gum chewing in the postoperative period is a safe, inexpensive and convenient method in enhancing the recovery of bowel function and reduces ileus after cesarean section.

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Abstract # 149

Study to Assess the Performance of Continuous Non-invasive Hemoglobin Measurement during Cesarean Delivery

Abstract Type: Original Research
Poster Type: Oral or Poster
Gillian Hilton, M.B.Ch.B., M.R.C.S., F.C.A.R.C.S.I., F.R.C.A.; Brendan Carvalho, M.B.B.Ch., F.R.C.A.; Alexander J. Butwick, M.B.B.S., F.R.C.A.
Stanford University School of Medicine

Background: Pulse CO-Oximetry™ (Masimo Corp., Irvine, CA) is a recently developed technology using multi-wavelength spectrophotometry for non-invasive and continuous hemoglobin monitoring (SpHb).(1) Blood loss estimation in an obstetric setting is often inaccurate,(2) thus this technology offers the potential for improving the assessment of maternal anemia and transfusion decision-making in an obstetric setting. The aim of this study was to assess the performance of this device in patients undergoing elective cesarean delivery (CD).

Methods: After IRB approval, 50 healthy term parturients undergoing elective CD with neuraxial anesthesia were enrolled in this prospective, controlled study. SpHb and venous hemoglobin values were compared prior to anesthesia, immediately post-CD and at 24 hours post-CD using Students t-test and Bland Altman Analyses (range of agreement defined as mean bias ± 2 SD). SpHb values were recorded at 10 time points from pre-CD to 48 hr post-CD. Correlation analyses were performed between hemoglobin (both SpHb and venous hemoglobin) and estimated blood loss as well as total volume of I.V. fluids (Pearson/Spearman correlations as appropriate). Secondary longitudinal analysis of SpHb changes over time was performed using mixed-effects regression modeling (with SAS PROC MIXED), due to non-uniformity of measurement intervals across the study period. $P < 0.05$ as statistically significant.

Results: The mean bias ± 2 SD between SpHb and venous hemoglobin was 1.3±2.5 g/dl, 0.2±2.6 g/dl and 1.4±1.9 g/dl in the pre-operative, immediate post-CD and 24 hours post-CD (Figure). There were no statistically significant correlations between percentage hemoglobin change and estimated blood loss as well as intravenous fluids administered $P>0.05$). We observed a significant decrease in SpHb values over the study period (-0.098 g/dl in SpHb for each time point) after controlling for total estimated blood loss and total volume of iv fluids at 24 hours post surgery in the mixed model.

Conclusion: Pulse CO-Oximetry-based SpHb measurement was relatively accurate compared to laboratory hemoglobin measurement in patients undergoing elective CD. However we observed a positive and variable bias towards higher hemoglobin values with SpHb compared to venous hemoglobin values. Future studies are needed to validate SpHb values in the setting of acute and massive peripartum blood loss.

References: (1) Anesth Analg 2010;111:1424-6 (2) Obstet Gynecol 2004;104:601-6.

Abstract # 150

The Effects of Head Elevated Ramped Position during Combined Spinal Epidural (CSE) Anaesthesia for Elective Caesarean Delivery

Abstract Type: Original Research
Poster Type: Oral or Poster

Katherine L. Cheesman, F.R.C.A., B.Sc.; Joanne M. Douglas, M.D., F.R.C.P.C.; Simon Massey, F.R.C.A., M.R.C.P.; Simrat Saran, M.D.; Alicia Murdoch, B.Sc.
British Columbia's Women's Hospital

Introduction: Elevating the torso in a head elevated ramped position (HERP) during cesarean delivery (CD) benefits the mother:
• Improved comfort and breathing characteristics (oxygenation, increased FRC), reduced reflux symptoms
• Better airway position -if unexpected intubation is needed.

Multiple factors affect the level of anesthetic block for CD. The effect of HERP on level of spinal anesthesia has never been reported.

We hypothesised that positioning a parturient in HERP for an elective CD using an elevation pillow would not significantly increase the time for a T4 block (primary outcome). Secondary outcomes were: maternal comfort, airway position, maximum height block, anesthesia duration.

Methods: Following informed consent 60 women undergoing elective CD were randomised to one of three groups:
A. Head Elevated Ramped Position (HERP)
B. HERP- Horizontal (HERP-H)
C. Control (C) – Horizontal with pillow under head

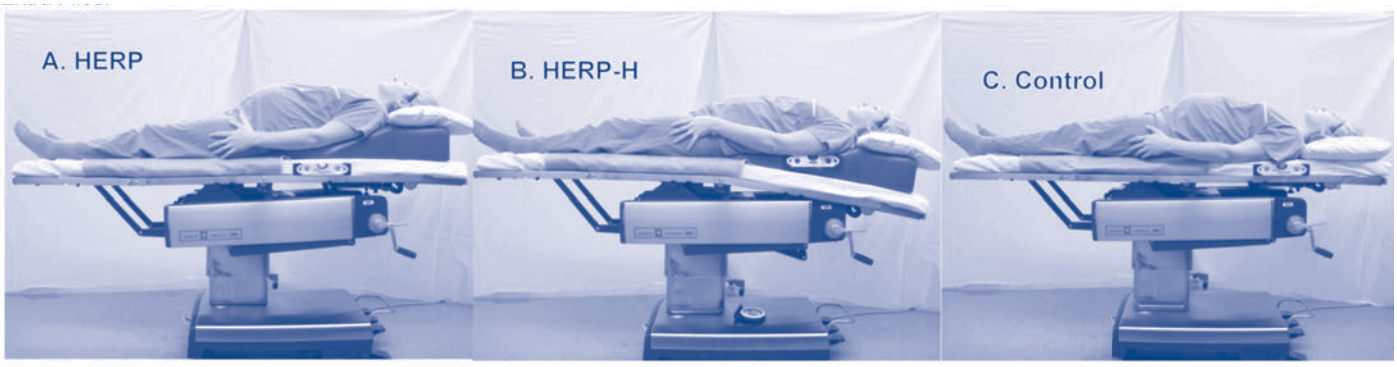
Patients at risk of high block were excluded. Following standard CSE anesthesia in the sitting position subjects were placed supine with LUD and in groups HERP and HERP-H elevation pillow was inserted. For group HERP-H the back of the operating table was lowered so the subject's back was horizontal (H) until adequate block and then bed levelled to same position as group (HERP).

Data collected: time to T4 with ice, block height at 30 and 120 mins, need for epidural supplementation, maternal comfort (5 point Likert scale) and airway position assessment (relationship of external auditory meatus (EAM) to sternal notch).

Results: ANOVA showed HERP delayed time to T4 significantly compared to control (p=.045. HERP: mean=681s range 344-1298s, Control: m=491s range 183-720s, HERP–H: m=598, range 317-1183s. All subjects found the elevated significantly position more comfortable (p = .001). EAM was at the level or higher than the sternal notch in 100% of HERP subjects compared to 20% in control position. 4 patients were excluded (2 failed attempts at CSE; 2 failed spinal-epidural used). All had block above T8 at 120mins.

Discussion: HERP immediately after CSE significantly delays onset of block (3mins), but this was not clinically relevant.

HERP provides a significantly more comfortable position and the woman is in an ideal position for intubation should conversion to GA be needed.
We would recommend elevating the torso once block is established so that women have the advantages of the position without potential delay.



Oral Presentations Session #2

Abstract # 151

Pressor Choice is Unrelated to Cord Blood pH in Clinical Practice

Abstract Type: Original Research
Poster Type: Oral or Poster
Scott Segal, M.D., M.H.C.M.[1]; Jason Wyse, M.D.[2]; Michael Orosco, M.D.[2]
Tufts University School of Medicine[1]; Brigham and Women's Hospital[2]

Introduction: The choice of vasopressor for treatment of hypotension following spinal anesthesia in obstetrics remains controversial. Several randomized trials (RCTs) have demonstrated a slight superiority of phenylephrine (PE) over ephedrine (E) as measured by newborn umbilical artery (UA), though not umbilical vein (UV) pH. However, by necessity, these RCTs require a blinded anesthesiologist to administer solely one agent on a protocolized regimen specifying the BP target and timing of doses. In actual clinical practice, most anesthesiologists use clinical judgment not only in pressor choice, but also in timing and BP target. We hypothesized that unblended anesthesiologists using either or both agents at their discretion would demonstrate equivalent neonatal outcomes.

Methods: After IRB approval and informed consent, 92 healthy term pregnant women scheduled for cesarean delivery under spinal anesthesia were recruited. Standardized spinal anesthesia (bupivacaine 12 mg, fentanyl 10 μg, morphine 200 μg) was administered and blood pressure measured every minute until delivery. E and/or PE were administered at the discretion of the anesthesiologist and the total dose of each at delivery were recorded. Apgar scores, and UV and UA blood gases were measured. Dose of each pressor and total pressor equivalent (PEq; assuming 40 μg PE = 5 mg E) and blood gas values were compared by linear regression. Dominant pressor (majority of total pressor given) was also compared by linear regression, and mean pH between dominant pressor groups was compared by ANOVA. The study was powered to detect an increment of 0.1 in R2 in pH regressions with 80% power at alpha=.05, with sample size=92.

Results: E dose ranged from 0-55 mg, PE from 0-760 mcg, and PEq from 0-30 units. Among patients receiving any pressor, 69% received both; 59% received more PE and 33% more E on a potency-adjusted basis. Total PEq was inversely related to UV pH (R2=.12, P=.0007) and UA pH (R2=.16, P<.0001). E dose was inversely related to UV pH (R2=.08, P=.018) but not UA pH (P=.10). PE dose was inversely related to UV pH (R2=.10, P=.0036) and UA pH (R2=.10, P=.0027). In multivariable regression of cases with nonzero pressor use and either pressor dominance, total PEq was related to UA and UV pH but the dominant pressor (E or PE) was unrelated (P=.74 and .76, respectively). Lowest BP, episodes of BP< 100 mm Hg, and minutes of BP < 100 mm Hg were unrelated to UV or UA pH. Mean UV and UA pH, PCO2, and PO2 did not differ between E and PE dominant groups (P>>.05). Apgar scores did not differ between dominant pressor groups. However, both 1 minute (P=.0004) and 5 minute (P=.0054) Apgars were inversely related to PEq dose by logistic regression.

Discussion: In real-world clinical practice, anesthesiologists rarely use only one pressor as they are forced to in RCTs. In unblinded actual clinical practice, neonatal blood gases and Apgar scores are unrelated to pressor choice.

Educational Session Materials

Sunday, April 17, 2011

Opportunities for Questions and Answers will be provided at the conclusion of each presentation.

Medinas Foyer	6:30 a.m. - 12:00 p.m.	Registration
Baraka Room	6:30 a.m. - 7:30 a.m.	Hosted Continental Breakfast and Poster Viewing
Casablanca ABCDE North	7:30 a.m. - 8:30 a.m.	Research Update 2011: The Oxytocin Hour Moderator: Richard Smiley, FRCA
	7:30 a.m. - 7:45 a.m.	Getting Good Tone: Recent Findings in the Lab Mrinalini Balki, M.D.
	7:45 a.m. - 8:00 a.m.	Getting Good Tone: Recent Lessons From the OR Alexander Butwick, M.B.B.S., FRCA
	8:00 a.m. - 8:15 a.m.	Oxytocin: Beyond the Uterus Ruth Landau, M.D.
	8:15 a.m. - 8:30 a.m.	Panel Q&A
Casablanca ABCDE North	8:30 a.m. - 10:00 a.m.	Ethical and Legal Panel Moderator: Stephen Pratt, M.D.
	8:30 a.m. - 9:15 a.m.	The Ethical and Legal Challenges of Keeping the Mother, Fetus and Anesthesiologist Safe Joanne Douglas, M.D.; Bill Sullivan, QC (Barrister and Solicitor)
	9:15 a.m. - 9:45 a.m.	Ethical and Legal Concerns of Disclosing Adverse Events Kelly A. Saran, R.N., M.S.
	9:45 a.m. - 10:00 a.m.	Panel Q&A
Baraka Room	10:00 a.m. - 10:20 a.m.	Coffee Break and Poster Viewing
Casablanca ABCDE North	10:20 a.m. - 11:50 a.m.	Best Case Reports of the Year: You Did What? Peter Pan, M.D.; Bhavani Kodali, M.D.
Casablanca ABCDE North	11:50 a.m.	Closing Remarks Maya S. Suresh, M.D.

Getting Good Tone: Recent Findings in the Lab

Mrinalini Balki, M.D.

Objectives: Upon completion of this presentation, participants will be able to understand the phenomenon of desensitization of oxytocin receptors (OTR) and its clinical implications in the pharmacological management of uterine atony.

Summary: Postpartum hemorrhage is one of the leading causes of maternal mortality and morbidity worldwide. It is mainly caused by uterine atony, and hence requires treatment with one or more uterotonic drugs such as oxytocin, ergonovine, carboprost, misoprostol etc., which promote uterine contractions by acting via different mechanisms. Among these drugs, oxytocin is the first-line drug used to restore uterine tone and minimize postpartum blood loss.

Oxytocin is a neurohypophysial hormone, naturally synthesized during pregnancy, which also plays a central role in the contraction of uterine smooth muscles during labor. It mediates its action by binding with OTR on the uterine surface. The oxytocin–OTR complex induces uterine contractility through the activation of phospholipase C, and the release of inositol 1,4,5-triphosphate, 1,2-diacylglycerol and intracellular calcium.

OTRs belong to the family of G-protein-coupled receptors (GPCR), and like other GPCRs, undergo rapid molecular desensitization due to homologous stimulation. This phenomenon has been recently explored in human myometrial tissues, and may have clinical significance in the context of oxytocin-augmented labors. OTR desensitization--induced by in-vivo or in-vitro exposure of the myometrium to oxytocin--reduces the ability of human myometrial culture cells to respond to subsequent administration of oxytocin, and is characterized as a reduction in the concentration of myometrial oxytocin binding sites and OTR mRNA.

In-vitro studies in pregnant rat model myometrial strips have demonstrated the clinical replication of this biomolecular desensitization phenomenon, in the form of inhibition of the oxytocin-induced myometrial contractions after pre-treatment with oxytocin in a concentration-dependent manner. A similar contractility decrease has been observed in the human myometrium of patients undergoing oxytocin-augmented labor; such a decrease is not seen in non-augmented labor or the non-laboring uterus. As the oxytocin-induced desensitization phenomenon is homologous, the uterotonic effects of ergonovine and prostaglandin F2α that act through different receptors do not appear to be affected by this phenomenon in rat myometrial strips. Interestingly, despite the effect of desensitization, the contractions induced by oxytocin in an oxytocin-exposed rat myometrial strip are still superior compared to other uterotonic drugs. Among all the prostaglandins, the myometrial contractions produced by PGF2 are superior compared to other types of prostaglandins but not compared to similar concentrations of oxytocin. A combination of oxytocin and ergot produces even better contractions compared to oxytocin alone in oxytocin-pre-treated rat myometrium or in human myometrium from augmented laboring woman. Further research in this area will eventually guide us in choosing the best combination of pharmacotherapy in the management of uterine atony.

Recent clinical studies have demonstrated poor uterine tone and a higher incidence of postpartum hemorrhage when oxytocin is used for labor augmentation in higher doses and for longer durations. These clinical findings can be explained by the aforementioned desensitization phenomenon and signal attenuation that occurs with oxytocin exposure during labor in a time- and concentration-dependent manner. In view of the fact that repeated or continued high doses of oxytocin after delivery may render the myometrium less responsive, especially in patients with augmented labor, second-line uterotonic agents should be considered early in the event of postpartum bleeding.

Key Points:

1. The desensitization of OTRs is seen after myometrial exposure to oxytocin in a time- and concentration-dependent manner, and is manifested as poor contractile response of the myometrium to additional oxytocin administration.
2. This phenomenon has implications in the control of uterine tone after delivery in women with oxytocin-augmented labor.
3. The best uterotonic therapy in the event of such desensitization remains to be determined, but oxytocin in combination with ergonovine appears to be the most effective option.

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Getting Good Tone: Recent Lessons From the OR

Alexander Butwick, M.B., B.S., FRCA

Objectives: Upon completion of this presentation, participants will obtain an overview of key aspects of the oxytocin dosing for achieving adequate uterine tone for patients undergoing Cesarean delivery (CD). This presentation will focus on recent and key literature for achieving optimal oxytocin dosing in patients undergoing pre-labor CD and in laboring patients undergoing intrapartum CD.

Summary: Uterine atony has been identified as leading cause of postpartum hemorrhage (PPH) in women undergoing CD. Population based studies indicate an apparent increase in PPH due to uterine atony. Oxytocin exposure during labor has been shown to be a significant independent risk factor for severe PPH due to uterine atony, which supports laboratory studies of oxytocin-receptor desensitization.

Oxytocin remains the first line agent for the prevention and management of uterine atony in women undergoing CD. However, there are inconsistent practices in oxytocin dosing during CD, which is supported by data from a recent survey of 391 lead anesthesiologists and obstetricians in the UK (Sheehan et al). In this survey, the majority (88%) of respondents use a 5 IU slow bolus and 12% of respondents using a 10 IU bolus; a wide variability in oxytocin infusions rates (3-20 IU/hour) for maintaining adequate uterine tone post-delivery was also reported.

Recent studies have investigated different dosing strategies (bolus, infusion, or bolus plus infusion) for the initiation and maintenance of adequate uterine tone during elective and non-elective CD.

Results of studies investigating oxytocin bolus dosing indicate that an oxytocin bolus less than 5 IU can initiate adequate uterine tone in patients undergoing elective and non-elective CD:

a) Elective Cesarean Delivery: Carvalho et al. determined the ED90 (minimum effective dose) of oxytocin to be 0.35 IU (95% CI = 0.18 - 0.52 IU). Butwick et al. studied the effects of four different oxytocin bolus doses (0.5, 1, 3, and 5 IU) oxytocin boluses with a placebo group. In this study, the proportion of patients with adequate uterine tone at 2min after placebo and 0.5 IU oxytocin was high (73% and 100% respectively), thus the ED50 and ED95 for oxytocin could not be derived. Sartain et al. compared a 2 IU bolus vs 5 IU bolus, and observed no differences in uterine tone at 5, 10, 15 and 20 min after oxytocin dosing. The results of these studies indicate that adequate uterine tone can be achieved with an oxytocin bolus of < 3 IU during elective CD.

b) Non-elective Cesarean Delivery: Balki et al. determined the ED90 of oxytocin during non-elective CD for labor arrest as 2.99 IU (95% CI = 2.32 – 3.67 IU). Thus a higher dose of oxytocin is needed to achieve adequate uterine tone for non-elective CD, which is in keeping with current knowledge of oxytocin receptor desensitization associated with labor.

Few studies have investigated oxytocin infusions for initiating or maintaining adequate uterine tone during CD. George et al. determined that the ED90 of an oxytocin infusion necessary to initiate adequate uterine tone during elective CD was 0.29 IU/min (95% CI = 0.15 – 0.43 IU/min). However nearly 18% of patients required additional uterotonics for achieving adequate uterine tone. Sarna et al. studied the effect of four different oxytocin doses (5, 10, 15, 20 IU) delivered as an infusion (1 IU/min) during elective CD, and observed no differences in uterine tone (assessed on a linear scale) between oxytocin groups.

Optimal oxytocin regimens for maintaining adequate uterine tone post-CD in women undergoing elective CD and non-elective CD remain uncertain. King et al. investigated the effects of a 5 IU oxytocin bolus + infusion (1.33 IU/min for 30 min followed by 0.04 IU/min for 8 hours) versus an identical oxytocin infusion without bolus post-CD in women with ≥ 1 risk factor for PPH. In the first 24 hr post-CD, the percentage of patients requiring additional uterotonics was similar in each group (29% vs 40%). Balki et al. compared blood loss with oxytocin (3 IU loading dose + maintenance infusion [2.4 IU/hr]) versus a combined oxytocin-ergometrine maleate regimen (identical oxytocin regimen + ergometrine (0.0375 mg loading dose + maintenance infusion [0.03 mg/hr]) during non-elective CD for labor arrest. The authors observed no significant differences in blood loss between groups (1218 mL vs 1299 mL respectively), although more women required additional boluses of study drug for inadequate uterine tone following oxytocin alone compared with oxytocin-ergometrine (21% vs 57% respectively).

Key Points:

1. Oxytocin (with initial 'mini' bolus dosing [0.5 IU – 3IU]) is advocated for initiating adequate uterine tone during elective Cesarean delivery, followed by a carefully titrated oxytocin infusion for maintaining adequate uterine tone.
2. Oxytocin dosing for initiating adequate uterine tone are higher for laboring patients requiring intrapartum CD than patients undergoing pre-labor CD.
3. Further work is needed to investigate optimal oxytocin regimens for maintaining adequate uterine tone during CD, and in the use of second line uterotonics (methergine, hemabate, misoprostol) for treating refractory uterine atony.

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Oxytocin: Beyond the Uterus

Ruth Landau, M.D.

Objectives: Upon completion of this presentation, participants will be able to understand the involvement of oxytocin in the regulation of brain functions, such as complex social behavior and cognition and its emerging role in pain inhibition.

Summary: Oxytocin is well known to the obstetric anesthesiologist as a neuropeptide produced in the hypothalamus that is released into the circulation where it acts as a hormone to promote uterine contractility during labor and delivery as well as milk production during breast feeding. The reproductive actions of oxytocin have been described for over a century and the peripheral release of oxytocin during parturition, lactation and sexual function have been documented as early as in the 1950s. However, oxytocin is also released directly into the brain where it functions as a neurotransmitter, and its effects on the central nervous system are currently eliciting much interest. The extent of oxytocin's involvement in behavior was only identified in the 1970s when central infusion of oxytocin in virgin female rats was shown to stimulate maternal behavior who would otherwise ignore or attack pups.

Based on these early animal experiments, recent work has shown that oxytocin plays an important role in human social and non-social behaviors. Oxytocin is believed to play a key role in maternal-infant bonding, attachment and nurturing. Due to a great diversity and the complexity of social attachments in humans, oxytocin is also involved in pair boding and has recently been called the 'love hormone'. Studies have identified a key role of oxytocin in memory, face recognition, identification of emotions, trust (including behavior during neuro-economic games, i.e. gambling), decision-making, learning, stress, depression, fear reduction and even feeding behaviors. Several studies have also explored the role of disrupted or pathological oxytocin signaling in psychiatric disorders including autism and schizophrenia.

Closer to the interest and practice of anesthesiologists and pain providers, a role for oxytocin in pain inhibition is emerging. Animal studies have shown that oxytocin mediates antinociception and analgesia via descending fibers of the para-ventricular hypothalamic nucleus (PVN). Activation of a sub-population of neurons (in lamina II) by oxytocin has recently shown to amplify local GABAergic inhibition, suggesting that oxytocin may specifically inhibit pain via supraspinal descending control of pain processing. The translation of these animal studies demonstrating oxytocin-induced antinociception through oxytocin that is secreted in the spinal cord dorsal horn by descending axons of the PVN still needs to be examined in human studies. Evidence that this phenomenon is also present in humans is currently examined by several groups, as this could result in a novel target for the management of chronic pain and in particular that of neuropathic pain.

Finally, in a clinical study examining the role of ethnicity on pain perception, African-American women were found to exhibit lower plasma levels of oxytocin that were associated with lower pain tolerance in response to different painful modalities, as compared to Whites.

Key Points

1. Central oxytocin mediates numerous social and non-social behaviors
2. Central oxytocin has recently been identified as a key mediator on pain inhibition at the level of the spinal cord
3. Studies on a potential role for central oxytocin to manage human chronic pain may be providing exciting perspectives

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The Ethical and Legal Challenges of Keeping the Mother, Fetus and Anesthesiologist Safe

Bill Sullivan, Q.C., L.L.B., M.C.L.; Joanne Douglas, M.D., FRCPC

Objectives:
By the end of this presentation the attendee will:

1. Have reviewed the basic ethical principles used to resolve ethical dilemmas
2. Have considered the relationship between autonomy and informed consent
3. Have discussed some ethical dilemmas encountered during obstetrical anesthesia and possible ways to resolve them
4. Have considered ways in which failure to resolve ethical dilemmas may result in safety (including legal) issues for the mother, fetus and anesthesiologist.

An ethical dilemma is where there are two or more possible solutions to a problem; the doing of one of them precludes doing any of the others, as each is incompatible with the other. The generally accepted method for resolving ethical dilemmas is to apply the most relevant of the four prima facie principles (autonomy, beneficence, non-maleficence, justice) to the facts to reach an ethical decision.

Ethical dilemmas are not uncommon in obstetrics and obstetrical anesthesia because there are two or more entities (woman, fetus, anesthesiologist, obstetrician) involved whose interests may be in conflict with each other. Many of the issues revolve around the ethical principle of autonomy, which is enforced by the legal requirement of "informed consent". The capable person has the right to choose treatment based on a full disclosure (understanding) of its (and its alternatives) risks and benefits.

For the physician, respect for the principle of autonomy may be challenging, as the physician's own beliefs (personal or professional) may be in conflict with the woman's decision. If the woman chooses not to have an advised intervention it may impact on the well being of her fetus (or herself). Honoring the principle of autonomy may incur potential risk to the woman and others, including the physician.

Key Points:

1. The capable person has the right to decide on a treatment option
2. Informed consent is the legal process of upholding the ethical principle of autonomy
3. Failure to honor the ethical principle of autonomy may have legal ramifications

Some ethical dilemmas in obstetrical anesthesia will be presented with interactive discussion.

Dilemmas for discussion

1. Informed consent in the laboring parturient
2. Refusal of consent including forced obstetrical intervention
3. Informed consent issues and trainees
4. Birth plans and the Ulysses directive
5. Does the physician have the right to refuse to administer the patient's choice of anesthetic?
6. Introduction of a new piece of equipment – do we need consent?

Suggested Reading

1. Beauchamp TL, Childress JF. Principles of Biomedical Ethics. 6th ed. 2009, Oxford University Press, New York.
2. Simon GR, Wilkins CJ, Smith L. Sevoflurane induction for emergency caesarean section: two case reports in women with needle phobia. Int J Obstet Anesth 2002;11:296-300.
3. Weiniger CF, Elchalal U, Sprung CL, Weissman C, Matot I. Holy consent – a dilemma for medical staff when maternal consent is withheld for emergency caesarean section. Int J Obstet anesth 2006;15:145-8.
4. Brooks H, Sullivan WJ. The importance of patient autonomy at birth. Int J Obstet Anesth 2002;11:196-203.
5. Pattee C, Ballantyne M, Milne B. Epidural analgesia for labour and delivery: informed consent issues. Can J Anaesth 1997;44:918-23.
6. Jackson A, Henry R, Avery N, et al. Informed consent for labour epidural: what labouring women want to know. Can J Anaesth 2000;47:1068-73.
7. Hoehner PJ. Ethical aspects of informed consent in obstetric anesthesia – new challenges and solutions. J clin Anesth 2003;15:587-600.
8. Canterbury v. Spence, 464 F.2d 772 (D.C. Cir. 1972).

Ethical and Legal Concerns of Disclosing Adverse Events

Kelly A. Saran, R.N., M.S.

Objectives: Upon completion of this presentation, participants will be able to identify key components of a successful disclosure program and understand the value of transparency to improve patient safety.

Summary: Efforts to prevent adverse patient outcomes of care must be supplemented by increased honesty and openness with patients and their families about a medical error. The barriers to disclosure are a human tendency to avoid conflict, inability to pierce an existing denial, and the fear of lawsuits. In addition, the root causes of medical malpractice claims are deeper and closer to home than many in the medical community care to admit. The University of Michigan Health System's experience suggests that a response by the medical community more directly aimed at what drives patients to call lawyers would more effectively reduce claims, without compromising meritorious defenses. More importantly, honest assessments of medical care give rise to clinical improvements that reduce patient injuries.

Key Points:

1. Disclosure begins with informed consent and is a process, not a single event.
2. Managing patient expectations minimizes the likelihood of a patient turning to a lawyer for answers.
3. Increased efforts toward patient safety are the most important methods to reduce adverse outcomes and claims.

Key References:

1. Kachalia, A, Kaufman, SR, Boothman, R, Anderson, S, Welch, K, Saint, S, Rogers, MA. Liability claims and costs before and after implementation of a medical error disclosure program. Annals of Internal Medicine, 153(4), 213-221.
2. Boothman, RC, Blackwell, AC, Campbell, DA, Commiskey, Anderson, S. A better approach to medical malpractice claims? The university of michigan experience. Journal of Health & Life Sciences Law, 2009, 2(2), 125-159.
3. Clinton, H, Obama, B. Making patient safety the centerpiece of medical liability reform. NEJM, 2006, 25; 354(21), 2205-8.
4. Studdert DM, Mello MM, Gawande AA, Brennan TA, Wang YC. .. Disclosure of medical injury to patients: an improbable risk management strategy. Health Aff (Millwood). 2007 Jan-Feb;26(1):215-26.
5. Gallagher TH, Studdert D, Levinson W. Disclosing harmful medical errors to patients. New England Journal of Medicine, 2007, 356(26):2713-9.
6. Gallagher TH, Garbutt JM, Waterman AD, Flum DR, Larsen EB, Waterman BM, Dunagan WC, Fraser VJ, Levinson W. . Choosing your words carefully: How physicians would disclose harmful errors to patients. Archives of Internal Medicine, 2006, 166:1585-1593
7. Shannon SE, Hardy M, Foglia MB, Gallagher TH. Disclosing errors to patients: Perspectives of registered nurses. Joint Commission Journal of Quality and Patient Safety 2008:35:5-12.

Notes:

Syllabus CD: The CD will include full Syllabus “book” as well as all abstracts.