



GSA 2022 (Virtual) Winter Forum Syllabus

Activity Directors:
Elizabeth Sigler, MD
Lindsay Sween, MD

GSA 2022 (Virtual) Winter Forum Agenda
January 7 - 8, 2022

Friday, January 7, 2022

5:00 - 7:00 pm GSA Virtual Board of Directors Meeting

Saturday, January 8, 2022

7:15 am Welcome
Dr. Jennifer Scaljon – GSA President

7:30 am *Improving Long-Term Outcomes After Perioperative Cardiac Arrest*
Dr. Craig Jabaley

8:30 am *Moving Past Burnout, Looking Towards Engagement*
Dr. Elizabeth Duggan

9:30 am *Update on Medical Malpractice Law and Anesthesia Trends*
Evan Cline, Esq.

10:30 am *Perioperative Analgesia: ERAS Analgesics and Beyond*
Dr. Yawar Qadri

11:30 am *Did Medusa just dye her hair? ABA/MOCA Update*
Dr. Andrew Patterson

12:30 pm GSA General Business Meeting - Elections

1:00 pm Policy Panel – Challenges to Georgia’s Model of Physician-Led Anesthesia and Perioperative Care

Panelists: Dr. Amanda Brown (GSA Government Affairs Chair), Jet Toney (GSA Executive Secretary, Lead Lobbyist), Representative Lee Hawkins (Gainesville), Senator Chuck Hufstetler, CAA (Rome), Jason Hansen, JD (ASA State Affairs Director), Derek Norton (GSA Lobbyist)

2:00 pm Job Fair for AA Students – Hosted by Anesthesia Associates of Gainesville

2:00 pm Chat Room - Political Strategy Q&A

**EMORY UNIVERSITY SCHOOL OF MEDICINE
STANDARD CURRICULUM VITAE**

Revised: 1/4/2022

1. **Name:** Craig S. Jabaley, MD
2. **Office Address:** Emory University Department of Anesthesiology
1750 Gambrell Dr, T5L10
Atlanta, GA 30322
Telephone: (404) 778-7777
Fax: (404) 712-4716
3. **E-mail Address:** csjabaley@emory.edu
4. **Current Titles and Affiliations:**
 - a. Academic Appointments:
 - i. Primary Appointments:
Associate Professor, Division of Critical Care Medicine, Department of Anesthesiology,
Emory University School of Medicine, September 2021 – present
 - b. Clinical Appointments:
Division Chief, Critical Care Medicine, Department of Anesthesiology, Emory University School
of Medicine, January 2019 – present
 - c. Other Administrative Appointments:
Medical Director, Cardiothoracic Intensive Care Unit, Emory University Hospital, September
2017 – present
5. **Previous Academic and Professional Appointments:**
 - a. Acting Associate Professor, Division of Critical Care Medicine, Department of Anesthesiology,
Emory University School of Medicine, December 2020 – August 2021
 - b. Assistant Professor, Division of Critical Care Medicine, Department of Anesthesiology, Emory
University School of Medicine, July 2015 – November 2020
6. **Previous Administrative and/or Clinical Appointments:**

Medical Director, Surgical Intensive Care Unit, Atlanta VA Medical Center, October 2016 – August
2018

Chief, Division of Critical Care Medicine, Anesthesia Service Line, Atlanta VA Medical Center,
November 2016 – August 2018

Associate Medical Director, Cardiothoracic Intensive Care Unit, Emory University Hospital, June
2017 – August 2017

7. Licensures:

Massachusetts, Issued 2014
Georgia, Issued 2015

8. Boards and Specialty Boards:

American Board of Anesthesiology, Primary Certification, Issued 2015
American Board of Anesthesiology, Primary Certification in Critical Care Medicine, Issued 2015

9. Education:

BS, Stetson University, Deland, FL, 2002 – 2006
MD, University of Miami, Miami, FL, 2006 – 2010

10. Postgraduate Training:

- a. Anesthesiology Clinical Base Year and Residency, Jackson Memorial Hospital/University of Miami, Miami, FL
Supervisor: Shawn Banks, MD
2010 – 2014
- b. Chief Resident, Jackson Memorial Hospital/University of Miami Anesthesiology Residency, Miami, FL
Supervisor: Shawn Banks, MD
2013 – 2014
- c. Clinical Fellow in Critical Care Medicine, Massachusetts General Hospital, Boston, MA;
Supervisor: Edward Bittner, MD, PhD
2014 – 2015

11. Continuing Professional Development Activities:

- a. Learning to Be a Better Teacher Workshop, Emory University School of Medicine, Atlanta, GA, January 2017
- b. Clinical Research Bootcamp, Emory University School of Medicine, Atlanta, GA, February 2017
- c. Health Services Research Core Curriculum, Emory University School of Medicine, Atlanta, GA, August 2017 – December 2017
- d. Junior Faculty Development Course, Emory University School of Medicine, Atlanta, GA, January 2018 – May 2018
- e. Team Science Workshop, Georgia Clinical & Translational Science Alliance, Atlanta, GA, September 2018
- f. Negotiation and Leadership: Dealing with Difficult People and Problems, Program on Negotiation, Harvard Law School, Boston, MA, December 2018
- g. Leadership Development for Physicians in Academic Health Centers, Harvard T.H. Chan School of Public Health, Boston, MA, November 2019

- h. Woodruff Leadership Academy, Emory Woodruff Health Sciences Center, Atlanta, GA, March 2021– August 2021

12. Committee Memberships:

- a. National and International:
 - i. Member, Year in Review Subcommittee, Anesthesiology Section, Society of Critical Care Medicine, 2017 – 2020
 - ii. Member, Adult Multidisciplinary Critical Care Knowledge Assessment Program (MCKKAP) Committee, Society of Critical Care Medicine, 2018
 - iii. Member, ICU Design Award Committee, Society of Critical Care Medicine, 2018 – 2021
 - iv. Member, Committee on Communications, Society of Critical Care Anesthesiologists, 2018 – 2019
 - v. Member, Critical Care Medicine Maintenance of Certification in Anesthesiology (MOCA) Minute Committee, American Board of Anesthesiology, 2019 – present
 - vi. Member, Congress Program Planning Subcommittee, Anesthesiology Section, Society of Critical Care Medicine, 2019 – present
 - vii. Chair, Committee on Communications, Society of Critical Care Anesthesiologists, 2019 – 2021
 - viii. Member, Educational Track Subcommittee on Critical Care, American Society of Anesthesiologists, 2019 – present
 - ix. Adjunct Member, Committee on Communications, American Society of Anesthesiologists, 2019 – 2021
 - x. Member, National Mechanical Ventilation Taskforce, Society of Critical Care Medicine, 2020 – present
 - xi. Co-Chair, Joint Task Force on COVID-19 Resources, American Society of Anesthesiologists, Society of Critical Care Medicine, Anesthesia Patient Safety Foundation, and Society of Critical Care Anesthesiologists, 2020 – 2021
 - xii. Society of Critical Care Anesthesiologists Representative, *Anesthesia and Analgesia* Social Media Committee, International Anesthesia Research Society, 2020 – 2021
 - xiii. Member, Congress Program Planning Committee, Society of Critical Care Medicine, 2020 – present
 - xiv. Member at Large, Anesthesiology Section Steering Committee, Society of Critical Care Medicine, 2021 – present
 - xv. Member, Board of Directors, Society of Critical Care Anesthesiologists, 2021 – present

- xvi. Immediate Past Chair, Committee on Communications, Society of Critical Care Anesthesiologists, 2021 – 2023
 - xvii. Member, Intensive Care Unit Design Guideline Committee, Society of Critical Care Medicine, 2021 – present
 - xviii. Co-Chair, Physiologically Difficult Airway Guideline Workgroup, Society of Critical Care Anesthesiologists (and others), 2021 – present
 - xix. Adjunct Member, Committee on Critical Care Medicine, American Society of Anesthesiologists, 2021 – present
- b. Regional:
- i. Member, Veterans Affairs Southeast Network (VISN 7) Critical Care Steering Committee, 2017 – 2018
- c. Institutional:
- i. Chair, Critical Care Medicine Fellowship Clinical Competency Committee, Emory University Department of Anesthesiology, 2015 – present
 - ii. Member, Airway Committee, Emory University Hospital, 2015 – 2016
 - iii. Member, Antimicrobial Stewardship Committee, Atlanta VA Medical Center, 2016 – 2018
 - iv. Member, CPR Committee, Atlanta VA Medical Center, 2016 – 2018
 - v. Member, Critical Care Workgroup, Atlanta VA Medical Center, 2016 – 2018
 - vi. Co-Chair, Airway Committee, Emory University Hospital, 2017 – 2020
 - vii. Member, Emory University Hospital Cardiothoracic ICU Design Committee, 2017 – 2018
 - viii. Member, Emory University Hospital Critical Care Committee, 2017 – present
 - ix. Member, Emory University Hospital Peer Review Committee, 2018 – present
 - x. Member, Emory Critical Care Center Operations Committee, 2019 – present
 - xi. Chair, Emory Healthcare Sedation Committee, 2019 – 2021
 - xii. Member, Emory Healthcare COVID-19 Critical Care Workgroup, 2020 – 2021
 - xiii. Member, Emory Healthcare COVID-19 Best Practice Workgroup, 2020 – 2021
 - xiv. Chair, Unit Startup Subcommittee, Emory Healthcare COVID-19 Best Practice Workgroup, 2020 – 2021
 - xv. Member, Emory COVID-19 Quality and Clinical Research Collaborative, 2020 – 2021
 - xvi. Member, Emory Healthcare Airway Committee, 2020 – present

- xvii. Co-Chair, Emory Healthcare Sedation Committee, 2021 – present
- xviii. Member, Emory Critical Care Center Executive Steering Committee, 2021 – present
- xix. Member, Epic Clinical Data Stewardship Workgroup, 2021 – present
- xx. Member, Emory University Hospital Heart and Vascular Service Line Steering Committee, 2021 – present
- xxi. Member, Emory Healthcare Medical Emergency Response Oversight Committee, 2021 – present
- xxii. Chair, Emory University Hospital Cardiothoracic ICU Design Committee, 2021 – present

13. Peer Review Activities:

a. Grants:

- i. National and International:
Proposal Assessor, National Institute of Biomedical Imaging and Bioengineering Rapid Acceleration of Diagnostics, National Institutes of Health Point-of-Care Technology Research Network, 2020 – 2021

b. Manuscripts:

- i. BMC Anesthesiology, ad-hoc reviewer, 2014 – present
- ii. Anesthesia and Analgesia, ad-hoc reviewer, 2016 – present
- iii. Critical Care Medicine, ad-hoc reviewer, 2017 – present
- iv. Anesthesia and Analgesia Practice, ad-hoc reviewer, 2018 – present
- v. Anesthesiology, ad-hoc reviewer, 2019 – present
- vi. BMJ Open, ad-hoc reviewer, 2019 – present
- vii. Critical Care, ad-hoc reviewer, 2019 – present
- viii. Critical Care Explorations, ad-hoc reviewer, 2019 – present
- ix. Journal of Intensive Care, ad-hoc reviewer, 2020 – present
- x. BMC Health Services Research, ad-hoc reviewer, 2020 – present
- xi. American Journal of the Medical Sciences, ad-hoc reviewer, 2021 – present
- xii. JAMA Open, ad-hoc reviewer, 2021 – present

c. Conference Abstracts:

- i. National and International:
 1. Society of Critical Care Medicine, Annual Congress, multiple locations, 2018 – present
 2. Society of Critical Care Anesthesiologists, Annual Meeting, multiple locations, 2019 – present
 3. International Anesthesia Research Society, Annual Meeting, multiple locations, 2021 – present

14. Editorships and Editorial Boards:

Editorial Board, *Critical Care Explorations*, 2022 – present

15. Honors and Awards:

- a. Excellence in Clinical Teaching, Emory University Department of Anesthesiology, 2016
- b. Excellence in Critical Care Medicine Teaching, Emory University Department of Anesthesiology, 2017
- c. Leadership Development Award, Emory University Department of Anesthesiology, 2018
- d. Recognition of Outstanding Leadership, Emory Critical Care Center, 2018, 2019
- e. Pandemic Response Recognition, CEO, Society of Critical Care Medicine, 2020
- f. Presidential Citation Award, Society of Critical Care Medicine, 2020

16. Society Memberships:

- a. Member, American Society of Anesthesiologists, 2011 – present
- b. Member, International Anesthesia Research Society, 2011 – present
- c. Member, Society of Critical Care Anesthesiologists, 2012 – present
- d. Member, Society of Critical Care Medicine, 2014 – present
- e. Member, American Thoracic Society, 2014 – 2019
- f. Member, Massachusetts Medical Society, 2014 – present
- g. Member, Georgia Society of Anesthesiologists, 2015 – present
- h. Member, Association of University Anesthesiologists, 2021 – present
- i. Fellow, American College of Critical Care Medicine, 2022 – present

17. Organization of Conferences:

- a. National and International:
 - i. Sessions as Chair:
 - a. Co-Chair, Pulmonary Track, ASAIO (American Society for Artificial Internal Organs) 64th Annual Conference, Washington, DC, June 2018
 - b. Chair, Colloids or Crystalloids for Intraoperative Goal-Directed Fluid Therapy: Which Bolus is Best? American Society of Anesthesiologists Annual Meeting, San Francisco, CA, October 2018
 - c. Moderator, Cardiovascular IX Research Snapshot, Society of Critical Care Medicine Annual Congress, San Diego, CA, February 2019
 - d. Moderator, Epidemiology V Research Snapshot, Society of Critical Care Medicine Annual Congress, San Diego, CA, February 2019

- e. Chair, Nudging Physicians to Change Behavior: The Theory, Conduct, and Critical Assessment of Nudge-Type Interventions, International Anesthesia Research Society Annual Meeting, Montreal, Canada, May 2019
 - f. Chair, Intraoperative Critical Care: How Best to Succeed when All Seems Lost. American Society of Anesthesiologists Annual Meeting, Orlando, FL, October 2019
 - g. Moderator, Cardiovascular IX Research Snapshot, Society of Critical Care Medicine Annual Congress, Orlando, FL, February 2020
 - h. Moderator, Epidemiology V Research Snapshot, Society of Critical Care Medicine Annual Congress, Orlando, FL, February 2020
 - i. Chair, Perioperative Approaches to the Prevention and Management of Organ Dysfunction: Rapid-Fire Pragmatic Pearls from the ICU, American Society of Anesthesiologists Annual Meeting, Washington, DC, October 2020 (canceled due to COVID-19)
 - j. Chair, Perioperative Approaches to the Prevention and Management of Organ Dysfunction: Rapid-Fire Pragmatic Pearls From the ICU, American Society of Anesthesiologists Annual Meeting, San Diego, CA, October 2021
 - k. Moderator, Early Career Group Networking Event, Society of Critical Care Anesthesiologists Annual Meeting, Online, May 2021
 - l. Moderator, COVID-19 Intensive Care Oral Abstract Session, Society of Critical Care Anesthesiologists Annual Meeting, Online, May 2021
 - m. Moderator, Going Viral: How to Combat Health Misinformation by Engaging the Popular Press, Society of Critical Care Anesthesiologists Webinar Series, Online, July 2021
 - n. Moderator, 2020/2021 Year in Review: Anesthesiology, Best of Society of Critical Care Medicine, Abu Dhabi, UAE (Online due to COVID-19), November 2021
 - o. Moderator, Evidence-Based Out of OR Airway Management: Past the Tipping Point? Society of Critical Care Anesthesiologists and International Anesthesia Research Society Annual Meetings, Honolulu, HI, March 2022
- b. Institutional:
- i. Administrative Positions:
 - a. Organizer, Faculty Development Lecture Series, Department of Anesthesiology Division of Critical Care Medicine, Atlanta, GA, 2020 – present

18. Clinical Service Contributions:

- a. Surgical Specialties Anesthesiology Attending, Emory University Hospital, 2015 – present
- b. Critical Care Medicine Attending, Cardiothoracic Intensive Care Unit (and others), Emory University Hospital, 2015 – present

- c. Established a critical care division and surgical intensive care unit service at the Atlanta VA Medical Center, 2016 – 2018
- d. Medical directorship of the Emory University Hospital Cardiothoracic Intensive Care Unit – a regional referral center for mechanical circulatory and extracorporeal support – including relocation and redesign, staff growth, and further development, 2017 – present
- e. Facilitated COVID-19 surge critical care capacity at a system level by serving as backup to the Emory Critical Care Center Director and a local level by organizing, executing, and staffing both relocation of a cardiothoracic intensive care unit and repurposing of that physical space into a dedicated COVID-19 unit, 2020 – 2021

19. Community Outreach:

- a. Media Appearances:
 - i. Anesthesiology News (print) – “Lung Protective Ventilation Varies with Mechanical Ventilation Type,” September 2018
 - ii. Financial Times (print) – “Doctors debate when best to place virus patients on ventilators,” April 2020
 - iii. Panelist, COVID-19 – Maximizing the Respiratory Team Dynamic: Effective Patient Care During a Pandemic, Joint Society of Critical Care Medicine and American Association for Respiratory Care Webinar, May 2020
 - iv. Medscape Medical News (online) – “COVID-19: Experts Warn of Psychological Trauma From ‘Air Hunger’,” June 2020

20. Formal Teaching:

- a. Graduate Programs:
 - i. Residency Programs:
 - 1. Surgical Specialties Anesthesiology Attending, Emory University Anesthesiology Residency Program, Emory University Hospital, 2015 – present
 - 2. Lecture and Board Review Series, Anesthesiology Residents, Emory University, 2015 – present, 6 hours/year (variable \pm 2 hours)
 - 3. Oral Board Preparation, Anesthesiology Residents, Emory University, 2015 – present, 4 hours/year
 - 4. Fundamentals of Critical Care, Anesthesiology Residents, Emory University, 2016 – present, 1 hour/month
 - 5. Rotation Director and Attending, Emory University General Surgery Residency Program, Atlanta VA Medical Center Surgical Critical Care Rotation, 2017 – 2018
 - 6. Literature Series and Journal Club, Anesthesiology Residents, Emory University, 2017 – 2018, 6 hours/year including individual resident preparation

7. Orientation Didactic Series, Anesthesiology Residents, Emory University, 2017 – present, 2 hours/year
 8. Critical Care Lecture Series, Emergency Medicine Residents, Emory University, 2019 – present, 2 hours/year
 9. Lecture Series, Anesthesiology Categorical Interns, Emory University, 2020 – present, 2 hours/year
 10. Resident Lecture Series, General Surgery Residents, Emory University, 2021 – present, 1 hour/year
- ii. Fellowship Programs:
1. Critical Care Medicine Attending, Multiple Training Programs, Emory University Hospital Cardiothoracic Intensive Care Unit, 2015 – present
 2. Multidisciplinary Critical Care Lecture Series, Critical Care Medicine Fellows, 2015 – present, 4 hours/year
 3. Journal Club, Critical Care Medicine Fellows, 2015 – present, 6 hours/year
 4. Lecturer, Cardiothoracic Anesthesiology Fellows, 2018 – 2019, 1 hour/year
- b. Other Categories:
- i. Lecturer, Emory University PA Program, 2016 – 2017, 2 hours/year
 - ii. Lecturer, Emory University Anesthesiology Assistant Program, 2017 – present, 4 hours/year
 - iii. Rotation Director and Clinical Preceptor, Emory University Anesthesia Assistant Program, Atlanta VA Medical Center Surgical Critical Care Rotation, 2017 – 2018
 - iv. Lecturer, Emory Healthcare “ECMO University,” 2018 – present, 3 hours/year
 - v. Lecturer, Professional Development Lecture Series, Department of Anesthesiology Division of Critical Care Medicine, 2020 – present, 8 hours/year

21. Supervisory Teaching:

- a. Residency Program (Including Fellowship):
- i. Carla Maffeo-Mitchell, MD, 2015 – 2018
Clinical Instructor, University of Connecticut School of Medicine
 - ii. Matt Mitchell, MD, 2015 – 2018
Clinical Instructor, University of Connecticut School of Medicine
 - iii. Katherine (Kate) Nugent, 2015 – 2017
Assistant Professor, Emory University School of Medicine

- iv. John Anthony (Tony) Vullo, 2016 – 2018
Assistant Professor, Icahn School of Medicine at Mount Sinai
- v. Brent Kidd, MD, 2017 – 2018
Assistant Professor, University of Kansas School of Medicine
- vi. Hemanckur Makker, MD, 2017 – 2018
Assistant Professor, Medical College of Wisconsin
- vii. Ofer Sadan, MD, 2017 – 2018
Assistant Professor, Emory University School of Medicine
- viii. Michael Best, MD, 2018 – 2019
Staff Physician, St. Luke's University Healthcare
- ix. Sarah (Coyle) Burke, MD, 2018 – 2019
Staff Physician and CVICU Medical Director, Emory St. Joseph's Hospital
- x. Theresa Barnes, MD, 2019 – 2020
Staff Physician, Orlando Veterans Affairs Medical Center
- xi. Maxwell (Max) Hockstein, MD, 2018 – 2020
Assistant Professor, George Washington University School of Medicine
- xii. Maria Christina Creel-Bulos, MD, 2019 – 2021
Assistant Professor, Emory University School of Medicine
- xiii. James Barger, MSE, MD, 2020 – 2021
Assistant Professor, Emory University School of Medicine

22. Lectureships, Seminar Invitations, and Visiting Professorships:

a. National and International:

- i. Visiting Professor, Anesthesiology Grand Rounds, "Intraoperative Protective Mechanical Ventilation: Dissimilar to the ICU?" Medical University of South Carolina, Charleston, SC, May 30, 2017
- ii. Visiting Lecturer, Anesthesiology Grand Rounds, "Intraoperative Cardiac Arrest," VA Boston Health Care System, Boston, MA, Sept 18, 2020
- iii. Visiting Lecturer, Anesthesiology Grand Rounds, "Intraoperative Cardiac Arrest," Kendal Regional Medical Center, Miami, FL Nov 30, 2020

b. Institutional:

- i. Pulmonary Hygiene in the Intensive Care Unit. Respiratory Grand Rounds, Department of Anesthesiology and Division of Respiratory Care, Massachusetts General Hospital, Boston, MA, May 18, 2015
- ii. Rational Fluid Therapy in the Operating Room. Departmental Inservice, Department of Anesthesiology, Emory University, Atlanta, GA, April 7, 2016 and September 28, 2017

- iii. Anesthesiology Grand Rounds, “Crystalloids versus Colloids for Intraoperative Resuscitation: Does Either Side Hold Water?” Department of Anesthesiology, Emory University, Atlanta, GA, February 15, 2018
- iv. Intravenous Fluids: Dogmas and Shibboleths. Department of Anesthesiology, Emory University, Atlanta, GA, June 12, 2019
- v. Perspectives on COVID-19 at Emory: Past, Present, and Future. Department of Anesthesiology, Emory University, Atlanta, GA, August 13, 2020

23. Invitations to National/International, Regional, and Institutional Conferences:

a. National and International:

- i. Advanced Forms of Mechanical Ventilation. Panel Discussion: Management of Severe Perioperative Hypoxemia and Respiratory Acidosis. American Society of Anesthesiologists Annual Meeting, San Diego, CA, October 2015
- ii. Optimizing Outcomes Following Severe Intraoperative Respiratory Failure. Panel Discussion: Intraoperative Critical Care – How Best to Succeed When All Seems Lost. American Society of Anesthesiologists Annual Meeting, Boston, MA, October 2017
- iii. Optimization of Hemodynamics in Patients on Mechanical Circulatory Support. Association of Physician Assistants in Cardiovascular Surgery 37th Annual Meeting, Miami, FL, April 2018
- iv. Intraoperative Cardiac Arrest: Is Cooling Still Hot? Panel Discussion: Intraoperative Critical Care – How Best to Succeed When All Seems Lost. American Society of Anesthesiologists Annual Meeting, San Francisco, CA, October 2018
- v. Colloids Should be Used Intraoperatively: Less is More. Panel Discussion: Colloids or Crystalloids for Intraoperative Goal-Directed Fluid Therapy. American Society of Anesthesiologists Annual Meeting, San Francisco, CA, October 2018
- vi. Team Dynamics in Management of Long Term ICU Patients. Association of Physician Assistants in Cardiovascular Surgery 38th Annual Meeting, Miami, FL, April 2019
- vii. Applications of Nudge Theory in the Anesthesiology and Perioperative Domains. International Anesthesia Research Society Annual Meeting, Montreal, Canada, May 2019
- viii. Optimizing Long-Term Outcomes after Intraoperative Cardiac Arrest. Panel Discussion: Intraoperative Critical Care – How Best to Succeed When All Seems Lost. American Society of Anesthesiologists Annual Meeting, Orlando, FL, October 2019
- ix. Cardiopulmonary Resuscitation and Emergency Airway Management. Anesthesiology Year in Review. Society of Critical Care Medicine Annual Congress, Orlando, FL, February 2020
- x. Airway Management and Mechanical Ventilation Management for the Critically Ill Patient. Pre-Course Workshop. Society of Critical Care Medicine Annual Congress, Orlando, FL, February 2020

- xi. Care Coordination for Complex Long Term ICU Patients. Association of Physician Assistants in Cardiovascular Surgery 39th Annual Meeting, Miami, FL, April 2020 (canceled due to COVID-19)
- xii. Consensus-Driven Quality Improvement in Adult Critical Care. Presented during: Wooden Nails to Brass Tacks: Pragmatic Approaches to Data-Driven Quality Improvement. Panel Presentation. International Anesthesia Research Society Annual Meeting. San Francisco, CA, May 2020 (canceled due to COVID-19)
- xiii. Altmetrics and Web Traffic Data Demystified: Tools to Measure Knowledge Dissemination and Uptake. Presented during: Social Media and Mobile Apps: Looking Beyond Retweets to Knowledge Dissemination and Novel Data for Research. Panel Presentation. International Anesthesia Research Society Annual Meeting. San Francisco, CA, May 2020 (canceled due to COVID-19)
- xiv. Optimizing Long-Term Outcomes after Intraoperative Cardiac Arrest. Panel Discussion: Intraoperative Critical Care – How Best to Succeed When All Seems Lost. American Society of Anesthesiologists Annual Meeting, Washington, DC, October 2020 (converted to a virtual meeting webinar due to COVID-19)
- xv. Emerging Strategies for Sedation of Morbidly Obese Patients. Panel Discussion: The Next Endoscopy Patient Has WHAT?! Safely Navigating Severe Comorbid Conditions in the Endoscopy Suite. American Society of Anesthesiologists Annual Meeting, Washington, DC, October 2020 (canceled due to COVID-19)
- xvi. Going Viral: How to Combat Health Misinformation by Engaging the Popular Press. Society of Critical Care Anesthesiologists Webinar Series, Online, July 2021
- xvii. Optimizing Long-Term Outcomes after Intraoperative Cardiac Arrest. Virtual Panel Discussion: Intraoperative Critical Care – How Best to Succeed When All Seems Lost. American Society of Anesthesiologists Annual Meeting, San Diego, CA, October 2021
- xviii. Emerging Strategies for Sedation of Morbidly Obese Patients. Panel Discussion: The Next Endoscopy Patient Has WHAT?! Safely Navigating Severe Comorbid Conditions in the Endoscopy Suite. American Society of Anesthesiologists Annual Meeting, San Diego, CA, October 2021
- xix. The Impact of COVID on Anesthesiologists: a Critical Care Perspective. American Society of Anesthesiologists Annual Meeting, San Diego, CA, October 2021.
- xx. Updates in Cardiopulmonary Resuscitation and Emergency Airway Management. Year in Review: Anesthesiology. Best of Society of Critical Care Medicine, Abu Dhabi, UAE, November 2021
- xxi. Supply Chain Lessons from Critical Care. Panel Discussion: Mitigation and Management of Perioperative Supply Chain Disruption. American Society of Anesthesiologists ADVANCE Practice Management Conference, Dallas, TX, January 2022
- xxii. Fundamental Airway Skills Instruction – Airway Management and Mechanical Ventilation Management for the Critically Ill Patient. Pre-Course Workshop. Society of Critical Care Medicine Annual Congress, San Juan, PR, February 2022

- xxiii. Disease-Specific Mechanical Ventilation Approaches – Airway Management and Mechanical Ventilation Management for the Critically Ill Patient. Pre-Course Workshop. Society of Critical Care Medicine Annual Congress, San Juan, PR, February 2022
 - xxiv. VV ECMO in the Current and Future Era. Panel Discussion: Extracorporeal Life Support: What's Here, What You Need to Know, and What's Coming. Society of Critical Care Medicine Annual Congress, San Juan, PR, February 2022
- b. Regional:
- i. Intraoperative Cardiac Arrest: Optimizing Outcomes. Georgia Society of Anesthesiologists Winter Forum, Atlanta, GA, January 2022

24. Abstract Presentations at National/International, Regional, and Institutional Conferences:

- a. National and International:
- i. **Jabaley C***, Dudaryk R. An unusual presentation of postoperative right ventricular failure and undiagnosed pulmonary hypertension. American Society of Anesthesiologists Annual Meeting, Washington, DC, October 2012 (poster presentation)
 - ii. **Jabaley C***, Fuhrman T. Anesthetic management for human spinal cord schwann cell transplantation. American Society of Anesthesiologists Annual Meeting, San Francisco, CA, October 2013 (poster presentation)
 - iii. Bodzin D*, **Jabaley C**, Rodriguez L, McNeer R, Dudaryk R. The association between early end tidal carbon dioxide and mortality during emergency surgery. American Society of Anesthesiologists Annual Meeting, San Diego, CA, October 2015 (poster and invited oral presentations)
 - iv. **Jabaley C**, George E, Bittner E*. Factors influencing the time required for in-hospital emergency endotracheal intubation. Society of Critical Care Medicine Annual Congress, Orlando, FL, February 2016 (poster presentation)
 - v. **Jabaley C**, Groff R, Raikhelkar J, Moll V, Blum J*. Modes of mechanical ventilation vary between intensive care units within a university healthcare system. International Anesthesia Research Society and Society of Critical Care Anesthesiologists Annual Meetings, Washington, DC, May 2017 (poster presentation)
 - vi. Groff R, **Jabaley C**, Raikhelkar J, Moll V, Blum J*. The likelihood of receiving lung protective ventilation depends on type and location of ICU within a university healthcare system. Society of Critical Care Anesthesiologists Annual Meeting, Washington, DC, February 2017 (poster presentation)
 - vii. **Jabaley C***, Wolf F, Lynde G, O'Reilly-Shah V. Early experience with sugammadex in the US: results from a mobile application-based survey. American Society of Anesthesiologists Annual Meeting, Boston, MA, October 2017 (poster presentation)
 - viii. **Jabaley C***, Groff R, Blum J, Sharifpour M. Trends in the global awareness of sepsis: insights from search engine data between 2012 and 2017. Society of Critical Care Medicine Annual Meeting, San Antonio, TX, February 2018 (poster presentation)

- ix. **Jabaley C**, Blum J, Groff R*, Sharifpour M, Budhrani G, Raikhelkar J, Stentz M. The likelihood of lung protective ventilation varies according to the mode of mechanical ventilation. Society of Critical Care Medicine Annual Meeting, San Antonio, TX, February 2018 (oral presentation)
- x. Stentz M*, **Jabaley C**, Groff R, Raikhelkar J, Sharifpour M, Budhrani G, Blum J. Addition of ventilator parameters improves accuracy of APACHE IVa score. Society of Critical Care Medicine Annual Congress, San Antonio, TX, February 2018 (oral presentation)
- xi. Groff R*, Blum J, Budhrani G, Sharifpour M, **Jabaley C**, Stentz M, Raikhelkar J. Decreased driving pressure is associated with decreased mortality after cardiac surgery. Society of Critical Care Medicine Annual Congress, San Antonio, TX, February 2018 (oral presentation)
- xii. Stentz M*, **Jabaley C**, Moll V, Blum J. Trends in the use of extracorporeal membrane oxygenation in the United States, 2011 – 2014: an examination of state-level billing data. Society of Critical Care Anesthesiologists Annual Meeting, Chicago, IL, May 2018 (poster presentation)
- xiii. Groff R*, Stentz M, **Jabaley C**, Blum J, Sharifpour M. Boarding of ICU patients does not impact mortality in an academic health system. Society of Critical Care Anesthesiologists Annual Meeting, Chicago, IL, May 2018 (poster presentation)
- xiv. Makker H*, **Jabaley C**. Successful management of severe inhalation injury secondary to sulfuric acid with veno-venous extracorporeal membrane oxygenation. Society of Critical Care Anesthesiologists Annual Meeting, Chicago, IL, May 2018 (poster presentation)
- xv. Weis M*, Elder C, Meka A, Meyer L, **Jabaley C**, Sharifpour M, O'Reilly-Shah V. Prevalence of bradycardia associated with sugammadex administration in a single-center retrospective analysis of electronic medical record data. International Anesthesia Research Society Annual Meeting, Montreal, Canada, May 2019 (poster presentation)
- xvi. Best M*, Madden L, Wiepking M, Hashmi S, Hockstein M, **Jabaley C**, Caridi-Scheible M. Early mobility in the cardiothoracic surgical intensive care unit: a quality improvement study. Society of Critical Care Anesthesiologists Annual Meeting, Montreal, Canada, May 2019 (poster presentation)
- xvii. Barnes T*, Groff R, Blum J, O'Reilly-Shah V, Moll V, Wang H, Mehta C, **Jabaley C**. Sepsis administrative claims data from employer sponsored insurance plans: insights from 2009 through 2015. American Society of Anesthesiologists Annual Meeting, Orlando, FL, October 2019 (poster presentation)
- xviii. **Jabaley C***, Blum J, O'Reilly-Shah V, Groff R, Moll V, Wang H, Mehta C. Baseline morphine milligram equivalents and length of stay are associated with opioid prescribing patterns after intensive care for sepsis. American Society of Anesthesiologists Annual Meeting, Orlando, FL, October 2019 (invited oral and featured poster presentations)
- xix. **Jabaley C***, Blum J, O'Reilly-Shah V, Groff R, Moll V, Wang H, Mehta, C. ICU utilization and respiratory failure are associated with new outpatient opioid use after sepsis. Society of Critical Care Medicine Annual Congress, Orlando, FL, February 2020 (oral presentation)

- xx. Blum J*, Wells J, Groff R, Panos R, **Jabaley C**. National network use and outcomes of thiamine, vitamin c, and hydrocortisone for sepsis treatment. Society of Critical Care Medicine Annual Congress, Orlando, FL, February 2020 (oral presentation)
 - xxi. Abide A*, Groff R, **Jabaley C**, Sharifpour M. Uncommon approach to VV ECMO cannulation in the setting of MRSA. Society of Critical Care Medicine Annual Congress, Orlando, FL, February 2020 (oral presentation)
 - xxii. Chang K, **Jabaley C**, Sharifpour M. Venovenous ECMO for intraoperative bronchospasm. American Society of Anesthesiologists Annual Meeting, San Diego, CA, October 2021 (poster presentation)
- b. Regional:
- i. **Jabaley C***, Fuhrman T. Anesthetic management for human spinal cord schwann cell transplantation. Florida Society of Anesthesiologists Annual meeting, Palm Beach, FL, June 2013 (poster presentation)
 - ii. **Jabaley C**, Gray D, Budhrani G, Lynde G, O'Reilly-Shah V. Association of chronic atypical antipsychotic use with reduced need for postoperative nausea and vomiting rescue in the post-anesthesia care unit: a retrospective observational study. Emory University Health Services Research Day, Atlanta, GA, May 2018
 - iii. Melanson V*, O'Reilly-Shah V, Sullivan C, **Jabaley C**, Lynde G. Lack of association between intraoperative handoff of care and postoperative complications: a retrospective observational study. Emory Quality Conference, Atlanta, GA, May 2019.

25. Research Focus:

My research interests include resuscitation and emergency airway management, leveraging health services research approaches to better understand and optimize the delivery of critical care, the study of information dissemination and uptake related to critical illnesses, and exploratory biomedical applications of time series analysis.

26. Grant Support:

a. Active Support:

i. Other

- 1. Co-I, Emory University, *Thrombin Generation in Patients with Pneumonia*, COVID-Catalyst-I³ Award, \$15,000, 2020 – 2022

b. Previous Support:

- i. PI, Emory University Department of Anesthesiology, The association between critical illness secondary to sepsis and new or prolonged opioid use following hospital discharge: a retrospective observational study, Team-Based Science Award, \$8,885, 2018 – 2020

27. Bibliography:

- a. Published and Accepted Research Articles (clinical, basic science, other) in Refereed Journals:
 - i. Dudaryk R, Bodzin D, Ray J, **Jabaley C**, McNeer R, Epstein R. Low end-tidal carbon dioxide at the onset of emergent trauma surgery is associated with non-survival: a case series. *Anesth Analg*. 2017;125(4):1261-1266.
 - ii. O'Reilly-Shah V, Kitzman J, **Jabaley C**, Lynde G. Evidence for increased use of the Society of Pediatric Anesthesia Critical Events Checklist in resource-limited environments: A retrospective observational study of app data. *Paediatr Anaesth*. 2018;28(2):167-173
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 - iv. Monroe K, Evans M, Mukkamala S, Williamson J, **Jabaley C**, Mariano E, O'Reilly-Shah V. Moving anesthesiology educational resources to the point of care: experience with a pediatric anesthesia mobile app. *Kor J Anesth*. 2018;71(3):192-200.
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- b. Manuscripts Submitted:
- i. Rosenthal E, Park S, Bihorac A, Clermont G, Moorman JR, Rashidi P, et al. A blueprint for a multi-center, patient-focused Collaborative Hospital Repository Uniting Standards (CHoRUS) for equitable artificial intelligence. Submitted to *Neurocrit Care*.
 - ii. Budde A, Kadar R, **Jabaley C**. Airway misadventures in adult critical care: a concise narrative review of managing lost or compromised artificial airways. Submitted to *Curr Opin Anaesthesiol*.
- c. Review Articles:
- i. **Jabaley C**, Dudaryk R. Fluid resuscitation for trauma patients: crystalloids versus colloids. *Curr Anesthesiol Rep*. 2014;4(3):216-224
 - ii. **Jabaley C**, Smith, C.E., Dudaryk R. Anesthetic considerations and ventilation strategies in cardiothoracic trauma. *Curr Anesthesiol Rep*. 2016;6(1):36-49.
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- vii. Barnes T, Hockstein M, **Jabaley C**. Vasoplegia after cardiopulmonary bypass: a narrative review of pathophysiology and emerging targeted therapies. *SAGE Open Med*. 2020;8:1-8.
 - viii. Kidd B, Sutherland L, **Jabaley C**, Flynn B. Efficacy, safety, and strategies for recombinant activated factor VII in cardiac surgical bleeding: a narrative review. *Cardiothorac Vasc Anesth*. 2021;10.1053/j.jvca.2021.03.021.
- d. Book Chapters:
- i. **Jabaley C**. Infectious disease. *Critical Care Handbook of the Massachusetts General Hospital*, 6th Edition. Wiener-Kronish JP ed. Wolters Kluwer 2016. Pages 164-177.
 - ii. **Jabaley C**, Bittner E. Emergency airway management: myths and misconceptions. *Current Concepts in Adult Critical Care*, 6th Edition. Bittner E, LaRossa J eds. Society of Critical Care Medicine 2016. Pages 51-72.
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 - vii. **Jabaley C**. Saline versus Albumin for Resuscitation of Critically Ill Adults. *50 Studies Every Intensivist Should Know*, 1st Edition. Bitter EA ed. Oxford University Press 2018. Pages 68-73.
 - viii. Koczman M, **Jabaley C**. Foundational Concepts in Surgical Critical Care: The Renal System. *Concepts in Surgical Critical Care*. Boling B, Hatton K, Hartjes T eds. Jones & Bartlett Publishers 2020. Pages 73-88.
 - ix. Fiza B, Ferrero N, Prabhakar A, **Jabaley C**. Cardiac: Tricuspid Valvular Disease. *Critical Care Echocardiography Review*, 1st Edition. Chang M ed. Wolters Kluwer 2021. Pages 285-294.
 - x. Leiendecker ER, Butterly A, **Jabaley C**. Overview of airway practice. *Airway and Mechanical Ventilation*. Society of Critical Care Medicine, in production.
 - xi. Mueller M, Barger J, **Jabaley C**, Tainter C. Disease-specific strategies. *Airway and Mechanical Ventilation*. Society of Critical Care Medicine, in production.
 - xii. **Jabaley C**, Coopersmith C. A Perspective on ICU Leadership and Administration. *Adult Comprehensive Critical Care*, 3rd Edition. Society of Critical Care Medicine, in production.
- e. Manuals, Videos, Computer Programs, and Other Teaching Aids:
- i. **Jabaley C**. Transitioning care of critically ill patients. Video feature for *Critical Care Handbook of the Massachusetts General Hospital*, 6th Edition. Wiener-Kronish, J.P. ed. Wolters Kluwer 2016
 - ii. **Jabaley C**. Video Laryngoscopy in Critical Care: New Standard or Fragile Crutch? Online CME for the American Society of Anesthesiologists, October 2019
 - iii. Bartz R and **Jabaley C**. Fundamentals of Critical Care Nephrology. Online educational materials and CME for the COVID Activated Emergency Scaling of Anesthesiology Responsibilities (CAESAR) ICU project, April 2020, last updated October 2020.

f. Published Abstracts:

- i. **Jabaley C**, George E, Bittner E. Factors influencing the time required for in-hospital emergency endotracheal intubation. *Crit Care Med*. 2015;43(12):Suppl p47
- ii. **Jabaley C**, Groff R, Raikhelkar J, Moll V, Blum J. Modes of mechanical ventilation vary between intensive care units within a university healthcare system. *Anesth Analg*. 2017;124(5):Suppl p239-240
- iii. **Jabaley C**, Groff R, Blum J, Sharifpour M. Trends in the global awareness of sepsis: insights from search engine data between 2012 and 2017. *Crit Care Med*. 2018;46(1):Suppl p693
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- v. Stentz M, **Jabaley C**, Groff R, Raikhelkar J, Sharifpour M, Budhrani G, Blum J. Addition of ventilator parameters improves accuracy of APACHE IVa score. *Crit Care Med*. 2018;46(1):Suppl p492
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- vii. Weis M, Elder C, Meka A, Meyer L, **Jabaley C**, Sharifpour M, O'Reilly-Shah V. Prevalence of bradycardia associated with sugammadex administration in a single-center retrospective analysis of electronic medical record data (S-53). *Anesth Analg*. 2019;128(5):Suppl 2 p99.
- viii. Best M, Madden L, Wiepking M, Hashmi S, Hockstein M, **Jabaley C**, Caridi-Scheible M. Early mobility in the cardiothoracic surgical intensive care unit: a quality improvement study (S-121). *Anesth Analg*. 2019;128(5):Suppl 2 p233.
- ix. **Jabaley C**, Blum J, O'Reilly-Shah V, Groff R, Moll V, Wang H, Mehta, C. ICU utilization and respiratory failure are associated with new outpatient opioid use after sepsis. *Crit Care Med*. 2020;48(1):Suppl p178
- x. Blum J, Wells J, Groff R, Panos R, **Jabaley C**. National network use and outcomes of thiamine, vitamin c, and hydrocortisone for sepsis treatment. *Crit Care Med*. 2020;48(1):Suppl p783
- xi. Abide A, Groff R, **Jabaley C**, Sharifpour M. Uncommon approach to VV ECMO cannulation in the setting of MRSA. *Crit Care Med*. 2020;48(1):Suppl p90

g. Other Publications:

- i. O'Reilly-Shah V, Wolf F, **Jabaley C**, Lynde G. Using a worldwide in-app survey to explore sugammadex usage patterns: a prospective observational study. *Br J Anaesth*. 2017;119(2):333-5. (Research letter, PMID 28854547)
- ii. O'Reilly-Shah V, **Jabaley C**, Lynde G, Monroe K. Opportunities and limitations in mobile technology. *Anesth Analg*. 2017;125(4):1416. (Letter, PMID 28806207)
- iii. O'Reilly-Shah V, Lynde G, **Jabaley C**. Anesthesia care handovers and risk of adverse outcomes. *JAMA*. 2018;319(21):2235. (Letter, PMID 29872852)
- iv. **Jabaley C**, Groff R, O'Reilly-Shah V. Asthma information seeking via Wikipedia between 2015 and 2018: implications for awareness promotion. *Am J Respir Crit Care Med*. 2018;199(4):531-533. (Research letter, PMID 30521354)
- v. **Jabaley C**. A Brief Conversation with...Jeffery S. Vender. *SOCCA Interchange*. 2018;29(3):15-16. (Newsletter)
- vi. O'Reilly-Shah V, Lynde G, **Jabaley C**. Is it time to start using the emoji in biomedical literature? *BMJ*. 2018;363:k5033. (Christmas 2018 Feature)
- vii. **Jabaley C**. A Brief Conversation with...Mike Fierro. *SOCCA Interchange*. 2019;30(1):10,12. (Newsletter)

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- ix. **Jabaley C**. A Brief Conversation With...Vivian Abalama. *SOCCA Interchange*. 2019;30(3):12,14. (Newsletter)
- x. **Jabaley C**. Editor's Message. *SOCCA Interchange*. 2019;30(4):2. (Newsletter)
- xi. **Jabaley C**. Communication Committee Update. *SOCCA Interchange*. 2020;31(1):4. (Newsletter)
- xii. **Jabaley C**. Developments Concerning Coronavirus Disease 2019 (COVID-2019). *SOCCA Interchange*. 2020;31(1):5-7,10. (Newsletter)
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- xiv. O'Reilly-Shah V, Gentry K, Van Cleve W, Kendale S, **Jabaley C**, Long D. The COVID-19 pandemic highlights shortcomings in U.S. healthcare informatics infrastructure: a call to action. *Anesth Analg*. 2020;131(2):340-344. (Viewpoint, PMID 32366769)
- xv. **Jabaley C**. Communications Committee Update. *SOCCA Interchange*. 2020;31(3):4. (Newsletter)
- xvi. **Jabaley C**. Committee on Communications Update: We Need You! *SOCCA Interchange*. 2020;32(1):3. (Newsletter)
- xvii. Creel-Bulos C, Hassani B, Stentz M, Budhrani G, Daneshmand M, **Jabaley C**, Groff R. Extracorporeal membrane oxygenation for amniotic fluid embolus-induced cardiac arrest in the first trimester of pregnancy: a case report. *Crit Care Explor*. 2020;2(7):e0162 (Case report, PMID 32766559)
- xviii. Sevransky J, Agarwal A, **Jabaley C**, Rochwerb B. Standardized care is better than Individualized care for the majority of critically ill patients. *Crit Care Med*. 2020;49(1):151-155. (Editorial, PMID 33060504)
- xix. **Jabaley C**. Committee on Communications Update: We Need You! *SOCCA Interchange*. 2020;32(1):3. (Newsletter)
- xx. **Jabaley C**. Venoarterial extracorporeal membrane oxygenation in elderly patients with refractory cardiogenic shock: is age truly just a number? *Crit Care Med*. 2021;49(1):156-159. (Editorial, PMID 33337744)
- xxi. **Jabaley C**. Sedation and neuromuscular blockade in acute respiratory distress syndrome: a step toward disentangling best practices. *Crit Care Med*. 2021;49(7):1211-1213. (Editorial, PMID 34135282)
- xxii. Cobas M, **Jabaley C**. SOCCA update 2021: critical care to the forefront. *ASA Monitor*. 2021;85(4):43. (Newsletter)
- xxiii. Zivot J, **Jabaley C**. American perspectives on COVID-19 vaccination hesitancy and refusal: time for a new approach? *J Crit Care*: 2021;PAP. (Invited Commentary, PMID 34663531)

28. Contributions Not Otherwise Noted:

- a. Editorial Board, *Interchange*, Society of Critical Care Anesthesiologists Newsletter, 2018 – present
- b. Editor, *Interchange*, Society of Critical Care Anesthesiologists Newsletter, 2019 – 2021
- c. Joint Task Force on COVID-19 Resources. Williams G and **Jabaley C**, eds. COVID Activated Emergency Scaling of Anesthesiology Responsibilities (CAESAR) ICU. Online educational materials. April 2020, last updated October 2020
- d. Examiner, American Board of Anesthesiology APPLIED Structured Oral and Clinical Examinations, 2021 – present

- e. Career Advancement Pathways, Project for the Woodruff Leadership Academy, Emory Woodruff Health Sciences Center, 2021
- f. Mentor, Foundation for Anesthesia Education and Research Medical Student Anesthesia Research Fellowship Program, 2021 – 2022
- g. Mentor, Discovery Phase, Emory University School of Medicine, 2021 – present

Intraoperative Cardiac Arrest: Optimizing Outcomes

Craig S. Jabaley, MD
Associate Professor of Anesthesiology
Emory University, Atlanta, GA

1/8/2022

Disclosures

- I have no relevant financial disclosures or conflicts of interest.
- We will discuss off-label use of medications and medical devices.

Objectives

- Contrast cardiac arrest in the OR with that in other settings
- Summarize methodical approaches to intraoperative cardiac arrest
- Identify evidence-based practices for cardiac arrest management that improve long-term outcomes

Important Disclaimers

- The accepted community standard of care for management of cardiac arrest is AHA's ACLS
- Cardiac arrest in the OR is different than arrest in other settings
 - Out-of-hospital
 - In-hospital
- However, there is not yet a widely accepted modification of this approach for use in the OR

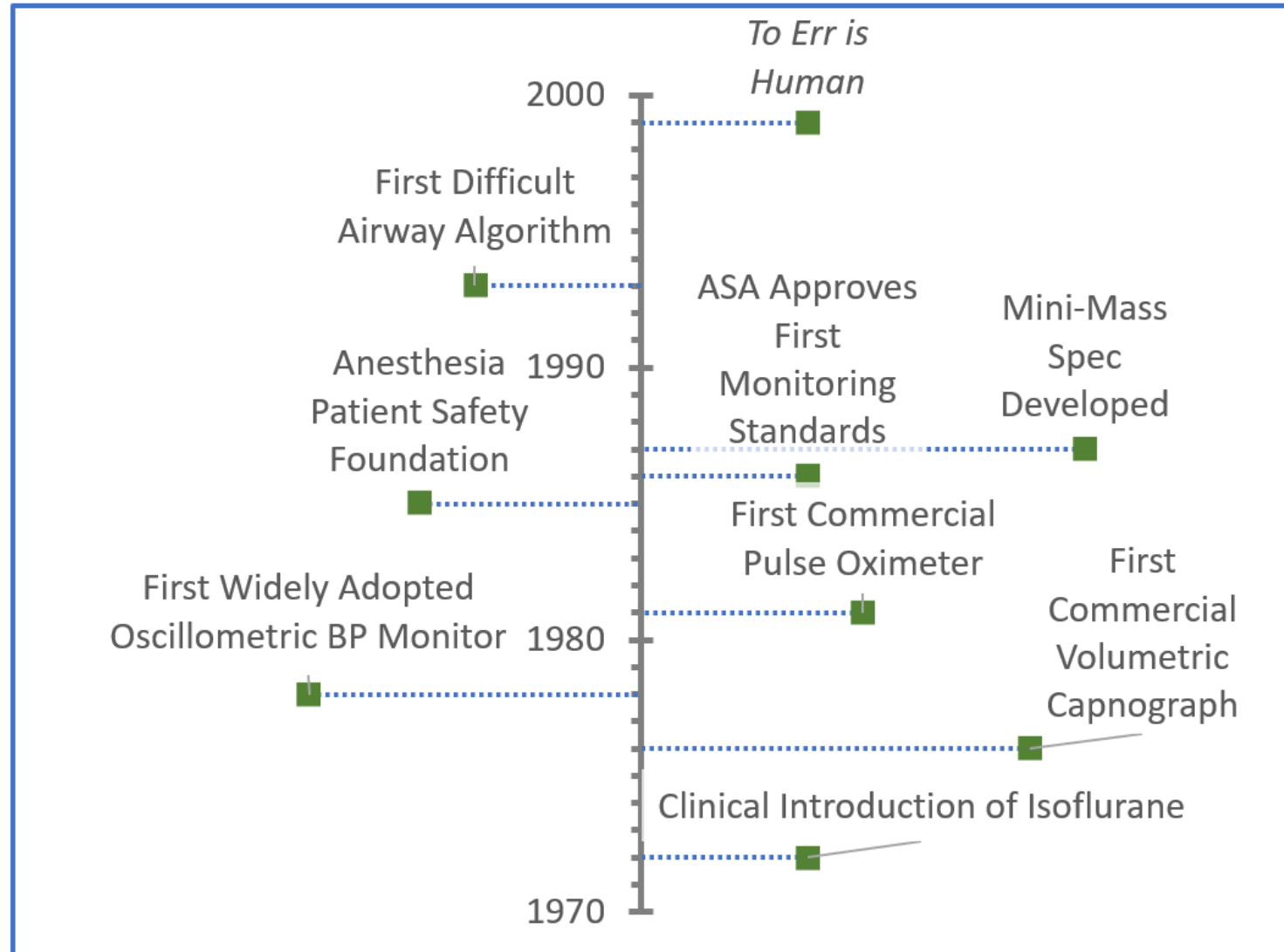


Epidemiology and Outcomes

Good News

- The incidence of perioperative cardiac arrest has declined with time
 - Estimated at **0.2 to 1.1 arrests per 10,000 non-cardiac adult cases**
 - Caveat: one recent study of the National Inpatient Sample (NIS) estimated 5.7 arrests per 10,000 adult cases (Fielding-Singh 2020)
 - This is a **10-fold reduction** from the 1970s
 - Why?

What Changed Since the 70s



Good News, Continued

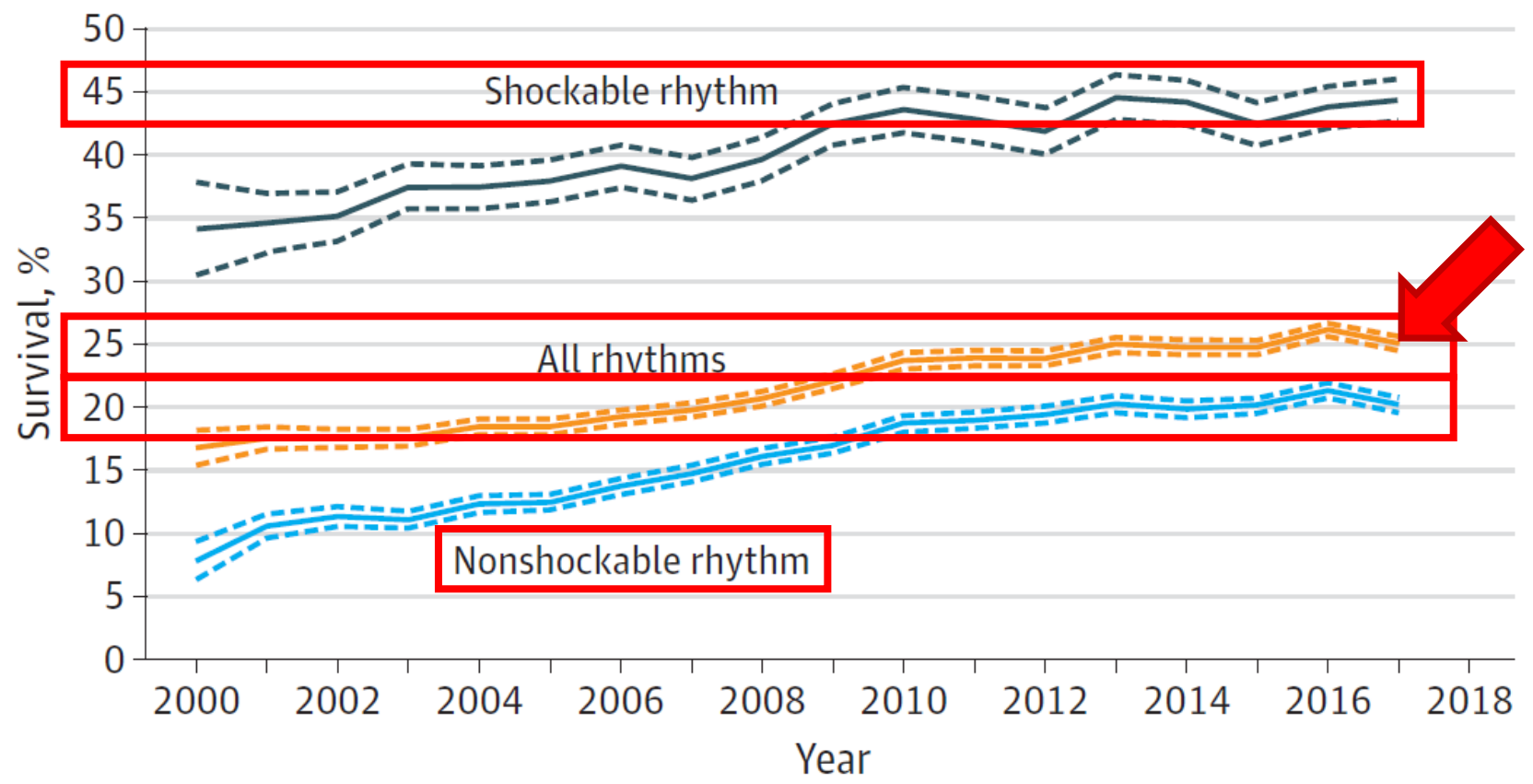
- The incidence of perioperative cardiac arrest has declined with time
 - Estimated at **0.2 to 1.1 arrests per 10,000 non-cardiac adult cases**
 - Caveat: one recent study of the National Inpatient Sample (NIS) estimated 5.7 arrests per 10,000 adult cases (Fielding-Singh 2020)
 - This is a **10-fold reduction** from the 1970s
- **Vulnerable populations remain (in descending order)**
 - Emergency surgery: 163 arrests per 10,000 cases
 - Neonates undergoing cardiac surgery: 127 arrests per 10,000 cases
 - Elderly: 54.4 arrests per 10,000 cases
 - General pediatrics: 1.4 to 4.6 arrests per 10,000 cases

In-Hospital Cardiac Arrest Outcomes

In-Hospital Cardiac Arrest A Review

Lars W. Andersen, MD, MPH, PhD, DMSc; Mathias J. Holmberg, MD, MPH; Katherine M. Berg, MD; Michael W. Donnino, MD; Asger Granfeldt, MD, PhD, DMSc

Figure 1. Survival After In-Hospital Cardiac Arrest, 2000 to 2017



Based on data from the Get With The Guidelines-Resuscitation registry on all adult in-hospital cardiac arrests from 2000 to 2017. The dotted lines represent 95% CIs. Shockable rhythms include ventricular fibrillation and pulseless ventricular tachycardia. Nonshockable rhythms include asystole and pulseless electrical activity. Adapted from Benjamin et al.²

In-Hospital Cardiac Arrest Outcomes

- In-hospital cardiac arrest survival is getting better but not impressive
 - ~25% survival to discharge in all-comers
 - **~20% survival to discharge in non-shockable rhythms**
 - (Most arrests in the OR are associated with non-shockable rhythms)
- What about in the OR?

Predictors of Survival from Perioperative Cardiopulmonary Arrests

A Retrospective Analysis of 2,524 Events from the Get With The Guidelines-Resuscitation Registry

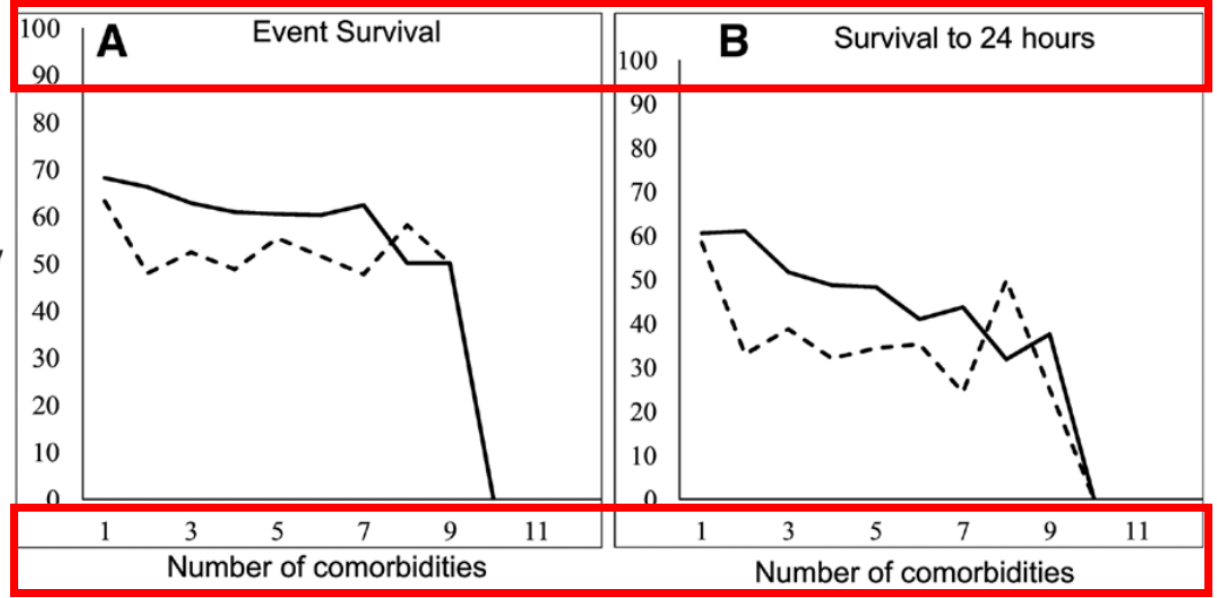
Satya Krishna Ramachandran, M.D., F.R.C.A.,* Jill Mhyre, M.D.,* Sachin Kheterpal, M.D., M.B.A.,* Robert E. Christensen, M.D.,* Kristen Tallman, B.S.N.,† Michelle Morris, M.S.,‡ Paul S. Chan, M.D., M.Sc.,§ for the American Heart Association's Get With The Guidelines-Resuscitation Investigators||

Characteristic	Survivors (n=799)	Nonsurvivors (n=1725)
Event location		
Operating room	455 (56.9)	1,003 (58.1)
Postanesthesia care unit	214 (26.8)	32 (18.8)
Intensive care area	76 (9.5)	256 (14.8)
Telemetry/step-down	20 (2.5)	38 (2.1)
General in-patient area	34 (4.3)	106 (6.1)



Intraoperative Cardiac Arrest Survival = 455/1458 = 31.2%

Frequency (%)



CPC1 at admission —
CPC>1 at admission - - -

Predictors of Functional Outcome after Intraoperative Cardiac Arrest

Anne-Laure Constant, M.D., Claire Montlahuc, M.D., David Grimaldi, M.D., Ph.D., Nicolas Pichon, M.D., Nicolas Mongardon, M.D., Lauriane Bordenave, M.D., Alexis Soummer, M.D., Bertrand Sauneuf, M.D., Sylvie Ricome, M.D., Benoit Misset, M.D., Ph.D., David Schnell, M.D., Etienne Dubuisson, M.D., Jennifer Brunet, M.D., Sigismond Lasocki, M.D., Ph.D., Pierrick Cronier, M.D., Belaid Bouhemad, M.D., Ph.D., Jean-François Loriferne, M.D., Emmanuelle Begot, M.D., Benoit Vandembunder, M.D., Gilles Dhonneur, M.D., Ph.D., Jean-Pierre Bedos, M.D., Ph.D., Philippe Jullien, M.D., Matthieu Resche-Rigon, M.D., Ph.D., Stephane Legriel, M.D.

869 425 patients receiving anesthesia for a surgical procedure in 11 community and university hospitals over a 13-year study period

98 patients excluded because of death occurring in the operating room after intraoperative cardiac arrest

~60% survival to ICU

140 patients with successfully resuscitated intraoperative cardiac arrest included in the study

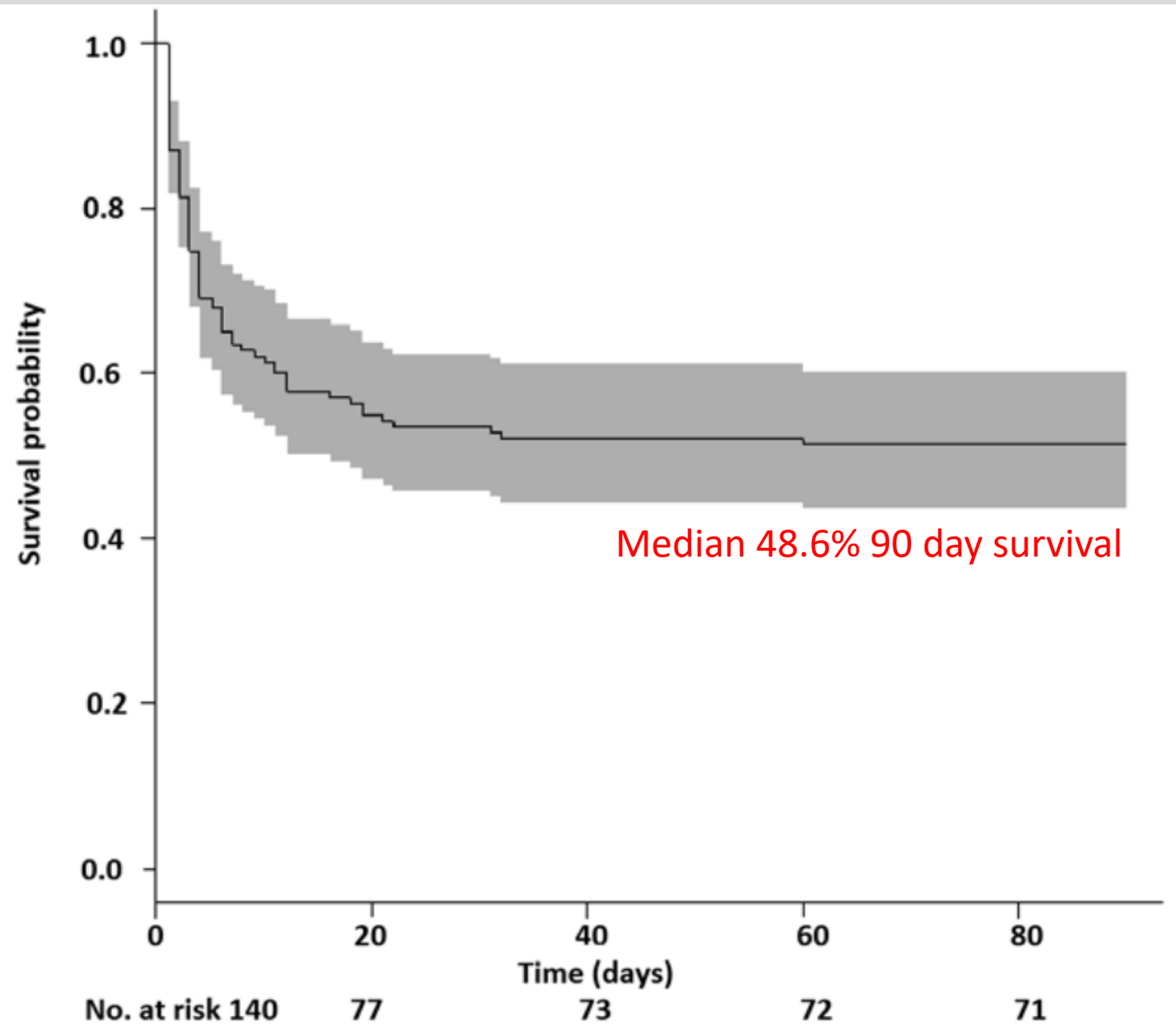
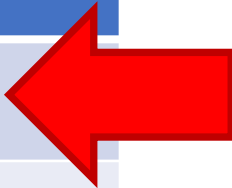
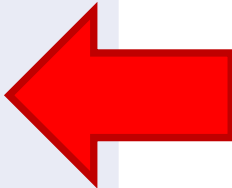


Fig. 2. Kaplan–Meir estimates of 90-day survival in 140 patients with successfully resuscitated intraoperative cardiac arrest.

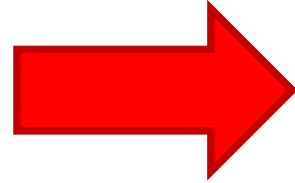
Additional Tidbits

	Ramachandran et al. 2013	Constant et al. 2014
Survival	31.2% (discharge)	29% (90-day) 
Most common rhythms	Asystole (37%) PEA (31%)	Asystole (52%) PEA (31%) 
Median time from arrest to CPR	0 minutes	0 minutes
Median time to ROSC	Not reported	10 minutes (IQR 5-20)

In-Hospital Cardiac Arrest Outcomes

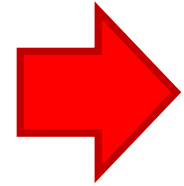
- In-hospital cardiac arrest survival is getting better but not impressive
 - ~25% survival to discharge in all-comers
 - ~20% survival to discharge in non-shockable rhythms
 - (Most arrests in the OR are associated with non-shockable rhythms)
- What about in the OR?
 - **~33% survival to discharge**
 - Why is this 65% better than in-hospital cardiac arrest?

Intraoperative Arrest is Unique



Key Differences About Intraoperative Arrest

- Patients are continuously monitored by people and devices
 - Arrests are (almost) always witnessed
 - Precipitating causes are typically known
 - Responses are timelier and more focused
- The airway may already be secure
- Many causes of arrest may be reversible



Box. Potential Reversible Causes of Cardiac Arrest

h's

Yes

→ Hypokalemia/hyperkalemia^a

Yes

→ Hypothermia

Yes

→ Hypovolemia

Yes

→ Hypoxia

t's

Tamponade

Tension pneumothorax

Thrombosis (coronary or pulmonary)

Yes

→ Toxins

^a Can include other metabolic alterations such as severe acidosis.

An Ounce of Prevention: Prepare and Plan

- Human factors (i.e., medical errors)
 - Frequently implicated in anesthesia-related perioperative cardiac arrest
 - Calling for help
 - Role clarity and assignment
 - Communication
- Potential solutions...
 - Cognitive aids & simulation
 - Emergency manuals
 - Checklists
 - Culture
 - Encourage/normalize reporting of safety concerns
 - Empower team members to communicate openly



4: Cardiac Arrest – Asystole/PEA

Condition: Non-shockable pulseless cardiac arrest.

Objective: Restore pulse, hemodynamic stability.

4

• **Call for help.**

- **CPR** (100 chest compressions/min and 8 breaths per minute)*
 - Ensure full chest recoil with minimal interruptions.

• **Epinephrine (or Vasopressin).**

• **Check pulse & rhythm** (after every 2 minutes of CPR):

- If **no pulse and shockable** (VF/VT): **GO TO: Cardiac Arrest - VF/VT Checklist**
- If **no pulse and NOT shockable** (asystole/PEA):

- Resume CPR.
- Read out potential causes (H&Ts).
- Restart checklist.

- If **pulse:**

- Begin post-resuscitation care.
- Read out potential causes (H &Ts).

Potential Causes (H&Ts):

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-/hyperkalemia
- Hypothermia
- Tension Pneumothorax
- Tamponade (Cardiac)
- Toxins (narcotic, local anesthetic, beta blocker, channel blocker)
- Thrombosis (Pulmonary)
- Thrombosis (Coronary)

During CPR:

- **Airway** ([bag mask ventilation]).
- **Breathing** (100% FIO₂).
- **Circulation** (confirm adequate IV or IO access).
 - Consider IV fluids wide open.
- **Assign roles for:** Chest compressions, airway, vascular access, documentation, code cart, time keeping. Orders should be explicitly acknowledged and repeated.

Drug Doses and Treatments:

Epinephrine dosing: 1mg IV, repeats every 3-5 minutes

Vasopressin 40 Units IV can be given to replace the first or second dose of epinephrine.

Hyperkalemia treatment:

- Calcium gluconate (10mg/kg) or Calcium chloride (10mg/kg) IV;
- Sodium bicarbonate 1-2mEq/kg, slow IV push
- Insulin 10 Units regular IV with 1-2 amps D50W (Dextrose 50% in Water)

Toxin Treatments:

Narcotic Overdose:

- Naloxone 0.04 to 0.4 mg IV, may repeat dosing if response inadequate.

Local Anesthetic overdose:

- Intralipid administration:
 - 1.5mL/kg IV bolus
 - Repeat 1-2 times for persistent asystole
 - Start infusion 0.25 to 0.5 mL/kg/min for 30-60 minutes for refractory hypotension

Beta-blocker overdose:

- Glucagon (2-4mg IV push)

Calcium channel blocker overdose:

- Calcium chloride (1g IV).

EMERGENCY:	Number:	Anes Workroom:	Number:	Teams:	Number:
Anes Staff Administrator	617-726-0202	Gray Anes Workroom	617-726-8997	Rescue TEE (Echo Team)	PAGE #21400
MGH Operator for Emergency	617-726-3333	Pharmacy:		Emergency/Surgical Airway	617-726-3333
Vocera Access Number	617-643-1811	Main OR	617-726-8947	(Request "Surgical Airway")	
MOR Anes Attending Call Rm.	617-726-1879	Off-Hours	617-726-2503	Acute MI Team (STEMI Team)	617-726-8282
Control Desk:		Blood Bank:		(Request "STEMI Team")	
Gray Desk - Anes	617-726-8995	Main OR	617-726-3623	Acute Stroke Team	PAGE #34282
Gray Desk - Nursing	617-726-8910	Lunder	857-238-5280	Blood Bank Fellow	PAGE #24346

ACLS (for perioperative setting)

Asystole	1	Fire – Airway	12
Bradycardia – Unstable	2	Fire – Patient	13
PEA	3	Hemorrhage – MTG	14
SVT Unstable – Tachycardia	4	Hypotension	15
SVT Stable – Tachycardia	5	Hypoxemia	16
VF/VT	6	Local Anesthetic Toxicity	17
		Malignant Hyperthermia	18
		Myocardial Ischemia	19

BROAD DIFFERENTIAL DIAGNOSES

Hypotension	15	Oxygen Failure	20
Hypoxemia	16	Pneumothorax	21
		Power Failure	22
		SVT Stable – Tachycardia	5
		Total Spinal Anesthesia	23
		Transfusion Reaction	24
		Venous Air Embolus	25

SPECIFIC CRITICAL EVENTS

Amniotic Fluid Embolism	7		
Anaphylaxis	8		
Bronchospasm	9		
Delayed Emergence	10		
Difficult airway – Unanticipated	11	CRISIS RESOURCE MANAGEMENT	26

EMERGENCY MANUAL

COGNITIVE AIDS FOR PERIOPERATIVE CRITICAL EVENTS 2014, V2.2
STANFORD ANESTHESIA COGNITIVE AID GROUP

CLINICAL CONCEPTS AND COMMENTARY

Jerrold H. Levy, M.D., F.A.H.A., F.C.C.M., Editor

Operating Room Crisis Checklists and Emergency Manuals

David L. Hepner, M.D., M.P.H., Alexander F. Arriaga, M.D., M.P.H., Sc.D., Jeffrey B. Cooper, Ph.D., Sara N. Goldhaber-Fiebert, M.D., David M. Gaba, M.D., William R. Berry, M.D., M.P.H., M.P.A., Daniel J. Boorman, B.S., Angela M. Bader, M.D., M.P.H.

Table 2. Failure to Adhere to Critical Steps in Management, According to the Presence or Absence of Checklists and the Scenario Type.

Scenario Type*	Failure Rate†		P Value‡
	With Checklists <i>no./total no. (%)</i>	Without Checklists <i>no./total no. (%)</i>	
ACLS scenario	7/100 (7)	15/89 (17)	0.005
ACLS scenario preceded by hemodynamically unstable condition	14/154 (9)	46/172 (27)	<0.001
Other crisis scenario	3/117 (3)	28/118 (24)	0.002

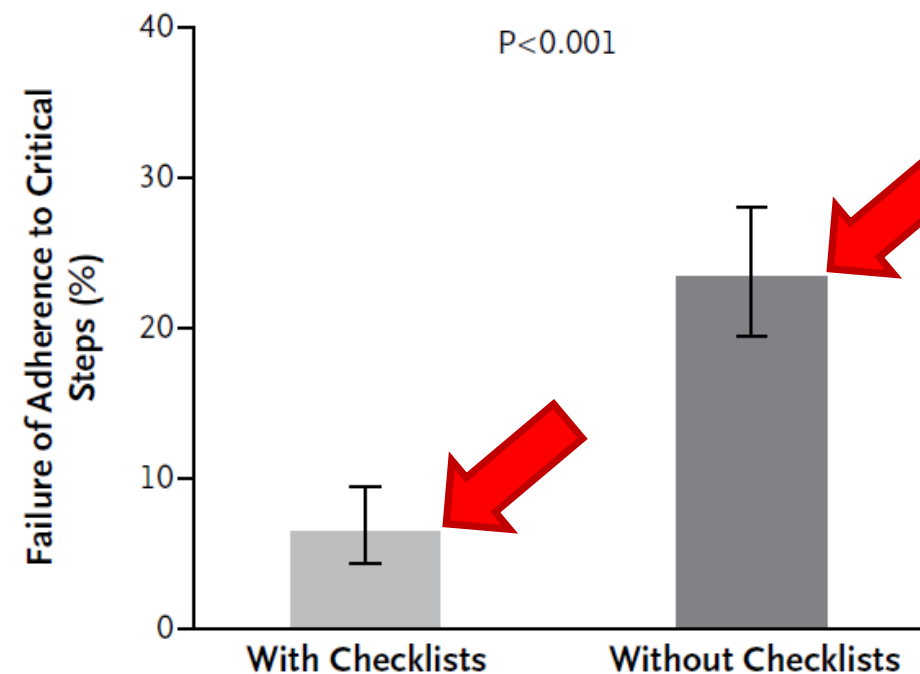


Figure 1. Association between Use or Nonuse of Operating-Room Crisis Checklists and Failure to Adhere to Critical Steps in Management.

The use of checklists during operating-room crises resulted in nearly a 75% reduction in failure to adhere to critical steps in management. Of 371 critical steps in the management of surgical crises, 24 (6%) were missed when the checklists were available, as compared with 89 of 379 steps (23%) missed when the checklists were not available. I bars indicate 95% confidence intervals.

CRISIS RESOURCE MANAGEMENT

Call for Help Early

- Call for help early enough to make a difference
- Err on the side of getting more help
- Mobilize early personnel with special skills if they may be needed

Designate Leadership

- Establish clear leadership
- Inform team members who is in charge
- 'Followers' should be active in asking who is leading

Establish Role Clarity

- Determine who will do what
- Assign areas of responsibility appropriate to knowledge, skills, and training
- Active followers may offer specific roles

Anticipate and Plan

- Plan & prepare for high work-load periods during low work-load periods
- Know where you are likely headed during the crisis and make backup plans early

Know the Environment

- Maintain situational awareness
- Know how things work and where things are
- Be aware of strengths and vulnerabilities of environment

Use All Available Information

- Monitor multiple streams of data and information
- Check and cross check information

Distribute the Workload

- Assign specific tasks to team members according to their abilities
- Revise the distribution if there is task overload or failure

Communicate Effectively

- Command and request clearly
- Seek confirmation of request (close the loop)
- Avoid "thin air" statements
- Foster input and atmosphere of open information exchange among all personnel

Allocate Attention Wisely

- Eliminate or reduce distractions
- Monitor for task saturation & data overload
- Avoid getting fixated
- Recruit others to help w/ monitoring

Mobilize Resources

- Activate all helpful resources including equipment and additional personnel

Use Cognitive Aids

- Be familiar with content, format, and location
- Support the effective use of cognitive aids

Management Pearls

A Brief Synopsis



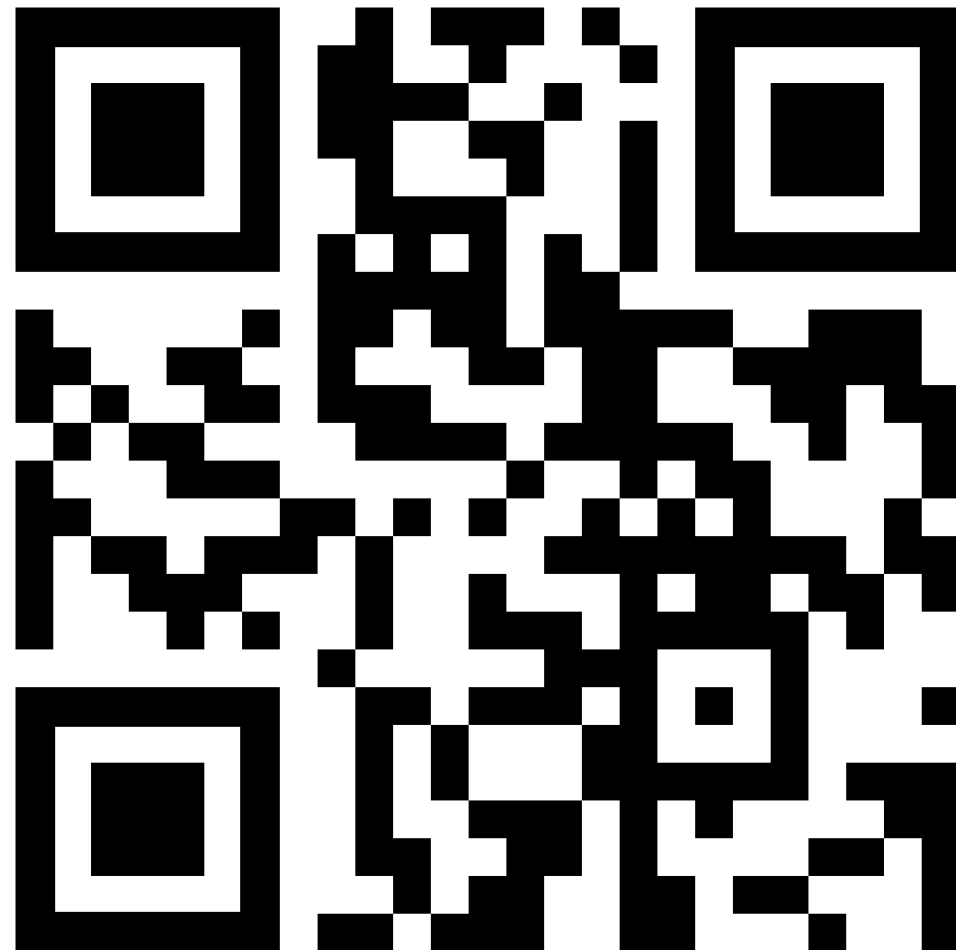
Cardiac Arrest in the Operating Room: Resuscitation and Management for the Anesthesiologist: Part 1

Vivek K. Moitra, MD,* Sharon Einav, MD,† Karl-Christian Thies, MD,‡ Mark E. Nunnally, MD,§ Andrea Gabrielli, MD,|| Gerald A. Maccioli, MD,¶|| Guy Weinberg, MD,# Arna Banerjee, MD,** Kurt Ruetzler, MD,†† Gregory Dobson, MD,‡‡ Matthew D. McEvoy, MD,** and Michael F. O'Connor, MD, FCCM§§



Cardiac Arrest in the Operating Room: Part 2—Special Situations in the Perioperative Period

Matthew D. McEvoy, MD,* Karl-Christian Thies, MD, FRCA, FERC, DEAA,† Sharon Einav, MD,‡ Kurt Ruetzler, MD,§|| Vivek K. Moitra, MD, FCCM,¶|| Mark E. Nunnally, MD, FCCM,# Arna Banerjee, MD,* Guy Weinberg, MD,** Andrea Gabrielli, MD, FCCM,†† Gerald A. Maccioli, MD, FCCM,‡‡ Gregory Dobson, MD,§§ and Michael F. O'Connor, MD, FCCM|||



A Brief Comment on Progressive Shock

Comprehensive Algorithm

- Communicate change in status with surgeon/proceduralist. **Call for Help!**
- Check ECG, oximeter, capnometry, skin and field blood color, quick-check circuit
- Confirm ECG cardiac arrest: A-line tracing, pulse, plethysmograph, capnometer
- Call for help, defibrillator
- Hold surgery, discontinue anesthesia, ventilate with 100% O₂, IVs wide open
- Start CPR at rate 100-120/min. Titrate to ET CO₂ of > 20mm Hg, Diastolic BP > 40mm Hg
- Establish airway. **Avoid Hyperventilation!**

- Could this be:
- hypervagal vs hypovolemia?
 - gas/air embolism? thrombo/fat embolism?
 - local anesthetic toxicity?
 - hyperkalemia?

Not Shockable

Asystole/ PEA

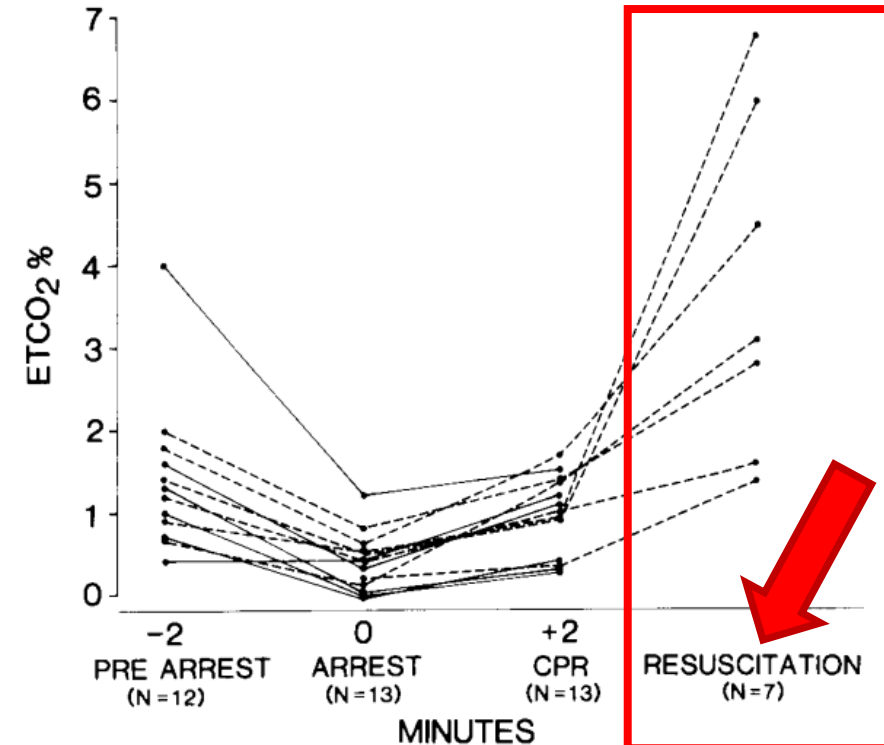
2

- Continue CPR
 - Echocardiography/focused ultrasound
 - **Epinephrine** 100-1000 mcg IV, may repeat
- May replace 1 dose of **Epi** with 40 U **Vaso** IV
- Consider Calcium chloride if hyperkalemia is in the differential

- If PEA, could this be:
 - hypovolemia?
 - tamponade?
 - tension pneumothorax?
 - auto-PEEP?
 - an embolism?
 - high neuraxial?
 - intra-abdominal hypertension?
- Check ST segment and T-wave

Best Practices During Resuscitation: EtCO₂

- End-tidal carbon dioxide
 - ROSC
 - Can precede meaningful BP or palpable pulse
 - Adequacy of chest compressions
 - 10 mm chest compression depth →
↑EtCO₂ by 1.4 mmHg
 - Prognosis
 - EtCO₂ > 10 mmHg generally associated with ROSC
 - Immediate EtCO₂ or 20 min EtCO₂ > 20 more strongly associated
 - **EtCO₂ < 10 mmHg after 20 min = 0.5% likelihood of ROSC (Paiva 2018)**



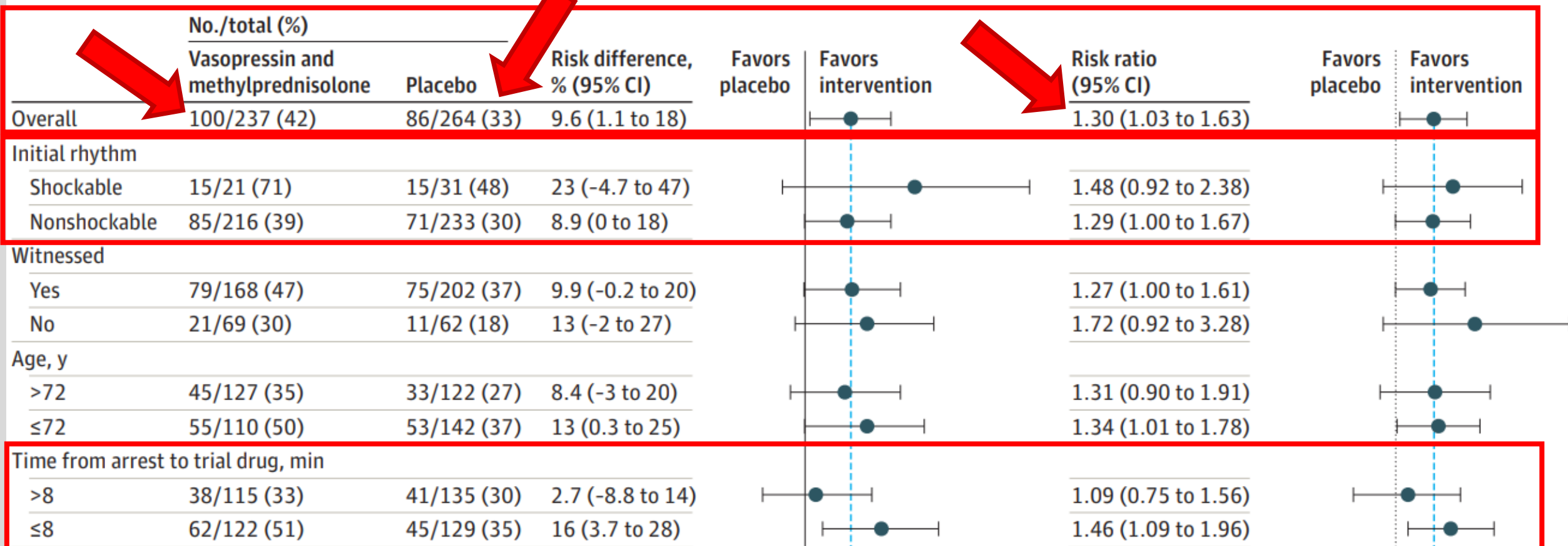
Falk JL et al. N Engl J Med. 1988 Mar 10;318(10):607-11.

Effect of Vasopressin and Methylprednisolone vs Placebo on Return of Spontaneous Circulation in Patients With In-Hospital Cardiac Arrest A Randomized Clinical Trial

Exploratory

Lars W. Andersen, MD, MPH, PhD, DMSc; Dan Isbye, MD, PhD; Jesper Kjærgaard, MD, PhD, DMSc;

Figure 2. Subgroups Results for Return of Spontaneous Circulation



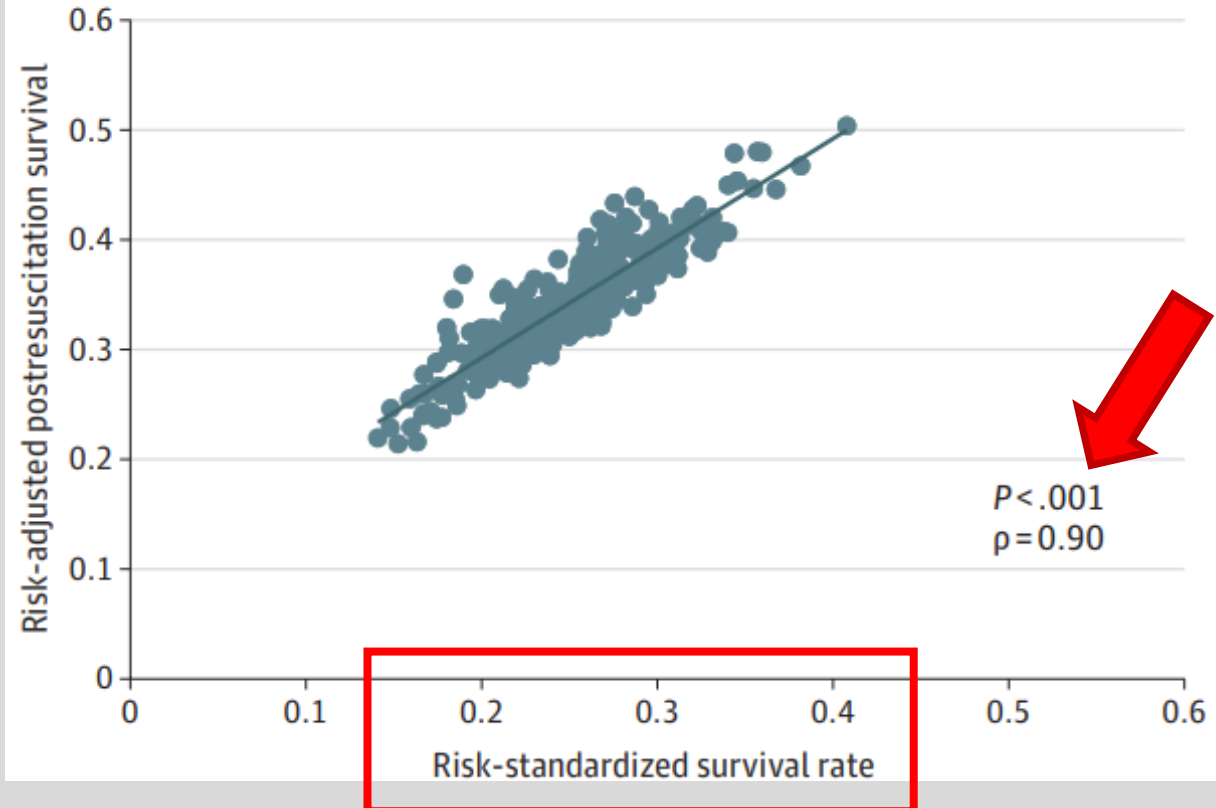
Post-Arrest Management

Improving Long-Term Outcomes

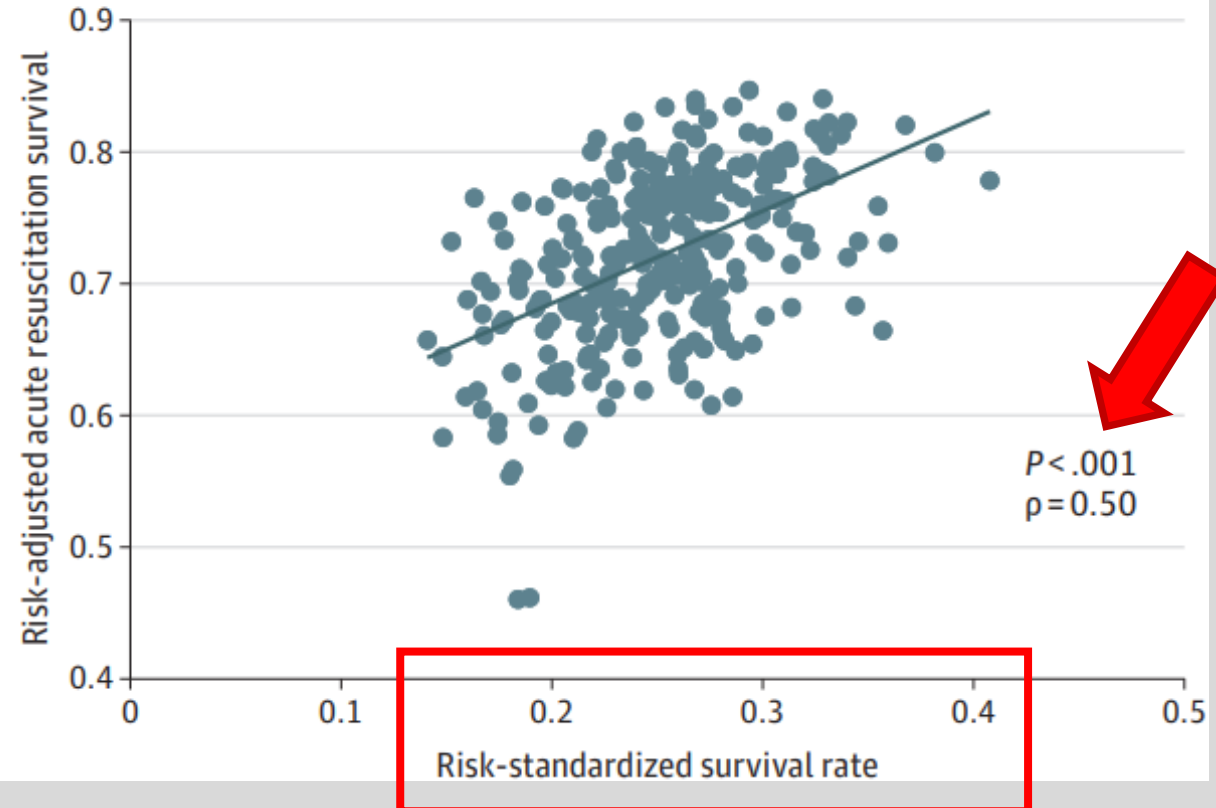
Association of Hospital-Level Acute Resuscitation and Postresuscitation Survival With Overall Risk-Standardized Survival to Discharge for In-Hospital Cardiac Arrest

Saket Girotra, MD, SM; Brahmajee K. Nallamothu, MD, MPH; Yuanyuan Tang, PhD; Paul S. Chan, MD, MSc;
for the American Heart Association Get With The Guidelines–Resuscitation Investigators

A Overall survival vs postresuscitation survival

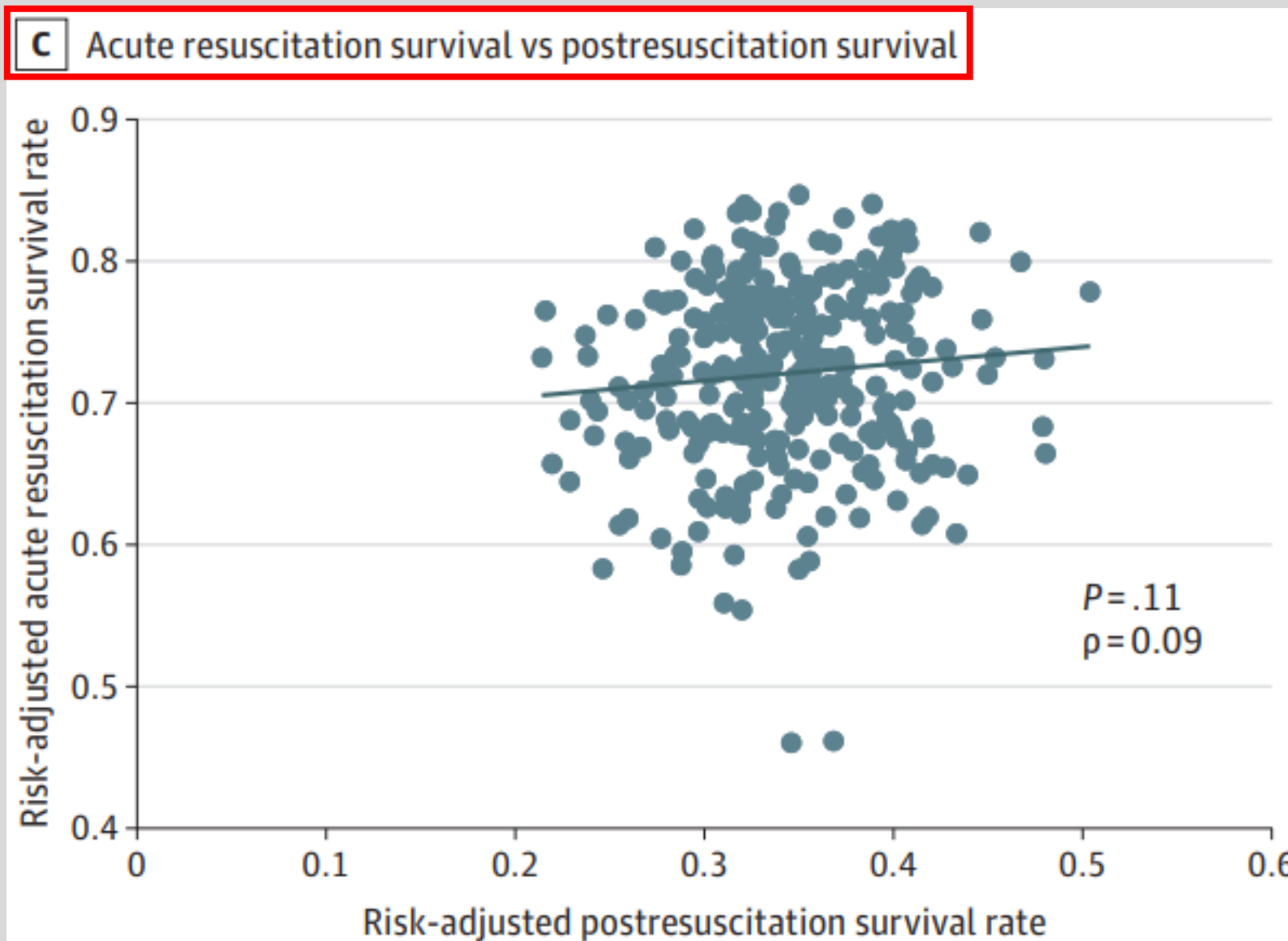


B Overall survival vs acute resuscitation survival



Association of Hospital-Level Acute Resuscitation and Postresuscitation Survival With Overall Risk-Standardized Survival to Discharge for In-Hospital Cardiac Arrest

Saket Girotra, MD, SM; Brahmajee K. Nallamothu, MD, MPH; Yuanyuan Tang, PhD; Paul S. Chan, MD, MSc;
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Neurologic Considerations

- **Neurologic injury is the main cause of mortality and eventual morbidity/functional limitations in survivors**
- Hyperthermia must be avoided: each 1°C over 37°C confers a 2-fold increased risk of death (Zeiner 2001)
- Targeted temperature management
 - If deep coma (i.e. no motor response or brainstem reflexes), evidence of cerebral edema, malignant EEG
 - 33°C x24 hours → re-warm 0.25 to 0.5°C/hour
 - In less practiced centers and/or none of the above (i.e. some motor response)
 - ≤ 36°C x24 hours → re-warm 0.25 to 0.5°C/hour
- EEG should be performed in comatose patients
- Early (non-contrast) CT imaging of the head

Is Cooling Still Hot?

Lascarrou 2019 (HYPERION)

- Non-shockable OHCA
- Randomized to 33°C vs 37°C
- 584 patients
- Comparable mortality (80%)
- Better functional outcomes at 90d (with a small sample size)
- Comparable adverse events

Dankiewicz 2021 (TTM2)

- All OHCA (75% shockable)
- Randomized to 33°C vs. “37°C”
- 1900 patients
- Comparable mortality (50%)
- Comparable functional outcomes
- Hypothermia → arrhythmia (24% vs. 17%)

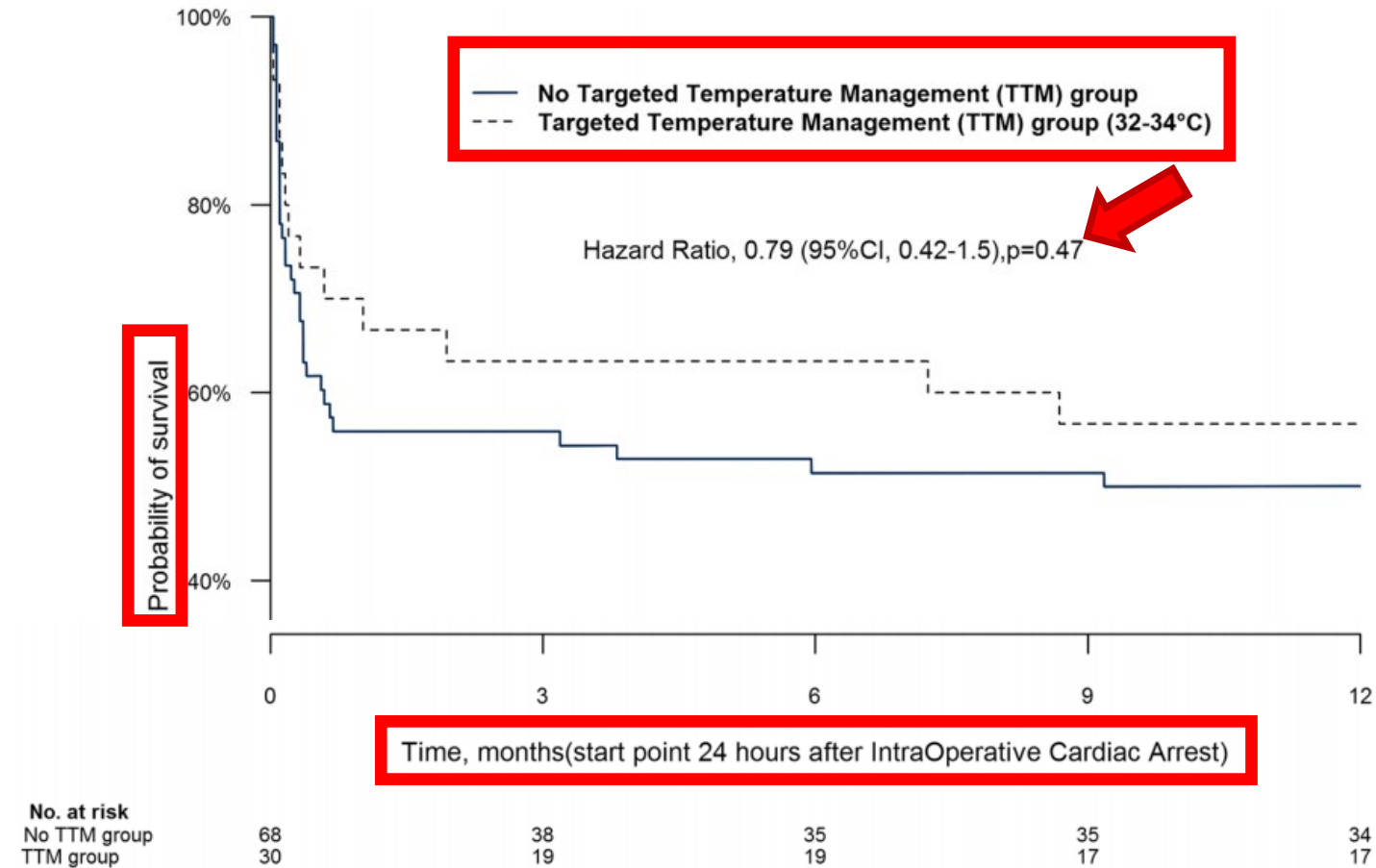
Bottom line: TTM2 raises the question of intervention bias
However, TTM is (currently) recommended

Perioperative Hypothermia: Practical?


- Coagulopathy
 - Incidence $\leq 20\%$ (Jarrah 2011)
 - Worse below 35°C ; can rewarm
- Infection
- Insulin resistance
- Hyperglycemia

Constant 2017

- Only 30% of 101 IOCAAs underwent TTM
- 2x infection rate

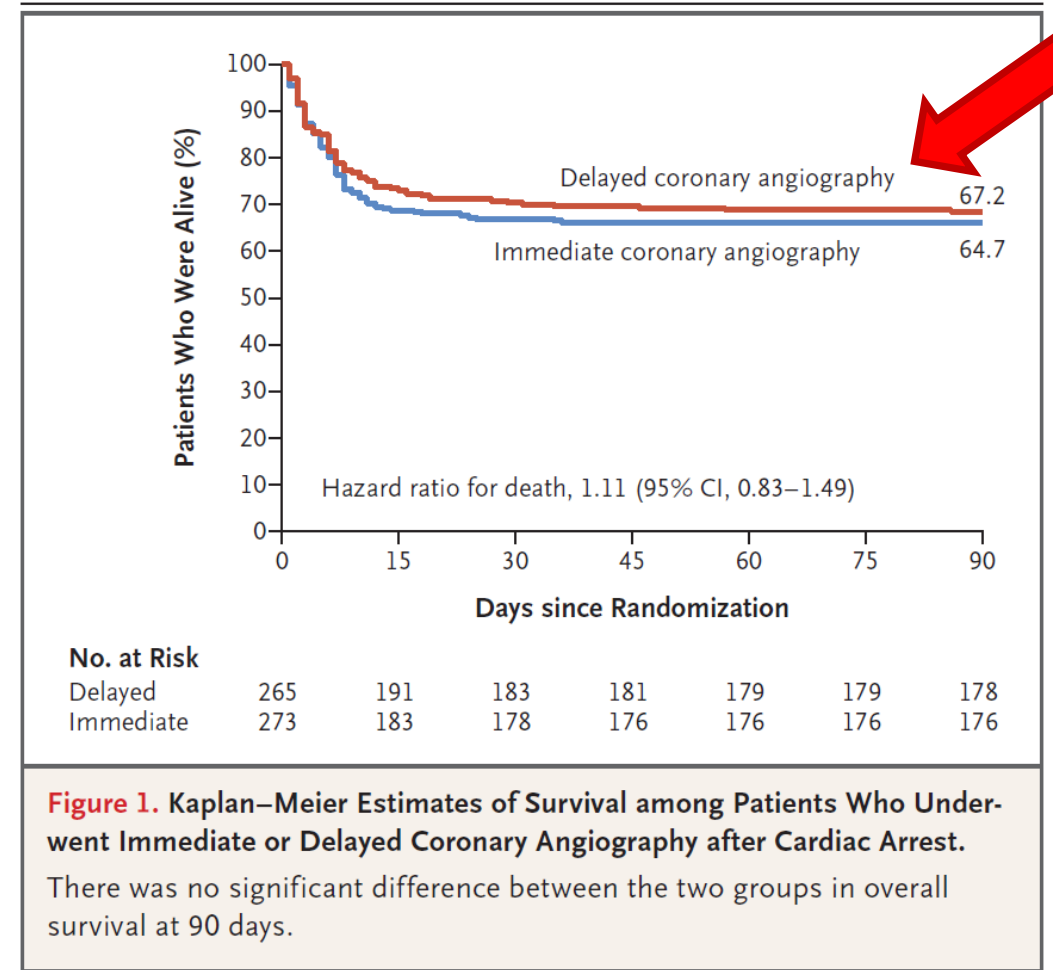


Cardiovascular Considerations

- **Circulatory failure is the 2nd leading cause of death after ROSC**
 - 12-lead EKG
 - Evidence of ischemia (to include new LBBB)
 - Echocardiography
 - PCI and early consultation with an interventional cardiologist
 - **Emergent** if EKG evidence of STEMI, *potentially emergent* when...
 - Continued hemodynamic instability
 - Focal wall motion abnormalities by echo
 - Consider if no obvious non-cardiac etiology
 - Temporize hemodynamics (SBP > 90 – 100 mmHg; **MAP > 65 – 70 mmHg**)
 - Restore euvolemia
 - Norepinephrine is the vasopressor of choice
 - Consider inotropes based on echocardiography
 - Antiarrhythmics as needed
- 

Coronary Angiography

- Lemkes et al. 2019
 - Multicenter RCT
 - 552 patients with out-of-hospital non-STEMI cardiac arrest
 - Immediate (2 hrs) vs. delayed coronary angiography (122 hrs)
 - Equivalent clinical outcomes
 - Interesting findings:
 - No disease: ~35%
 - Acute lesions: ~20% patients
 - CTO: ~35% patients



Pulmonary Considerations

- Lung protective ventilation
 - 6 ml/kg PBW
 - Limit plateau pressures < 30 cmH₂O
 - Avoidance of over-zealous PEEP
- Normocapnia (McKenzie 2017)
- *Consider* avoiding hyperoxia (PaO₂ > 300 mmHg)
- Confirm location of tubes and lines with radiography
 - Rule-out pneumothorax

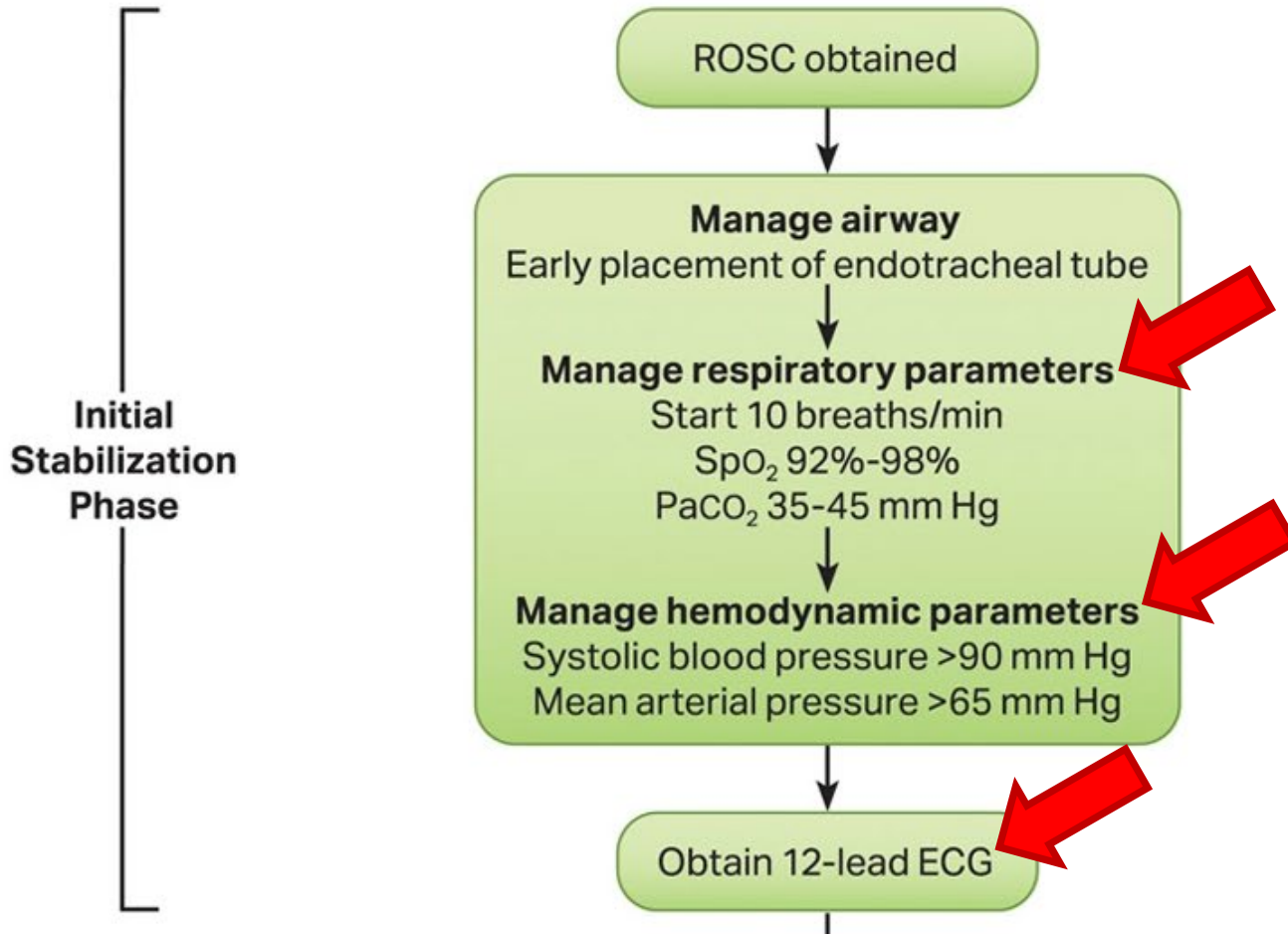
Metabolic and Other Considerations

- Glycemic control: 140 to 180 mg/dL (Longstreth 1986, Skrifvars 2003)
- Immediate hyperkalemia is common
 - This typically self-corrects through endogenous catecholamines and acid/base normalization
- Raise the head of the bed to 30°
- Consider empiric antibiotics (François 2019)
- VTE and stress ulcer prophylaxis where appropriate

2020 ACC/AHA Guidelines: Initial Management

Adult Post-Cardiac Arrest Care Algorithm

Panchal AR et al. Circulation. 2020 Oct 21;142(16S2):S366-S468



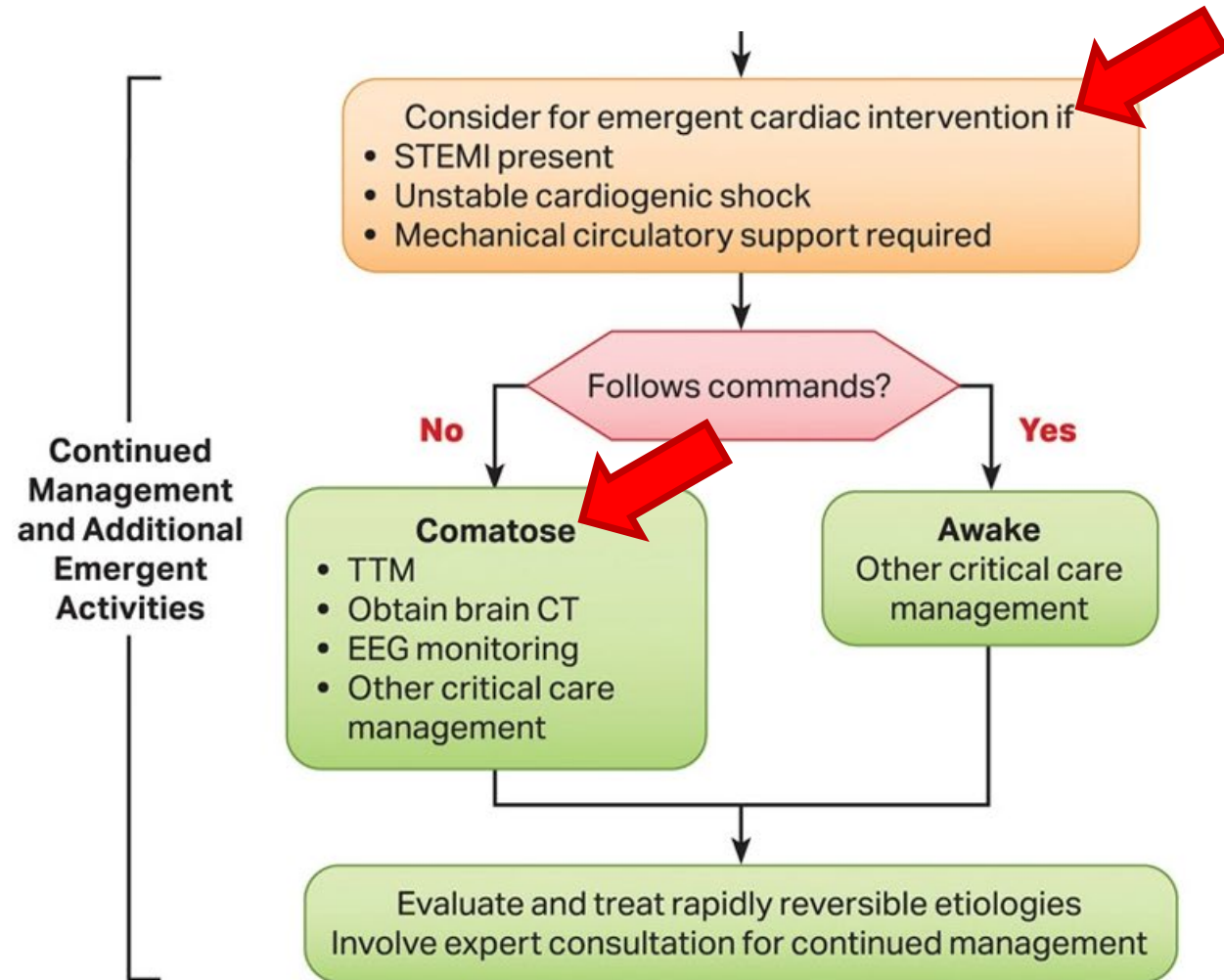
Initial Stabilization Phase

Resuscitation is ongoing during the post-ROSC phase, and many of these activities can occur concurrently. However, if prioritization is necessary, follow these steps:

- **Airway management:**
Waveform capnography or capnometry to confirm and monitor endotracheal tube placement
- **Manage respiratory parameters:**
Titrate FIO₂ for SpO₂ 92%-98%; start at 10 breaths/min; titrate to PaCO₂ of 35-45 mm Hg
- **Manage hemodynamic parameters:**
Administer crystalloid and/or vasopressor or inotrope for goal systolic blood pressure >90 mm Hg or mean arterial pressure >65 mm Hg

2020 ACC/AHA Guidelines: Initial Management

Panchal AR et al. Circulation. 2020 Oct 21;142(16S2):S366-S468



Continued Management and Additional Emergent Activities

These evaluations should be done concurrently so that decisions on targeted temperature management (TTM) receive high priority as cardiac interventions.

- Emergent cardiac intervention: Early evaluation of 12-lead electrocardiogram (ECG); consider hemodynamics for decision on cardiac intervention
- TTM: If patient is not following commands, start TTM as soon as possible; begin at 32-36°C for 24 hours by using a cooling device with feedback loop
- Other critical care management
 - Continuously monitor core temperature (esophageal, rectal, bladder)
 - Maintain normoxia, normocapnia, euglycemia
 - Provide continuous or intermittent electroencephalogram (EEG) monitoring
 - Provide lung-protective ventilation

Coming Soon: NAP7

RCOA
Royal College of Anaesthetists

NAP7
Perioperative Cardiac Arrest

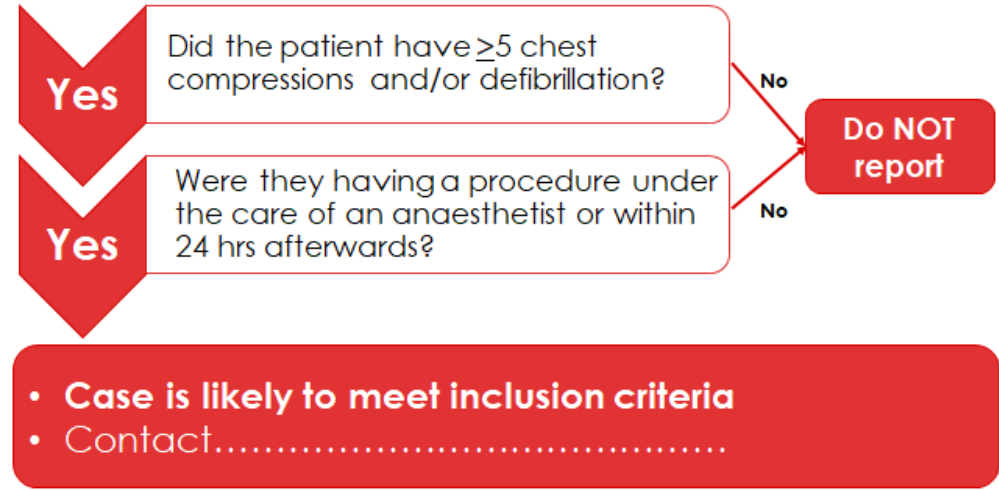
NIAA
National Institute of Academic Anaesthetics

HSRC
Health Services Research Centre

National Audit Project 7
A Clinical Service Evaluation of
Perioperative Cardiac Arrest
in the UK



NAP7 inclusion criteria
16 June 2021-15 June 2022



https://twitter.com/NAPs_RCoA/status/1390957229742960646



Available online at www.sciencedirect.com

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation



European Resuscitation Council Guidelines 2021: Cardiac arrest in special circumstances

Carsten Lott^{a,}, Anatolij Truhlář^{b,c}, Annette Alfonzo^d, Alessandro Barelli^e, Violeta González-Salvado^f, Jochen Hinkelbein^g, Jerry P. Nolan^{h,i}, Peter Paal^j, Gavin D. Perkins^{k,l}, Karl-Christian Thies^m, Joyce Yeung^{k,l}, David A. Zidemanⁿ, Jasmeet Soar^o, the ERC Special Circumstances Writing Group Collaborators¹*

- Recognise cardiac arrest by continuous monitoring.
- Inform the surgeon and the theatre team. Call for help and the defibrillator.
- Initiate high-quality chest compressions and effective ventilation.
- Follow the ALS algorithm with a strong focus on reversible causes, especially hypovolaemia (anaphylaxis, bleeding), hypoxia, tension-pneumothorax, thrombosis (pulmonary embolism).
- Use ultrasound to guide resuscitation.
- Adjust the height of the OR table to enable high-quality CPR.
- Check the airway and review the EtCO₂ tracing.
- Administer oxygen with a FiO₂ 1.0.
- Open cardiac compression should be considered as an effective alternative to closed chest compression.
- Consider ECPR as a rescue therapy for selected patients with cardiac arrest when conventional CPR is failing.

Concluding Thoughts on Optimizing Outcomes

- Determine and treat the cause of the arrest
 - An ounce of prevention is worth a pound of cure
 - Don't neglect capnography
 - Consider the cath lab when indicated
- Minimize injury to the brain
 - Targeted temperature management
- Manage cardiovascular dysfunction and the sequelae of ischemia and reperfusion



Thank You

csjabaley@emory.edu

 [@CraigJabaley](https://twitter.com/CraigJabaley)

CURRICULUM VITAE

Elizabeth Watson Duggan, MD

- 1) Elizabeth Watson Duggan, MD
- 2) Office Address:
Department of Anesthesiology and Perioperative Medicine
University of Alabama Birmingham School of Medicine
619 South 19th Street
JT 804
Birmingham, AL 35249-6810

Home Address:
217 W. Hill St.
Atlanta, GA 30030

Cell Phone: 215-847-4231
- 3) Work email: eduggan@uabmc.edu
- 4) Citizenship: United States of America
- 5) Current Title and Affiliations:
 - a) Academic Appointments:
 - i) Primary Appointments:
 - (1) Assistant Professor, Emory University School of Medicine, Department of Anesthesiology, 5/2013-2/2019
 - (2) Associate Professor, Emory University School of Medicine, Department of Anesthesiology, 3/2019-6/2020
 - (3) Associate Professor, University of Alabama Birmingham, Department of Anesthesiology, 11/2020
 - b) Administrative Appointments:
 - i) Co-Director, Culture Collaboration, 03/2021 – present
 - ii) Director, Professional Development, Engagement and Inclusion, 11/2020-present
 - iii) Executive Coach, Department of Anesthesiology, 12/2020-present
- 6) Previous Academic and Professional Appointments:
 - a) Academic Appointments:
 - i) Instructor, University of Pennsylvania School of Medicine, Department of Anesthesiology, 09/2011-06/2012
 - ii) Assistant Professor, Thomas Jefferson University Hospital, Department of Anesthesiology, 08/2012-03/2013

January 7, 2022

- 7) Previous Clinical Appointments:
 - a) Director of Vascular Education, Thomas Jefferson University Hospital, 08/2012-03/2013
 - b) Medical Director Post Anesthesia Care Unit (PACU), Emory University Hospital, 05/2013-07/2016
 - c) Director of Vascular Anesthesia, Emory University Hospital, 05/2013-07/2016
 - d) Chief of Service, Division of General, Transplant, Vascular and Neuroanesthesiology, 7/2016-10/2019

- 8) Previous Administrative Appointments:
 - a) Assistant Fellowship Director, Liver Transplant Anesthesia, Emory University Hospital, 08/2015- 01/2020

- 9) Licensures/Boards:
 - a) American Board of Anesthesiology Certification, 2012-2022
 - b) Unrestricted Pennsylvania Medical License, 05/2011-12/2014
 - c) Unrestricted Georgia Medical License, 03/2013-present
 - d) Unrestricted Alabama Medical License, 7/2020- present

- 10) Specialty Boards:
 - a) Certification National Board of Echocardiography Basic Perioperative Transesophageal Echocardiography, 2012-2022

- 11) Education:
 - a) 07/1997-12/2000: Bachelor of Arts, University of Colorado Boulder
Major: Environmental and Population Biology, Specialty Certificate: Neurosciences
 - b) 08/2002-05/2006: Medical Doctor, University of Virginia School of Medicine
 - c) 08/2019-08/2021: Master's in Industrial and Organizational Psychology, University of Georgia

- 12) Postgraduate Training:
 - a) 07/2006-06/2007: Internship, Duke University Hospital, Durham NC, Supervisor: Dr. Catherine (Lineberger) Kuhn
 - b) 07/2007-06/2008: Research Fellow, University of Pennsylvania, Philadelphia PA, Supervisor: Dr. E. Andrew Ochroch and Dr. Lee A. Fleisher
 - c) 07/2008-07/2011: Resident in Anesthesiology, University of Pennsylvania, Philadelphia PA, Supervisor: Dr. Robert Gaiser
 - d) 09/2011-06/2012: Fellow, Liver Transplant Anesthesiology, University of Pennsylvania, Philadelphia PA, Supervisor: Dr. Dimitry Baranov

- 13) Continuing Professional Development Activities:
 - a) Patient Oriented Research and Training (PORT) Certification, University of Pennsylvania School of Medicine, 2007-2008
 - b) Matrix Executive Coaching, 2013-2014
 - c) EM-ProLEAD Course, Emory University School of Medicine, 2016

- d) Executive Leadership Coaching, The CADENT Group, 2017-2018
- e) 360 Feedback, HRCatalyst Inc., Dr. Alison Mallard, 2018
- f) Academic Mentorship Training, Atlanta Society of Mentors, Emory Chapter, 2019
- g) Master's Degree, Industrial and Organizational Psychology, University of Georgia, 2019 (Expected Graduation 2021)
- h) Sherpa Executive Coaching Certification (October 2020), University of Georgia

14) Committee Memberships:

- a) National:
 - i) *Member*, Committee on Transplant Anesthesiology, American Society of Anesthesiology, 2018-2020
 - ii) *Ad Hoc Member*, Education Committee, Society of Perioperative Assessment and Quality Improvement, 2018-2019
 - iii) *Appointed Member*, *Guidelines Committee for Management of Hyperglycemia*, Society for Ambulatory Anesthesia, 2019-present
 - iv) *Member*, Committee on Physician Wellbeing, American Society of Anesthesiology, 2020-present
 - v) *Ad Hoc Member*, Subcommittee on Physician Coaching, Committee on Physician Wellbeing, American Society of Anesthesiology, 2020-present
 - vi) *Member*, *Guidelines Committee for the Management of Perioperative Inulin Pumps and Continuous Glucose Monitors*, Society of Perioperative Assessment and Quality Improvement, 2022-present
- b) Regional:
 - i) *Ad Hoc Member*, Membership Committee, Georgia Society of Anesthesiologists, 2018-2019
- c) Institutional:
 - i) *Resident Appointee (one of only two selected)*, Ethics Committee, University of Pennsylvania, 2010-2011
 - ii) *Member*, Wound Infection Group (WIG), Emory University Hospital, 2013-2016
 - iii) *Member*, Resuscitation Committee, Emory University Hospital, 2013-2016
 - iv) *Member*, Obesity Initiative, Emory University Hospital, 2014-2016
 - v) *Mentor*, American Medical Women's Association Program, Emory University School of Medicine Group, 2014-2016
 - vi) *Advisor*, Crawford Long Medical Student Anesthesia Interest Group, Emory University School of Medicine, 2014-2017
 - vii) *Chairperson*, Airway Committee, Emory University Hospital, 2014-present
 - viii) *Member*, Perioperative Quality Committee, Emory University Hospital, 2015-2017
 - ix) *Appointed Member*, Operating Room and Surgical Services Committee, Emory University Hospital, 2016-present
 - x) *Appointed Member*, Operating Room Policies and Procedures Committee, Emory University Hospital, 2016-2019

- xi) *Member*, Endoscopy Executive Committee, Emory University Hospital, 2016-2019
- xii) *Ad Hoc Member*, Department of Anesthesiology Education Committee, 2016-2019
- xiii) *Ad Hoc Member*, Emory Healthcare Hyperglycemia/Diabetes Committee, 2017-2020
- xiv) *Appointed Member*, Emory University Hospital Medical Practice Committee, 2018-2020.

15) Peer-Review Activities:

- a) Manuscript Reviewer
 - i) Surgery and Obesity Related Diseases, 2016-2017
 - ii) Anesthesia and Analgesia, 2017-present
 - iii) Clinical Transplantation, 2017-2019
 - iv) Critical Care Medicine, 2017-present
 - v) Aesthetic Surgery Journal, 2017-2018
 - vi) A&A Practice, 2018-present
 - vii) American Association of Clinical Endocrinology, 2020
 - viii) Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy, 2020

- b) Conference Abstracts
 - i) Regional:
 - (1) Georgia Society of Anesthesiologists Summer Conference, Amelia Island, FL. 2017.

16) Consultantships/Advisory Boards

- a) Correspondence/expertise via conference, webinar, phone meetings, or on-site teaching provided regarding perioperative hyperglycemia management:
 - i) Ms. Christina Assad, Clinical Pharmacist and Diabetes Educator, Florida Hospital, Tampa, FL. 2017.
 - ii) Dr. John Mannion, Chief Quality Officer, Chair Glucose Optimization Project, Bayside Health, Dover, DE. 2016-2017.
 - iii) Dr. David Pennington, Staff Anesthesiologist, St. Anthony's Hospital, Lakewood, CO. 2018.
 - iv) Hawaii Chapter for Improving Surgical Care and Recovery, November 27, 2018.
 - v) Johns Hopkins Armstrong Institute, Agency for Healthcare Research and Quality Safety Program, Dr. Della Lin (Facilitator), December 18, 2018.
 - vi) Johns Hopkins Armstrong Institute, Agency for Healthcare Research and Quality Safety Program, Dr. Elizabeth Wick (Director), September 30, 2021.

17) Honors and Awards

- a) Dean's Distinguished Service Award, Emory University School of Medicine, August 2018.
- b) Excellence in Mentoring Award, Emory University School of Medicine Department of Anesthesiology Core Residency Program, June 2019.

- c) Top 10 Faculty Educator, University of Alabama Birmingham Department of Anesthesiology and Perioperative Care Core Residency Program, June 2021.

18) Society Memberships:

- a) American Society of Anesthesiologists, 2005-present
- b) American Medical Association, 2005-2008, 2019-present
- c) International Liver Transplant Society, 2012-present
- d) Society of Anesthesia and Sleep Medicine, 2014-2019
- e) Georgia Society of Anesthesiologists, 2016-2020
- f) Society for Perioperative Assessment and Quality Improvement, 2018-2019, 2022-present
- g) Society for Ambulatory Anesthesia, 2019- present
- h) International Anesthesia Research Society, 2021-present
- i) Society for Education in Anesthesiology, 2021-present

19) Organization of Conferences:

- a) Regional:
 - i) *Co-Chair*, Georgia Society of Anesthesiologists Summer Conference, Amelia Island, FL. July 14-16, 2017.
- b) Institutional:
 - i) *Co-Director*, Grand Rounds Education Conference, Department of Anesthesiology, Emory University School of Medicine, 07/2015-10/2019
 - ii) *Director*, Clinical Updates Morning Conference Series, Division of General, Transplant and Neuroanesthesiology, Emory University Hospital, 09/2018-8/2019.

20) Clinical Service Contributions:

- a) Developed the first surgical hyperglycemia management algorithm for the Emory Healthcare Perioperative Service. Perioperative diabetes and hyperglycemia screening, standard instruction/algorithm for pre/intra and postoperative glycemic management.
- b) Re-instituted (2014) and chair (2014-present) the Emory University Hospital Airway Committee. Formed the emergency airway response team to manage out-of-operating room airways for patients in respiratory/hemodynamic distress. Representative to at-large effort for Emergency Airway Policy for Emory Healthcare.
- c) Built a Two-Step Screening Algorithm for the Safe Management of Perioperative Obstructive Sleep Apnea (Emory University Hospital and Emory University Hospital Midtown) to meet the American Society of Anesthesiologists' and Joint Commission's Recommendations for safe perioperative patient management.
- d) Chief of Service, General and Transplant Anesthesiology Service (07/2016-present). Responsible to oversee medical practice for subspecialty anesthesiology teams,

faculty evaluations/recruitment and retention, provision of division educational activities (formal didactics for faculty and residents), monthly faculty meetings, pediatric case scheduling, interpersonal dynamics/conflict resolution, team building, new faculty orientation, operating room staffing, and active maintenance of the division external and internal website.

- e) Director Professional Development, Engagement and Inclusion (11/2020-present). Constructed a validated competency model for academic career pathing, recruitment, succession planning and high-potential identification. Oversight as a co-director of the culture collaborative to re-envision department mission; includes engagement and motivation measures, leadership and team training. Personalized career planning.
- f) Certified Executive Coach (12/20-present). Coach chair-selected department faculty through 14-week sessions to build professional competency and leadership skills including emotional intelligence, conflict resolution, setting expectations and professional accountability.

21) Community Outreach

- a) Assistant coach for 4-5year old soccer team, YMCA Decatur (2017)
- b) Active volunteer at Oakhurst Elementary School and College Heights Public Preschool, Decatur GA (2016-2018)
- c) Volunteer Roy's Toys and Engage Team Feed a Family through Decatur First United Methodist Church (2018)

22) Formal Teaching

- a) Medical Student Teaching:
 - i) Crawford Long Anesthesia Group Annual Lecture, 2014-2017 (1 hour annually)
 - ii) Capstone Pharmacology Small Groups, Group Leader, 2015, 2018 (4 hours annually)
 - iii) Crawford Long Airway Management Skills Session, 2016-2017 (3 hours annually)
- b) Graduate Programs
 - i) Anesthesiology Residency (Emory University School of Medicine, Atlanta, Georgia)
 - (1) Curriculum Development:
 - (a) Vascular Anesthesia Director 2013-2016
 - (i) Created "20 Key Questions" curriculum for resident rotation
 - (b) Post-Anesthesia Care Unit Medical Director 2014-2016
 - (i) Created "20 Key Questions" curriculum for resident rotation
 - (2) Lectures:
 - (a) Anesthetic Considerations for Patients with Neuromuscular Disease (Annual 2014/2015)

- (b) Fluids and Electrolytes Review (Annual 2014/2015)
- (c) Review Session: Endocrine Topics (Annual 2014-2016)
- (d) Case Presentation: Anesthetic Concerns for Myasthenia Gravis (Annual 2014/2015)
- (e) Anesthetic Considerations for Patients with Endocrine Disease (January 23, 2014)
- (f) Resident Morning Lecture: Succinylcholine (July 28, 2014)
- (g) Key Words Session, Intraoperative Management of Congestive Heart Failure and Myocardial Ischemia (August 26, 2014)
- (h) Post-Operative Nausea and Vomiting (September 25, 2014)
- (i) Screening Patients with Suspected Obstructive Sleep Apnea, (March 30, 2015)
- (j) Board Prep: Exam Review for Endocrine Topics (May 18, 2015)
- (k) Resident Board Review: Hepatic Physiology (March 11, 2016)
- (l) Key Words Missed on Your ITE, How to Evaluate Written Board Questions (October 26, 2016)
- (m) Anesthesia Jeopardy: Cardiovascular and Respiratory Physiology, Mechanical Ventilation, Pacemakers (May 24, 2017)
- (n) Anesthesia Jeopardy: Cardiovascular, Pharmacology and Physiology Topics (August 2, 2017/October 23, 2018)
- (o) Out-of-Operating Room Emergency Airway Management CA-1 Orientation Lecture (August 16, 2017/July 6, 2018)
- (p) Common Post Anesthesia Care Unit Concerns and Complications CA-1 Orientation Lecture (August 16, 2017/August 15, 2018/August 14, 2019)
- (q) Anesthesia Jeopardy- Transplant, Vascular and Pharmacology Topics (Annually 2017-present)
- (r) Out-of-OR Airway Management Case Workshop (December 12, 2017/May 22, 2019)
- (s) Anesthesia Jeopardy- Renal and Respiratory Physiology, Invasive Cardiac Monitoring, Sedative Pharmacology (Annually, 2018-present)
- (t) Anesthesia Jeopardy- Endocrine, Hepatic Physiology, Narcotic Pharmacology, 30 minutes (Annually, 2018-present)
- (u) Hepatic Physiology (April 18 and November 28, 2018)
- (v) Managing Conflict: How to Work Within your Communication Style (May 2, 2018)
- (w) Positioning and Common Nerve Injury, CA-1 Orientation Lecture, Emory University (July 6, 2018/July 2, 2019)
- (x) Perioperative Considerations for Obstructive Sleep Apnea (October 22, 2019/January 7, 2020/March)

(3) Journal Club:

- (a) *New England Journal of Medicine* "Lactic Acidosis, Disorders of Fluids and Electrolytes," 1 hour (December 4, 2014)

- (b) *Anesthesiology* “The Relationship Between Intraoperative Hypotension, Defined by the Thresholds of Acute Kidney Injury and Myocardial Injury After Non-Cardiac Surgery,” 1 hour (March 23, 2017)
 - (c) *Anesthesiology* “The SLUScore: A Novel Method of Detecting Hazardous Hypotension in Adult Patients Undergoing Non-Cardiac Surgical Procedures,” 1 hour (June 13, 2017)
- (4) Mock Oral Board Examiner, 2013-2017 (4 hours annually)
- (5) Small Group Teaching
 - (a) CA-1 Operating Room Orientation Faculty, 2017, Drs. Lizzie Sigler and Matthew Weis (32 contact hours)
- ii) Anesthesiology Residency Program (University of Alabama Birmingham, Birmingham, Alabama)
 - (1) Lectures
 - (a) Emotional Intelligence, How to Gain (or Lose) Professional Influence (March 10, 2021) (Lecture + Workshop)
- iii) General Surgery Residency Program (Department of General Surgery, Emory University School of Medicine, Atlanta, Georgia)
 - (1) Post-Operative Nausea and Vomiting: A Surgeon’s Perspective (Annual 2015-2016)
 - (2) General Versus Regional Anesthesia, The Basics (October 16, 2016)
- iv) Anesthesiology Resident Lectures (External)
 - (1) Post-Operative Nausea and Vomiting, Reviewing an Old Topic to See What’s New. Department of Anesthesiology Residency Program, Medical University of South Carolina, Charleston, South Carolina. June 27, 2016.
 - (2) Journal Club. Ochsner Health System Residency Program. New Orleans, Louisiana. January 24, 2017.
 - (3) Journal Club. Department of Anesthesiology Residency Program, University of Florida- Jacksonville. Jacksonville, Florida. May 5, 2017
 - (4) Self-Awareness and Professional Influence. Department of Anesthesiology Residency Program, Emory University, Atlanta, Georgia. September 9, 2020.
 - (5) Burnout and Motivation. Department of Anesthesiology Residency Program, Emory University, Atlanta, Georgia. March 13, 2021.
 - (6) Emotional Intelligence, How to Gain (or Lose) Professional Influence (*Lecture and Workshop*). Department of Anesthesiology Residency Program, Oregon Health Sciences University, Portland, Oregon. March 24, 2021.
- v) Anesthesiology Fellowship Lectures (External)
 - (1) Emotional Intelligence, How to Gain (or Lose) Professional Influence (*Lecture and Workshop*). Department of Anesthesiology Cardiac Fellowship Program, Oregon Health Sciences University, Portland, Oregon. March 22, 2021.

- c) Master's and PhD Programs Emory Master of Medical Science (Allied Health) in Anesthesiology (Atlanta, Georgia)
 - (1) Post-Operative Nausea and Vomiting, 1 hour annually (2014-present)
 - (2) Post-Anesthetic Care in Elderly Patients, 1 hour annually (2015-2016)
 - (3) Common Complications and Concerns in the Post Anesthesia Care Unit, 2 hours annually (2015-present)
 - (4) Hyperglycemia, Who, How and Why? 1 hour annually (2017-present)
 - (5) Obstructive Sleep Apnea in the Perioperative Period, 1 hour (2018-present)

- d) Other

- i) Lectures

- (1) Perioperative Management of Obstructive Sleep Apnea, Department of Anesthesiology, Continuous Quality Improvement Conference. Emory University Hospital. Atlanta, Georgia. March 26, 2014.
 - (2) Perioperative Management of Obstructive Sleep Apnea, Department of Respiratory Therapy, Emory University Hospital. Atlanta, Georgia. June 10, 2014.
 - (3) Considerations for Pain Management in Patients with Obstructive Sleep Apnea, Perioperative Nursing Pain Committee. Emory University Hospital, Emory University Hospital Midtown, Emory St. Joseph's Hospital. Atlanta, Georgia. July 28, 2014.
 - (4) Building an Algorithm for Obstructive Sleep Apnea. Clinical Steering and Safety Committee, Emory University Hospital. Atlanta, Georgia. March 19, 2015.
 - (5) Building an Algorithm for Obstructive Sleep Apnea. Emory University Hospital Critical Care Fellows and Affiliates. Atlanta, Georgia. March 30, 2015.
 - (6) Perioperative Management of Obstructive Sleep Apnea, Perioperative Nursing, Emory University Hospital Midtown. Atlanta, Georgia. May 6, 2015.
 - (7) The Three-Ounce Swallow Challenge; FESS Versus Bedside Swallow Evaluation. Perioperative Nursing Emory University Hospital. Atlanta, Georgia. November 19, 2015.
 - (8) The Management of Hyperglycemia in Non-Cardiac Surgical Patients. Emory Hyperglycemia Committee, Emory St. Joseph's Hospital. Atlanta, Georgia. February 10, 2016.
 - (9) Emergency Airways- How Do We Trigger a Response Team? Medical Practice Committee, Emory University Hospital. Atlanta, Georgia. March 14, 2016.

- 23) Supervisory Teaching:

- a) Residency Program:

- i) Dr. George Pan, 2014-2015, Assistant Professor, University of California Los Angeles Department of Anesthesiology and Perioperative Medicine (Los Angeles, CA)
 - ii) Dr. Caitlin Sutton, 2014-2015, Assistant Professor, Baylor College of Medicine Department of Anesthesiology/Texas Children's Hospital (Houston, TX)

- iii) Dr. McKenzie Hollon, 2014-2015, Assistant Professor, Grady Memorial Hospital (Atlanta, GA).
 - iv) Dr. Danielle Howe, 2015-2016, Staff Anesthesiologist, Emory Specialty Anesthesiologists (Atlanta, GA).
 - v) Dr. Peiman Lahsaei, 2015-2016), Assistant Professor Anesthesiology and Critical Care Medicine, UT Southwestern Medical Center (Dallas, TX).
 - vi) Dr. Blaine Farmer, 2016-2017, Assistant Professor, Division of Cardiothoracic Anesthesia, Emory University Hospital (Atlanta GA).
 - vii) Dr. Cara Iorianni, 2018-2019, Staff Anesthesiologist (Atlanta, GA).
 - viii) Dr. Devin Weinberg, 2017-2019, Assistant Professor, Division of Surgical Specialty Anesthesiology and Liver Transplant Division, Emory University Department of Anesthesiology (Atlanta, GA)
 - ix) Dr. Marjana Segers, 2016-2019, Critical Care Fellow, Stanford University (Palo Alto, CA).
 - x) Dr. Daniel Viox, 2016-2019, Assistant Professor, Division of Cardiothoracic Anesthesia, Emory University Hospital (Atlanta, GA).
 - xi) Dr. Lizzie Sigler, 2017-present, Staff Anesthesiologist, Northside Hospital (Atlanta, GA)
 - xii) Dr. Katherine Tinkey, 2017-2019 Pain Clinic Staff Anesthesiologist (Denver, CO)
 - xiii) Dr. Lauren Meyer, 2017- 2019, Staff Anesthesiologist (Winter Park, FL)
 - xiv) Dr. Hannah Dalke, 2018-2020, Current Pediatric Fellow, Children's Healthcare of Atlanta (Atlanta, GA)
 - xv) Dr. Blake Wiggins, 2021-present, Current PGY-1, University of Alabama Birmingham (Birmingham, AL)
- b) Resident Mentor
- i) Dr. George Pan, 2014-2015, Assistant Professor, University of California, Los Angeles (Los Angeles, CA)
 - ii) Dr. Tee Todd, 2014-2016, Anesthesia Associates (Columbus, GA)
 - iii) Dr. Erica Johnson, 2014-2016, Assistant Professor, Grady Memorial Hospital (Atlanta, GA)
 - iv) Dr. Thomas Kessinger, 2014-2016, Guardian Anesthesia Services (Webster, TX)
 - v) Dr. Eric Brown, 2015-2016, Assistant Professor, University of Florida Department of Anesthesiology (Gainesville, FL)
 - vi) Dr. Courtney Elder, Staff Anesthesiologist, Emory Specialty Associates (Atlanta, GA)
 - vii) Dr. Hannah Dalke, Current PGY-3 Resident, 2018-present, Emory University Department of Anesthesiology (Atlanta, GA)
 - viii) Dr. Max Schubert, Current PGY-2 Resident, 2019-present, Emory University Hospital (Atlanta, GA)
 - ix) Dr. Alex Kosiak, Current PGY-2 Resident, 2019-present, Emory University Department of Anesthesiology (Atlanta, GA)
- c) Faculty Mentor, Resident Quality Initiative Projects

- i) Operating Room to Intensive Care Unit Standardized Handoffs, Resident McKenzie Hollon. Joint initiative with ICU Nursing Leadership. The resultant hand-off tool remains the standard transfer tool for all direct admissions from the OR to the ICU to report relevant information to nursing, respiratory therapy and accepting care physicians, 20 contact hours (2014)
 - ii) Anesthesia Quality Initiative Mentor (co-mentors Drs. Grant Lynde and Michael Duggan) using Hangenix monitoring device to determine hand washing compliance in the preoperative holding area, 25 contact hours (2015-2016)
 - iii) Obstructive Sleep Apnea (Two Step Screening), Resident Dr. Cara Iorianni, 8 contact hours (2017-2018).
- d) Editor for Anesthesiology Textbook Publication (faculty editor for 11 resident chapters)
- (1) Goudra B, Duggan M, Chidambaran V, Hari K, **Duggan EW**, Powell, M, Mohinder SP (Eds.), *Anesthesiology, A Practical Approach*. Philadelphia: Springer, 2018.
- e) Medical Students
- i) Dr. Cristen (Garrett) Cain (graduated 2017, Emory SOM). Mentor 2017-2019. Graduated Emory University Department of Anesthesiology (Atlanta, GA)
 - ii) Dr. Lisa Tang (graduated 2017, Emory SOM). Mentor 2017-2019. Graduated Emory University Department of Anesthesiology (Atlanta, GA)
 - iii) Dr. Brian Taussig (graduated 2017, Emory SOM). Mentor 2017. Graduated New York University Department of Anesthesiology (New York, NY)
 - iv) Dr. Hande Bilen, MS (graduated 2019, Emory SOM). Mentor 2019. Current PGY-2 Resident, 2019. Emory University Department of Anesthesiology (Atlanta, GA)
- f) Other
- i) American Women's Medical Association Mentor, Mentee: Lisa Tang (MSII-MSIII), 2013-2014 (8 hours annually)
- 24) Lectureships, Seminar Invitations and Visiting Professorships:
- a) National/International Speaker (Invited):
 - i) Moving Past STOP-Bang: What Do I Need to Know to Keep My Patients Safe? Department of Anesthesiology Grand Rounds, Oregon Health Sciences Center. Portland, Oregon. March 14, 2017.
 - ii) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery: Who, How, Why? Perioperative Services Grand Rounds. BayHealth Medical Center. Dover, Delaware. May 16, 2017.
 - iii) Obstructive Sleep Apnea, Moving Past STOP-Bang. Department of Anesthesiology Grand Rounds, University Hospital Cleveland. Cleveland, Ohio. March 14, 2018.
 - iv) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery: Who, How, Why? Perioperative Services, Team Health Anesthesia. St. Anthony's Hospital. Lakewood, Colorado. August 9, 2018.

- v) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery: Who, How, Why? Department of Anesthesiology, Albert Einstein University. Philadelphia, Pennsylvania. September 26, 2018.
 - vi) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery. Johns Hopkins Armstrong Institute, Agency for Healthcare Research and Quality Safety Program, Dr. Della Lin (Facilitator), October 2018.
 - vii) Facilitation: Build the Skills Needed for the Conversation. Graduate Medical Office “Community of Practice” Lecture Series. Oregon Health Sciences University, April 1, 2021.
- b) Regional (Invited):
- i) A Perioperative Algorithm for the Management of Obstructive Sleep Apnea. Physician Specialists in Anesthesia, St. Joseph’s Hospital. Atlanta, Georgia. October 14, 2015.
 - ii) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery: Who, How, Why? Department of Anesthesiology Grand Rounds, Medical University of South Carolina. Charleston, South Carolina. June 28, 2016.
 - iii) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery: Who, How, Why? Department of Anesthesiology Grand Rounds, Ochsner Health System. New Orleans, Louisiana. January 25, 2017.
 - iv) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery: Who, How, Why? Department of Anesthesiology Grand Rounds, University of Florida-Jacksonville. Jacksonville, Florida. May 6, 2017.
 - v) Moving past STOP-Bang, What Do I Need to Know Now and How Do I Keep My Patients Safe? Northside Anesthesiology Consultants. Atlanta, Georgia. January 8, 2018.
 - vi) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery: Who, How, Why? Department of Anesthesiology, University of Kentucky. Louisville, Kentucky. November 7, 2018.
- c) Institutional:
- i) Thomas Jefferson University Hospital
 - (1) The Pre-Operative Cardiac Evaluation; Are We Adhering to the ACC/AHA Guidelines? Department of Anesthesiology, Thomas Jefferson Hospital. Philadelphia, Pennsylvania. February 21, 2014.
 - ii) Emory University School of Medicine
 - (1) The Awake Carotid Endarterectomy and Superficial Cervical Plexus Block. Department of Anesthesiology, Emory University Hospital. Atlanta, Georgia. February 27, 2014.
 - (2) Integrating Goals, Shared Projects in the Department of Surgery and Anesthesiology. Surgical Performance Day (Departments of Surgery, Anesthesiology and Perioperative Nursing). Emory University Hospital. Atlanta, Georgia. April 26, 2014.
 - (3) Perioperative Management of Obstructive Sleep Apnea. Department of Anesthesiology, Emory University Hospital. Atlanta, Georgia. May 7, 2014.

- (4) Obstructive Sleep Apnea; Building A Screening and Treatment Algorithm. Department of Anesthesiology, Emory University Hospital. August 7, 2014.
- (5) Post-Operative Nausea and Vomiting, A New Approach to an Old Problem. Department of Anesthesiology, Emory University Hospital Midtown. Atlanta, Georgia. October 3, 2014.
- (6) Obstructive Sleep Apnea, Building a Screening and Treatment Algorithm, Surgical Performance Day (Departments of Surgery, Anesthesiology and Perioperative Nursing). Emory University Hospital. Atlanta, Georgia. October 23, 2014.
- (7) Post-Operative Nausea and Vomiting: A Surgeon's Approach. Department of Plastic Surgery Grand Rounds, Emory University School of Medicine. Atlanta, Georgia. November 7, 2014.
- (8) Post-Operative Nausea and Vomiting: A Surgeon's Approach. Department of Obstetrics and Gynecology Grand Rounds, Emory University School of Medicine. Atlanta, Georgia. December 6, 2014.
- (9) Monsoon Jet Ventilation (Joint lecture with Dr. Michael Duggan). Department of Anesthesiology, Emory University Hospital. Atlanta, Georgia. January 8, 2015.
- (10) A Perioperative Algorithm for the Management of Obstructive Sleep Apnea, Department of Surgery, Emory University Hospital Midtown. Atlanta, Georgia. March 4, 2015.
- (11) A Perioperative Algorithm for the Management of Obstructive Sleep Apnea. Department of Anesthesiology, Grady Hospital. Atlanta, Georgia. March 19, 2015.
- (12) A Perioperative Algorithm for the Management of Obstructive Sleep Apnea. Department of Anesthesiology, Emory University Hospital Midtown. Atlanta, Georgia. March 26, 2015.
- (13) Screening and Management of Patients with Obstructive Sleep Apnea. Critical Care Medicine Faculty, Emory University Hospital. Atlanta, Georgia. March 30, 2015.
- (14) A Perioperative Algorithm for the Management of Obstructive Sleep Apnea. Department of Anesthesiology, Emory University Hospital. Atlanta, Georgia. May 7, 2015.
- (15) Obesity and Obstructive Sleep Apnea, Pre and Post-Operative Screening. Department of Anesthesiology, Ambulatory Surgery Center. Atlanta, Georgia. December 10, 2015.
- (16) The Management of Hyperglycemia in Non-Cardiac Surgical Patients. Department of Anesthesiology, Emory University Hospital. Atlanta, Georgia. March 2, 2016.
- (17) The Management of Hyperglycemia in Non-Cardiac Surgical Patients, Surgical Performance Day (Departments of Surgery, Anesthesiology and Perioperative Nursing). Emory University Hospital. April 28, 2016.
- (18) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery: Who, How, Why? Department of Surgery Grand Rounds, Emory University School of Medicine. Atlanta, Georgia. February 7, 2017.

- (19) Moving past STOP-Bang; What do I Need to Know Now and How do I Keep My Patients Safe? Department of Anesthesiology, Emory University Hospital. Atlanta, Georgia. September 14, 2017.
 - (20) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery: Who, How, Why? Division of General Anesthesiology. Emory University Hospital Midtown. Atlanta, Georgia. May 3, 2018.
 - (21) Pulmonary Embolism during Orthotopic Liver Transplant. Department of Anesthesiology, Emory University General/Transplant and Neuroanesthesiology, Continuous Quality Improvement Conference. Emory University Hospital. June 7, 2018.
 - (22) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery: Who, How, Why? Department of Urology Grand Rounds, Emory University School of Medicine. Atlanta, Georgia. August 2, 2018.
 - (23) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery: Who, How, Why? Department of Anesthesiology, Emory University Division of General/Transplant and Neuroanesthesiology, Expert Case Conference. Atlanta, Georgia. September 27, 2018.
 - (24) Common Considerations in a Neurosurgical Population (3 Person Panel). Department of Neurosurgery Grand Rounds, Emory University School of Medicine. Atlanta, Georgia. December 13, 2018
 - iii) University of Alabama Birmingham
 - (1) Emotional Intelligence, How to Gain (or Lose) Professional Influence (*Lecture and Workshop*). Department of Anesthesiology Grand Rounds, University of Alabama Birmingham, Birmingham, Alabama. August 30, 2021.
- 25) Invitations to National/International, Regional and Institutional Conferences:
- a) National/International:
 - i) Obstructive Sleep Apnea: Using the Literature to Build your Practice Algorithm. New Horizons in Anesthesiology. Vail, Colorado. February 15-20, 2016.
 - ii) Updates in PONV: From SAMBA 2014 to now- what's new in the literature? New Horizons in Anesthesiology. Vail, Colorado. February 15-20, 2016.
 - iii) The Management of Hyperglycemia in Non-Cardiac Surgical Patients. New Horizons in Anesthesiology. Vail, Colorado. February 15-20, 2016.
 - iv) Perioperative Management of Hyperglycemia for Non-Cardiac Surgery: Who, How and Why? Review Course Lecture (Session 259). International Anesthesia Research Society (IARS). Chicago, Illinois. April 28, 2018.
 - v) Perioperative Management of the Patient with Type 2 Diabetes; From Guidelines to Individualized Patient Care. International Anesthesia Research Society (IARS). Problem Based Learning Session. Montreal, Canada. May 18, 2019.
 - vi) Encouraging the Next Generation: Growing Junior Faculty as Leaders. International Anesthesia Research Society (IARS). Panel Organizer and Speaker, Montreal, Canada. May 18, 2019.
 - vii) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery. Johns Hopkins Armstrong Institute, Agency for Healthcare Research and Quality Safety

- Program, Dr. Della Lin (Facilitator), December 18, 2018.
- viii) Climbing the Leadership Ladder: How to Navigate Generational Divide and Build Lasting Teams. International Anesthesia Research Society (IARS). Panel Speaker, San Francisco, CA. May 2020 (CANCELLED due to COVID-19 Pandemic).
 - ix) Facilitate, Mediate or Negotiate: Communication Skills to Engage in the Conversation. International Anesthesia Research Society (IARS). Panel Moderator and Speaker Virtual Conference, May 21, 2021.
 - x) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery. Johns Hopkins Armstrong Institute, Agency for Healthcare Research and Quality Safety Program, Dr. Elizabeth Wick (Facilitator). October 7, 2018.
 - xi) Moving Past Burnout, Let's Talk Engagement. International Anesthesia Research Society (IARS). Moderator and Panel Speaker, Honolulu, HI. May 19, 2022.
 - xii) Climbing the Leadership Ladder: How to Navigate Generational Divide and Build Lasting Teams. International Anesthesia Research Society (IARS). Panel Speaker, Honolulu, HI. May 19, 2022.

b) Regional:

- i) A Perioperative Algorithm for the Management of Obstructive Sleep Apnea. Georgia Association of Peri Anesthesia Nursing (GAPAN). Atlanta, Georgia. October 24, 2015.
- ii) Post-Anesthesia Care of the Elderly Patient. Georgia Association of Peri Anesthesia Nursing (GAPAN). Atlanta, Georgia. October 24, 2015.
- iii) Moving past STOP-Bang; What do I Need to Know Now and How Do I Keep My Patients Safe? Georgia Society of Anesthesiologists. Atlanta, Georgia. February 4, 2017.
- iv) Perioperative Management of Hyperglycemia in Non-Cardiac Surgery: Who, How and Why? Georgia Society of Anesthesiologists. Atlanta, Georgia. February 4, 2017.
- v) Perioperative Considerations to Optimize Patient Outcomes. Advances in Urology. Atlanta, Georgia. December 7, 2018.
- vi) Moving Past Burnout, Let's Talk Engagement. Georgia Society of Anesthesiologists. Atlanta, Georgia. January 8, 2022.

26) Abstract Presentations:

b) National:

- i) Wolf F*, Regan P, **Duggan E**. Uncovering residual paralysis in the PACU, a pilot study. International Anesthesia Research Society. The Hilton Hawaiian Village, Honolulu, HI. March 21-24, 2015. Poster Presentation.
- ii) Long CA*, Fang ZB, Hu FY, Veeraswamy RK, Rajani RR, Brewster LP, **Duggan E**, Duwayri Y. Poor glycemic control is a strong predictor of post-operative morbidity and mortality in patients undergoing vascular surgery. Society of Vascular Surgery 2016 Annual Meeting. Gaylord National Resort. National Harbor, Maryland. June 8-11, 2016. Poster Presentation.

- iii) Lynde G* and **Duggan E**. Barriers to Quality Research. Advancing Health Care Quality at Emory. American Society of Anesthesiologists 2016 Annual Meeting. Chicago, Illinois. October 23-26, 2016. Poster Presentation.
- iv) O'Reilly-Shah V*, **Duggan EW** and Lynde G. Strategies to Maximize the Detection and Treatment of Perioperative Hyperglycemia. 13th Annual Academic Surgical Congress. Jacksonville, FL. January 30, 2017. Poster Presentation.
- v) **Duggan EW**, O'Reilly-Shah VN, Tsekga K, Galindo RJ*, Umpierrez GE. HbA1C Screening Characterizes Hyperglycemia in Surgical Patients. The American Diabetes Association 78th Scientific Session. Orlando, FL. June 24, 2018. Poster Presentation.

c) Institutional:

- i) Baily A,* Charrier R, Stopa C, Stuart A, Weaver T, **Duggan E**. Resident perceptions of Out-of-OR Airway Management. The Science of Graduate Medical Education. Emory University School of Medicine. March 18, 2014. Atlanta, Georgia. Poster Presentation.
- ii) Cook C, Curry A, Dellaquilla M, Demma L, Hollon M,* Patel K, **Duggan E**. Improving provider handover from OR to ICU. The Science of Graduate Medical Education. Emory University School of Medicine. March 18, 2014. Atlanta, Georgia. Poster Presentation.
- iii) Lynde G* and **Duggan E**. Barriers to Quality Research. Advancing Health Care Quality at Emory. Emory University School of Medicine. Atlanta, Georgia. May 18, 2016. Poster Presentation.
- iv) Brown E, Cartwright B,* Farmer B, Johnson E, Kessinger T, Lahsaei P, Macias P, Maffeo C, Mitchell M, Todd J, **Duggan E**, Duggan M, Lynde G. Measuring perioperative hand hygiene via ultrasound at EUH. Health Services Research Day. Emory University School of Medicine. Atlanta, Georgia. June 6, 2016. Poster Presentation.
- v) Henderson KW,* Pimental C, **Duggan E**, Kandiah P. Neurosurgery Intensive Care Unit Quality Initiative in Emergent Airway Management. Emory Quality Forum. Emory University School of Medicine. Atlanta, Georgia. June 6, 2016. Poster Presentation.

24) Clinical Research Focus: Risk factor identification/mitigation in non-cardiac surgery patients to determine impact of hyperglycemia management on perioperative outcomes. Includes development of a screening and treatment algorithm, ventures/feedback to change provider behaviors, and use of a medical app to support physician workflow. Additionally, two-step screening processes to mitigate risk of respiratory failure and opioid-induced respiratory depression (OIRD) in high-risk sleep apnea patients.

25) Bibliography:

- a) Published Articles (clinical, basic science, other) in Refereed Journals:
 - i) **Duggan EW**, Klopman M, Berry A, Umpierrez G. The Emory University perioperative algorithm for the management of hyperglycemia and diabetes in

- non-cardiac surgery patient. *Current Diabetes Reports*. 2016; 16(3): 1-13. PMID: 26971119
- ii) Demma LJ, Carlson KT, **Duggan EW**, Morrow JG, Umpierrez G. Effect of basal insulin dosage on blood glucose concentration in ambulatory surgery patients with type 2 diabetes. *J Clin Anes*. 2017; 36: 184-188. PMID 28183563.
 - iii) **Duggan EW**, Carlson K, Umpierrez G. Perioperative hyperglycemia management: An Update. *Anesthesiology*. 2017; 126(3): 547-560. PMID 28121636.
 - iv) Fayfman M, Davis G, **Duggan EW**, Urrutia MA, Chachkiani D, Wang H, Schindler JM, Galindo R, Reyes D, Pasquel FJ, Umpierrez G. Sitagliptin for prevention of stress hyperglycemia in patients without diabetes undergoing surgery: a pilot randomized study. *Journal of Diabetes and Its Complications*. 2018; 32(12):1091-1096. PMID 30253968.
 - v) Long CA, Fang ZB, Hu FY, Veeraswamy RK, Rajani RR, Brewster LP, **Duggan E**, Duwayri Y. Poor Glycemic Control is a Strong Predictor of Post-operative Morbidity and Mortality in Patients Undergoing Vascular Surgery. *Journal of Vascular Surgery*. 2019; 69(4):1219-1226. PMID 30459015.
 - vi) **Duggan EW**, Vadlamudi R, Spektor B, Sharifpour M. Abdominal Surgery with Bilateral Rectus Sheath Block, A Case Report. *A and A Practice*. 2019; Ahead of print. PMID 31361662.
 - vii) **Duggan EW**, Chen Y. Glycemic Management in the Operating Room: Screening, Monitoring, Oral Hypoglycemics and Insulin Therapy. *Curr Diabetes Reports*. 2019; 19(11): 134. PMID 31749027.
 - viii) Perez-Guzman MC, **Duggan E**, Gibanica C, Cardona S, Corujo-Rodriguez A, Faloye A, Halkos M, Umpierrez GE, Peng L, Davis GM, Pasquel FJ. Continuous Glucose Monitoring in the Operating Room and Cardiac Intensive Care Unit. *Diabetes Care*. 2021; 44(3): e50-52.
 - ix) Jang J, Colletti AA, Ricklefs C, Snyder HJ, Kardonsky K, **Duggan EW**, Umpierrez GE, O'Reilly-Shah, VN. Implementation of App-Based Diabetes Medication Management: Outpatient and Perioperative Clinical Decision Support. *Current Diabetes Reports*, 2021; 22(50).
 - x) **Duggan EW**, Clark M. Moving Past Burnout, Let's Talk Engagement. *Anesthesiology Clinics*. Accepted for publication, in press.

b) Review Articles:

- i) **Duggan EW** and Collop N. Building a Peri-Operative Sleep Apnea Algorithm; Applying the Literature to Your Practice. *Bariatric Surgical Practice and Patient Care*. 2015; 10(4): 137-144.
- ii) Garcia P, **Duggan EW**, McCullough IL, Lee S, Fischman D. Postanesthesia Care for the Elderly Patient. *J Clin Therapeutics*. 2015; 37(12): 2651-2665. PMID: 26598176.

c) Book Chapters:

- i) **Duggan E**, Duggan M, Horak J. Dipyrimadole. In Singh-Radcliff N, Gupta A (eds). *Pharmacology in Anesthesia Practice*. New York, Oxford University Press, 2011.
 - ii) **Duggan E**, Duggan M, Horak J. Adenosine Phosphate Inhibitors. In Singh-Radcliff N, Gupta A (eds). *Pharmacology in Anesthesia Practice*. New York, Oxford University Press, 2011.
 - iii) **Duggan E**, Duggan M, Horak J. Low Molecular Weight Heparin. In Singh-Radcliff N, Gupta A (eds). *Pharmacology in Anesthesia Practice*. New York, Oxford University Press, 2011.
 - iv) **Duggan E**, Duggan M, Horak J. Miscellaneous Anticoagulants. In Singh-Radcliff N, Gupta A (eds). *Pharmacology in Anesthesia Practice*. New York, Oxford University Press, 2011.
 - v) **Duggan E**, Duggan M. Streptokinase and Tissue Plasminogen Activator (tPA). In Singh-Radcliff N, Gupta A (eds). *Pharmacology in Anesthesia Practice*. New York, Oxford University Press, 2011.
 - vi) **Duggan E**, Elkassabany N. Valproic Acid and Carbapenam Antibiotics. In Marcucci C, Kirsch J (eds). *Perioperative Drug-Drug Interactions*. New York, Springer Publishing. 2015.
 - vii) **Duggan E** and Schwock K. Pharmacology of Anesthetic Drugs Used in Non-Operating Room Anesthesia. In Goudra BG, Singh PM (eds). *Out of Operating Room Anesthesia: A Comprehensive Review*. Philadelphia. Springer Science. 2016.
 - viii) Baird E and **Duggan EW**. What are the Issues in Intraoperative Management of Patients Undergoing Liver Transplantation: An Anesthesiologist's Perspective. In Chu QD, Vollmer C, Zibari G, Orloff S, Williams M and Gimenez M (eds): Hepato-Pancreato-Biliary and Transplant Surgery: Practical Management of Dilemmas. Americas Hepato-Pancreato-Biliary Association. 2018.
 - ix) Baird E and **Duggan EW**. What Are the Intraoperative Coagulation Issues During Liver Transplantation: An Anesthesiologist's Perspective. In Chu QD, Vollmer C, Zibari G, Orloff S, Williams M and Gimenez M (eds): Hepato-Pancreato-Piliary and Transplant Surgery: Practical Management of Dilemmas. Americas Hepato-Pancreato-Biliary Association. 2018.
- d) Books Edited and Written
- i) Goudra B, Duggan M, Chidambaran V, Hari K, **Duggan EW**, Powell, M, Mohinder SP (Eds.), *Anesthesiology, A Practical Approach*. Philadelphia: Springer, 2018.
 - Editor for 14 Chapters: Vascular, Transplant, Urologic, General, Orthopedic Topics.
- e) Manuals, Videos, Computer Programs, and Other Teaching Aids:
- i) **Watson E**, Sinha A. Intravenous Line Placement. In Fleisher LA, Gaiser R (eds). *Anesthesia Procedures Consult*. www.proceduresconsult.com Philadelphia, Elsevier, 2008.

- ii) **Watson E**, Sinha A. Glidescope. In Fleisher LA, Gaiser R (eds). *Anesthesia Procedures Consult*. www.proceduresconsult.com Philadelphia, Elsevier, 2008.
 - iii) **Watson E**, Video Editor (34 videos). *Anesthesia Procedures Consult*. www.proceduresconsult.com Philadelphia, Elsevier, 2008.
 - iv) **Duggan E**. Perioperative Management of Hyperglycemia for Non-Cardiac Surgery: Who, How and Why? *IARS 2018 Annual Meeting On-Demand*. Glendale, Learner's Digest International. Wolters Kluwer. 2018.
 - v) McNamara C, **Duggan EW**. General Anesthesia and Management. In Berger, JS and Heinz E (eds). *Comprehensive Review of Anesthesiology*. CMEInfo. www.practicalreviews.com/My_Media?PDF/cmeinfo/357-Syllabus.pdf
- f) Published Abstracts:
- i) Long CA, Fang ZB, Hu FY, Veeraswamy RK, Rajani RR, Brewster LP, **Duggan E**, Duwayri Y. Poor glycemic control is a strong predictor of post-operative morbidity and mortality in patients undergoing vascular surgery. *J Vasc Surg*. 2016; 63(6):51S-52S.
 - ii) **Duggan EW**, O'Reilly-Shah VN, Tsekga K, Galindo RJ, Umpierrez GE. HbA1C Screening Characterizes Hyperglycemia in Surgical Patients. *The American Diabetes Association 78th Scientific Session*. *Diabetes*. 2018; 67(Suppl 1): <https://doi.org/10.2337/db18-1305-P>.
- g) Other Publications:
- i) **Duggan EW** and Patel GP. Commentary on bilateral breast reduction surgery without opioid analgesics: A comparative study. *Aesthet Surg J*. 2017. 8(1): 900-903. PMID 29036942.
 - ii) **Duggan EW** and Guillermo GE. Insulin for Perioperative Glucose Control: Settled Science? In Reply. *Anesthesiology*. 2017; 127: 900. PMID 29040104.
 - iii) **Duggan EW** and Chunduri A. Guidelines Update: Regional Anesthesia and Antithrombotic or Thrombolytic Therapy. *Society for Perioperative Assessment and Quality Improvement*. Newsletter, Vol. 13 (2). 2019.
 - iv) Bezinover D, Diaz G, **Duggan E**, Galusca D, Kindscher JD, Moguevitch M, Nicolau-Raducu R, Pivalizza EG, Planinsic R, Ramsay MAE, Rosenfeld DM, Skubas N, Wagener G. Bacchus listed for a liver transplant: Comment. *Anesthesiology*. 2020; 132:1590-1.

L. EVAN CLINE

5011 Northside Drive | Atlanta, Georgia 30327
404.431.3588 | evancline@gmail.com

PROFESSIONAL CAREER:

Huff Powell & Bailey, LLC

- Partner (2015 – present)
- Associate (2008 – 2015)
- Areas of Practice
 - Physician and Hospital Malpractice
 - Gross Negligence/Ordinary Negligence
 - Premises Liability
 - General Civil Litigation
 - Appellate Practice
 - Georgia Composite Medical Board Representation
- Representative Experience
 - Representation of Georgia hospitals and medical corporations involving claims of medical malpractice and ordinary negligence.
 - Defense verdicts in cases on behalf of hospitals, medical corporations, and providers from various specialties, including but not limited to anesthesia, emergency medicine, general surgery, internal medicine, interventional cardiology, vascular surgery, and nursing.
 - Thorough appellate management and successful outcomes in appellate issues arising from initial pleadings, discovery motions, trial rulings, and jury verdicts.



I have experience representing physicians, mid-level providers, nurses, and hospitals in every stage of complex medical malpractice and general civil cases, including drafting pleadings and motions; managing written discovery; taking and defending the depositions of parties, experts, and other witnesses; evaluating case strengths, weaknesses and value; preparing for trial and trying cases; and handling appellate issues. I particularly enjoy working with physicians and other healthcare professionals to provide information and reassurance about the medical/legal process while also helping to develop their presentation skills and fully prepare them for substantive issues that might arise in deposition or at trial.

EDUCATION:

Emory University School of Law (Doctor of Jurisprudence) (2005 – 2008)

- Student Bar Association President/Vice President/Class Rep.
- Dean's Distinguished Service Award at Graduation
- Winner of Moot Court Intraschool Competition

University of South Carolina (2002 – 2005)

- Bachelor of Arts in Journalism and Mass Communications

Clemson University (2001 – 2002)

Update on Medical Malpractice Law + Anesthesia Trends

L. EVAN CLINE

HUFF POWELL & BAILEY, LLC
999 PEACHTREE STREET NE
ATLANTA, GEORGIA 30309

H·P·B

HUFF POWELL BAILEY

Overview of a Medical Malpractice Case

FILE TO TRIAL



Components of Every MM Case:

Duty

Breach

Cause

Harm

Overview of a Medical Malpractice Case

LAWSUIT W/ EXPERT AFFIDAVIT FILED AND SERVED



Overview of a Medical Malpractice Case

FILE ANSWER AND CONDUCT WRITTEN DISCOVERY



Overview of a Medical Malpractice Case

DEPOSITION DISCOVERY



Post-Discovery Motions Practice

**DAUBERT MOTIONS
&
MOTIONS FOR
SUMMARY JUDGMENT**

Duty

Breach

Cause

Harm

Components of a Trial

DEPOSITION DISCOVERY



- Jury Selection
- Opening Statements
- Presentation of the Evidence
- Closing Arguments
- Jury Charges
- Verdict



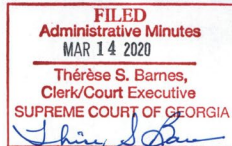
trial

... IN THE TIME OF THE
COVID

Status of Trials COVID



SUPREME COURT OF GEORGIA



March 14, 2020
(Amended)

ORDER DECLARING STATEWIDE JUDICIAL EMERGENCY

WHEREAS, the Governor has determined that a Public Health State of Emergency exists in the State of Georgia due to the spread of the Coronavirus/COVID-19, and whereas that state of emergency constitutes a "judicial emergency" pursuant to OCGA § 38-3-60 et seq., see OCGA § 38-3-60 (2).

Now therefore, pursuant to OCGA § 38-3-61, the Honorable Harold D. Melton, Chief Justice of the Supreme Court of Georgia, DOES HEREBY ORDER AND DECLARE a Statewide Judicial Emergency in the State of Georgia. The nature of this emergency is the continued transmission of Coronavirus/COVID-19 throughout the State and the potential infection of those who work in or are required to appear in our courts.

Thus, in order to protect the health, safety, and liberty of all citizens in this State, the undersigned hereby declares a Statewide Judicial Emergency affecting all courts and clerk's offices in the State as it relates to all judicial proceedings.

To the extent feasible, courts should remain open to address essential functions, and in particular courts should give priority to matters necessary to protect health, safety, and liberty of individuals. Essential functions are subject to interpretation; however, some matters that fall into the essential function category are: (1) where an immediate liberty or safety concern is present requiring the attention of the court as soon as the court is available; (2) criminal court search warrants, arrest warrants, initial appearances, and bond reviews; (3) domestic abuse temporary protective orders and restraining orders; (4) juvenile court delinquency detention hearings and emergency removal matters; and (5) mental health commitment hearings.







FILING NEW CASES DURING COVID

?????

II. Reimposition of Deadlines on Litigants

(A) As announced in the June 12 extension order, this order hereby reimposes all deadlines and other time schedules and filing requirements (referred to collectively herein as “deadlines”) that are imposed **on litigants** by statutes, rules, regulations, or court orders in civil and criminal cases and administrative actions and that have been suspended, tolled, extended, or otherwise relieved by the March 14, 2020 Order Declaring Statewide Judicial Emergency, as extended, on the following schedule and with the following exceptions and conditions:

(2) **All other deadlines imposed on litigants shall be reimposed effective July 14, 2020**, as further explained below.

(3) **In cases that were pending before the March 14 Order.** litigants will have the same amount of time to file or act after July 14 that they had as of March 14. For example, if an answer in a civil case was due on March 20, that answer will now be due on July 20, and if a criminal defendant’s pretrial motions were due on March 23, they will now be due on July 23.

(4) **In cases filed between March 14 and July 13, 2020**, the time for deadlines will begin running on July 14. For example, if a civil complaint was filed in June and the answer would have been due 30 days later, that 30-day period will begin on July 14 and the answer will be due on August 13.

(5) **In cases filed on or after July 14, 2020**, litigants shall comply with the normal deadlines applicable to the case.



~~SURELY WE ARE PAST THIS.~~
WAIT... ARE WE PAST THIS? 2022

UPDATE ON MEDICAL MALPRACTICE LAW

+ ANESTHESIA

- 1. EXPANSION OF GROSS NEGLIGENCE STATUTE**
- 2. LIABILITY RELATED TO ANESTHESIOLOGIST ASSISTANTS**
- 3. APPORTIONMENT OF LIABILITY/DAMAGES**
- 4. TECHNOLOGY/IT**

EXPANSION OF GROSS NEGLIGENCE

O.C.G.A. § 51-1-29.5 (c) In an action involving a health care liability claim arising out of the provision of emergency medical care in a hospital emergency department **OR** obstetrical unit **OR** in a surgical suite immediately following the evaluation or treatment of a patient in a hospital emergency department, no physician or health care provider shall be held liable unless it is proven by clear and convincing evidence that the physician or health care provider's actions showed gross negligence.

EXPANSION OF GROSS NEGLIGENCE

OBGYN Associates, P.A. v. Brown, 849 S.E.2d 257 (2020)

- Birth Injury (Shoulder Dystocia) case
- Defendant argued that language “in a hospital emergency department **or obstetrical unit** or in a surgical suite immediately following the evaluation or treatment of a patient in a hospital emergency department” allowed for heightened standard of GN
- Plaintiff countered that GN is an ER Statute and should be read as: “in a hospital emergency department” OR “in an obstetrical unit or surgical suite if the patient had first been in the hospital emergency department”
- Court held that legislative intent = in ED, in obstetrical unit, OR in surgical suite if it immediately follows evaluation in ED.

EXPANSION OF GROSS NEGLIGENCE

- What does this mean for you? In any case where you are responding to or addressing emergency in the ED, OB unit, or surgical suite if the patient was “just” evaluated in the ED, you should be able to argue that the plaintiff must prove gross negligence by clear and convincing evidence.
- Examples:
 - Called to ED to intubate a patient with laryngeal edema? **YES. GN.**
 - Involved in trauma surgery for gunshot wound that wheeled directly back to the OR through the ED? **Yes. GN.**
 - In OB cases, response to high spinal, involvement in stat c-section, maternal hemorrhage, etc. **Yes. GN. (for now...)**

LIABILITY RELATED TO AAs

- Physician Assistant Act uses the word “responsible” in describing the relationship between the supervising physician and the PA
- Plaintiffs are now arguing that ANY alleged standard of care violation by the PA or AA is directly attributable to the supervising physician → Even if there are NO direct claims against the physician
- This is called “Vicarious Liability” and historically has been limited to situations where there is either an employer/employee relationship or proof that the actor (AA) was an agent of the MD
- There is a case that just was approved for review by Georgia Court of Appeals so we’ll see what the Court does with this, but it is a very big deal and important to continue to follow

APPORTIONMENT OF LIABILITY/DAMAGES

Alston & Bird, LLP v. Hatcher Management Holdings, LLC, 862 S.E.2D 295(2021)

- Supreme Court of Georgia Rules Apportionment to Nonparties Does Not Apply in Cases “Brought Against” One Defendant.
- Judiciary is “sticking it to” the legislature (and also defendants everywhere)

Georgia CVS Pharmacy, LLC v. Carmichael, 865 S.E.2D 559 (2021)

- Court of Appeals identifies case status at time of trial as controlling apportionment

- What does this mean for YOU/your practice?

THE TECHNOLOGY TRAP



ELECTRONIC MEDICAL RECORDS



- Defaults
- Auto-population (templates and timing)
- Corporate Witnesses
- Demands for Plaintiff Experts to Enter Hospital EMR

AUDIT TRAIL



- Audit Trail for EMR
- All Versions Reports
- All Access Reports
- Post Care Included

LOCATING TECHNOLOGY



LOCATING TECHNOLOGY



SOCIAL MEDIA ISSUES



OTHER TECH ISSUES



OTHER TECH ISSUES

CARDIOLOGIST

The patient is alive but very sick ... I guess you have learned not to trust that idiot [ER doctor].

HOSPITALIST

Most definitely. [ER doctor] is a moron and an embarrassment to my race.

OTHER TECH ISSUES



OTHER TECH ISSUES



- Direct Insulting Comments and Posts about Patients
- Indirect Posts/Comments about Patient Populations
 - Obesity Crisis
 - Opioid Abuse
 - Care of Illegal Immigrants/Uninsured
 - COVID

HIPAA and Lawsuits

- Under the current posture of the law in Georgia, you only are allowed to disclose protected patient information to YOUR lawyer or the lawyer representing the plaintiff.
- You cannot talk to defense counsel (without plaintiff's counsel present) unless you are given a copy of an authorization from the family or a court order allowing such communication.
- You are not obligated to talk to a plaintiff's attorney in private, and you should be careful when talking to anyone about a case.
- Depositions/Subpoenas for testimony.

Update on Medical Malpractice Law + Anesthesia Trends

L. EVAN CLINE

HUFF POWELL & BAILEY, LLC
999 PEACHTREE STREET NE
ATLANTA, GEORGIA 30309

H·P·B

HUFF POWELL BAILEY

**EMORY UNIVERSITY SCHOOL OF MEDICINE
STANDARD CURRICULUM VITAE**

Revised: 02/25/2021

1. Name:
Muhammad Yawar Jamal Qadri, MD PhD
2. Office Address:
550 Peachtree St, NE. MOT 12, Atlanta, Georgia, 30308
Telephone: 404.686.2410
3. E-mail Address: yawar.qadri@emory.edu
4. Current Titles and Affiliations:
 - a. Academic Appointments:
 - i. Primary Appointments:
Assistant Professor of Medicine, Emory University School of Medicine, Department of Anesthesiology, 07/2020
 - b. Other Administrative Appointments:
Associate Cancer Pain Director, Emory University School of Medicine, Department of Anesthesiology, Division of Pain Medicine, 12/2020
5. Previous Academic and Professional Appointments:
Assistant Professor, Duke University School of Medicine, 2016 - 2020
6. Licensures/Boards:
North Carolina Medical Board 2014 – 2020
American Board of Anesthesiology 2016 – 2026
Georgia Composite Medical Board 2020 – Present
7. Specialty Boards:
Pain Medicine, 09/2017, Raleigh,
8. Education:
1999 – 2003, BS Physics/Honors Program, The College of New Jersey, Trenton, NJ
2003 – 2011, MD/PhD, Physiology & Biophysics, University of Alabama School of Medicine, Birmingham, AL
9. Postgraduate Training:
Anesthesiology Residency, 2011 – 2015, University of North Carolina at Chapel Hill, Chapel Hill, NC. Supervisor: Harendra Arora, MD
Pain Medicine Fellowship, 2015 – 2016, Duke University, Durham, NC. Supervisor: David Lindsay, MD
10. Continuing Professional Development Activities:
Academy of Educators, UNC School of Medicine 2014 – 2015
11. Committee Memberships:
 - a. Institutional:

Patient Safety/Quality Improvement Committee, Department of Anesthesiology, UNC,
2013-2015
Performance Improvement Committee, Davis Ambulatory Surgical Center, Duke
Regional 2018 – 2020

12. Peer Review Activities:

a. Manuscripts:

Anesthesiology
Molecular Pain
Journal of Pain Research
Pain
American Journal of Physiology – Cell Physiology
Journal of Biological Chemistry
Journal of Cardiovascular Translational Research
Regional Anesthesia and Pain Medicine
Journal of Neuroinflammation
Frontiers in Neurology

b. Conference Abstracts:

i. National and International:

North American Neuromodulation Society, Las Vegas, NV 2018
North American Neuromodulation Society, Las Vegas, NV 2019
North American Neuromodulation Society, Las Vegas, NV 2020
North American Neuromodulation Society, Orlando, FL 2021

13. Consultantships/Advisory Boards:

Ziconotide Advisory Board, Jazz Pharmaceuticals, 2017

14. Honors and Awards:

Robert C. Byrd Honors Scholarship, 1999 – 2003
Edward J. Bloustein Distinguished Scholar, 1999 – 2003
New Jersey Outstanding Scholar, 1999 – 2003
Outstanding Graduate Student in the Department of Cellular and Molecular Physiology, 2010
Caduceus Club Travel Fellowship, 2011
Nominee, Anesthesiology 2012 - Best of Abstracts: Clinical Science, 2012
UNC Department of Anesthesia Resident Research Symposium, 3rd place presenter, 2013
FAER Resident Scholar (SNACC/ASA 2013), 2013
Most Outstanding Resident Researcher, Department of Anesthesiology, UNC, 2015
Duke Health Fellow, 2016
Cancer Pain Research Consortium Conference Top 3 Abstracts, 2016
The Interventional Cancer Pain Symposium, Best of conference poster, 2017

15. Society Memberships:

North American Neuromodulation Society
International Anesthesia Research Society
International Association for the Study of Pain
Georgia Society of Interventional Pain Physicians

16. Clinical Service Contributions:

First clinical usage of Bioness Stimrouter and Stimwave Freedom peripheral nerve stimulators at
Duke University

17. Formal Teaching:

- a. Graduate Programs:
 - i. Residency Programs:
 - Duke Anesthesiology, 2016-2020, supervised and educated residents training in OR anesthesia, inpatient pain, and chronic interventional pain, ~6 hours/week
 - ii. Fellowship Programs:
 - Duke Anesthesiology, 2016-2020, supervised and educated fellows training in inpatient pain and chronic interventional pain, ~12 hours/week
18. Supervisory Teaching:
- a. Residency Program:
 - Rebecca Donald, 2016-2017, Assistant Professor Vanderbilt University Medical Center*
 - b. Other: (e.g., tutorials, summer research, supervision of visiting scientists, etc.)
 - Missia Kohler, Summer Research, 2007-2008, Pathologist, Cook County Medical Examiners*
 - Alexander Chamessian, Nerve Injury and Pain Mechanisms Lab, Duke University, 2016-2020, Physiatry resident at Washington University at St Louis*
19. Lectureships, Seminar Invitations, and Visiting Professorships:
- a. National and International:
 - 1. Single-cell & Single Nuclei Transcriptomics of the Murine Spinal Cord: Implications for Nociception, Stanford, California, April 2018
 - b. Regional:
 - 1. UNC Pain Medicine fellowship: Intrathecal Pumps 101, Chapel Hill, NC January 2020
 - 2. UNC Pain Medicine fellowship: Management of Intrathecal Pumps, Chapel Hill, NC October 2020
 - c. Institutional:
 - 1. FRETting over the CFTR and ENaC association. CF Seminar Series. University of North Carolina at Chapel Hill, Chapel Hill, NC, May 2012
 - 2. Spinal cord physiology in mouse models of chronic pain, Durham, NC January 2017
 - 3. Duke Pain Medicine Fellowship: Urogenital Pain In Men, Durham, NC May 2017
 - 4. Duke Pain Medicine Fellowship: Urogenital Pain In Men, Durham, NC May 2018
 - 5. Duke Hospice and Palliative Care fellowship: Interventional Pain Options, Durham, NC August 2018
 - 6. Duke Hospice and Palliative Care fellowship: Interventional Pain Options, Durham, NC August 2019
 - 7. Duke Pain Medicine Fellowship: Neuropathic Pain, Durham, NC September 2019
 - 8. Emory Anesthesiology Grand Rounds: Interventional Cancer Pain: Stepping Off The Ladder, December 2020
20. Invitations to National/International, Regional, and Institutional Conferences:
- a. National and International:
 - 1. A Census of the Murine Spinal cord: Implications for Pain, Pain Mechanisms and Therapeutics Conference Taormina, Sicily, June 2018
 - b. Regional:
 - 1. Neurolytic procedures. 2016 Duke Pain Medicine's Cancer Pain, Palliative Care & End-Of-Life Conference. Chapel Hill, NC April 2016
 - 2. Peripheral Stimulation: The State of Neuromodulation for Pain 2017. Pain Society of the Carolinas Annual Meeting, Charleston, SC, December 2017

- c. Institutional:
 1. Spinal cord physiology in mouse models of chronic pain. Anesthesiology Research Conference, Durham, NC 01/2017
 2. *Interventional Therapies for Cancer Pain, Duke Pain Champion Meeting, Durham, NC June 2019*

21. Abstract Presentations at National/International, Regional, and Institutional Conferences:

- a. National and International:
 - i. ***Qadri YJ**, Bortsov AV, Swor RA, Peak DA, Jones JS, Rathlev NK, Lee DC, Domeier RM, Hendry PL, Mclean SA. Genetic polymorphisms in the Dopamine Receptor D2 are associated with acute pain severity after motor vehicle collision. Anesthesiology 2012 - Best of Abstracts: Clinical Science, Washington, D.C. 10/2012 (oral)
 - ii. *Sumrow B, Powell A, **Qadri MY**, Bortsov AV, Coombs RF. Approaches to Total Knee Arthroplasty at UNC: Multimodal Regional Anesthetics versus Monomodal General Anesthetics, ASRA 38th Annual Regional Anesthesia and Acute Pain Medicine Meeting, Boston, MA 5/2013 (poster)
 - iii. ***Qadri YJ**, Ganesh A, Rowan CC, Coombs RF. Rotation of Continuous Peripheral Nerve Catheters to Provide 18+ Days of Pain Relief. Anesthesiology 2013 – Medically Challenging Case, San Francisco, CA 10/2013 (poster)
 - iv. *Rice G, **Qadri Y**, Ravulapati J. Dexmedetomidine Sedation and High Degree AV-Block. Anesthesiology 2013 – Medically Challenging Cases, San Francisco, CA 10/2013 (poster)
 2. ***Qadri MY**, Shah G, Weyers E, Idiopathic Verapamil Sensitive Ventricular Tachycardia After Transhiatal Esophagectomy, IARS 2015 Annual Meeting and International Science Symposium, Honolulu, HI 03/2015 (poster)
 3. *Shah G, **Qadri MY**, Lupa C, Peripheral Nerve Block In A Child For Skin Grafting: Playing With Fire? IARS 2015 Annual Meeting and International Science Symposium, Honolulu, HI 03/2015 (poster)
 4. *Liu AY, Hu J, Platts-Mills TF, Lateef B, **Qadri YJ**, Wang HE, Velilla MA, Pearson C, Zimny E, Lewandowski C, Hendry PL, Damiron K, Domeier RM, Kaushik S, Feldman JA, Jones JS, Villard MA, McLean SA. Education status is not associated with opioid medication receipt among African American emergency department patients with acute pain. American Pain Society Meeting 2015, Palm Springs, CA 05/2015 (poster)
 5. *Lateef B, **Qadri MY**, Kumar P, Arora H. Unique Challenges in the Management of a Massive Ascending Aortic Pseudoaneurysm. Anesthesiology 2015 – Medically Challenging Cases, San Diego CA 10/2015 (poster)
 6. ***Qadri YJ**, Hendrickson M, Moyses D, Boortz-Marx R. Intrathecal drug delivery for malignant pediatric pain using an external pump. Poster. Cancer Pain Research Consortium Conference, Scottsdale AZ 04/2016 (poster)
 7. ***Qadri YJ**, Intrathecal drug delivery for malignant pediatric pain using an external pump. Cancer Pain Research Consortium Conference, Scottsdale AZ 04/2016 (oral)
 8. ***Qadri MY**, Chamessian A, Bruno K, Bleckner LL, McDuffie M, Buckenmaier CC, Buchheit T, Van de Ven T. Sciatic Nerve EXpression and Identification (SEXI) Analysis of Proteins in the Setting of Traumatic Amputation. Anesthesiology 2016, Chicago, IL 10/2016 (poster)
 9. *Brockbank B, **Qadri MY**, Boortz-Marx RL. Triple Toxicity - A Case Report of Inadvertent Intrathecal Pump Pocket Fill. Anesthesiology 2016 – Medically Challenging Cases, Chicago, IL 10/2016 (poster)
 10. ***Qadri YJ**, Boortz-Marx R. A Tale of Two Trials: The Case for Intrathecal Catheter Trials. NANS 2017. Las Vegas, NV, USA January 19-22, 2017 (poster)
 11. *Donald R, Millet Y, Runyon SL, Boortz-Marx RL, **Qadri YJ**. Chemotherapy-Induced Neuropathy of the Feet: Dorsal Root Ganglion Stimulation, Dorsal Column Stimulation, & Ultimately Ziconotide. The Interventional Cancer Pain Symposium, New York City, NY September 2017 (poster)

12. *Davies C, Hsia J, Ginsberg B, Millet Y, Kim B, Persaud J, Boortz-Marx RL, **Qadri YJ**. Ziconotide for Compression Fracture Pain and End-of-Life Care. The Interventional Cancer Pain Symposium, New York City, NY September 2017 (poster)
 13. *Persaud J, Davies C, Millet Y, Kim B, Carter J, Runyon S, Boortz-Marx RL, **Qadri YJ**. Sacral neuromodulation for fecal incontinence and rectal pain The Interventional Cancer Pain Symposium, New York City, NY September 2017. (poster)
 14. *Donald R.R., Millet Y., Runyon S.L., Boortz-Marx R.L., and **Qadri Y.J.** Chemotherapy induced neuropathy of the feet: Dorsal root ganglion stimulation, dorsal column stimulation, and ultimately ziconotide. American Society of Regional Anesthesia and Pain Medicine; Lake Buena Vista, Florida. November 2017 (poster)
- b. Regional:
1. ***Qadri Y**, Liver transplantation in a patient with moderate to severe portopulmonary hypertension: when to proceed versus cancel. *UNC/Duke Joint Liver Transplant Meeting*, Chapel Hill, NC 5/2014 (oral)
 2. ***Qadri YJ**, Southwell B, Moyse D, Roy LD, Runyon SL, Boortz-Marx RL. Isolated sixth nerve palsy following intrathecal catheter trial. *Pain Society of Carolinas Annual Meeting*, Greenville, SC 10/2015 (poster)
- c. Institutional:
1. ***Qadri YJ**, Ochoa R. Measuring glucose in aqueous solutions using Raman spectroscopy, Independent Study Presentations, The College of NJ, Trenton, NJ, 12/2001. (oral)
 2. ***Qadri YJ**, Ochoa R. Raman Studies of Amorphous Silica, Celebration of Student Achievement, The College of NJ, Trenton, NJ, 5/2002. (oral)
 3. ***Qadri YJ**, Ochoa R. Visualization of void growth during silica fracture, Independent Study Presentations, The College of NJ, Trenton, NJ, 12/2002. (oral)
 4. ***Qadri YJ**, Ochoa R. Searching for precursors of fracture in silica glass, Celebration of Student Achievement, The College of NJ, Trenton, NJ, 5/2003. (oral)
 5. ***Qadri YJ**, Benos DJ. The Interaction of Ibuprofen and Acid Sensitive Ion Channel 1, in the Context of Human Glioblastomas. Summer Physiology Seminar Series, University of Alabama at Birmingham, Birmingham, AL, 6/2006. (oral)
 6. ***Qadri YJ**. Characterizing the Interaction of Human Acid Sensing Ion Channel 1 with Ibuprofen, Summer Physiology Seminar Series, University of Alabama at Birmingham, Birmingham, AL, 6/2007, (oral)
 7. ***Qadri YJ**. Characterizing the Interaction of Human Acid Sensing Ion Channel 1 with Ibuprofen, Medical Scientist Training Program Retreat, University of Alabama at Birmingham, Birmingham, AL 7/2007, (poster)
 8. ***Qadri YJ**. Molecular Modeling of Acid Sensing Ion Channel 1, Graduate Student Research Day, University of Alabama at Birmingham, Birmingham, AL, 2/2008 (poster)
 9. ***Qadri YJ**. Molecular Modeling of Acid Sensing Ion Channel 1, Summer Physiology Seminar Series, University of Alabama at Birmingham, Birmingham, AL, 6/2008, (poster)
 10. ***Qadri YJ**, Sumrow B, Powell A, Bortsov AV, Coombs RF. Approaches to Total Knee Arthroplasty at UNC: Multimodal Regional Anesthetics versus Monomodal General Anesthetics, Department of Anesthesiology Resident Symposium, Chapel Hill, NC 3/2013 (poster)
 11. *Judd BJ, **Qadri MY**, Isaak RS, Arora HJ, Liver Transplantation in a Patient with Moderate Portopulmonary Hypertension: When to Proceed Versus Cancel. *Anesthesiology 2014 – Medically Challenging Cases*, New Orleans, LA, 10/2014 (poster)
 12. ***Qadri Y**, Genetic Polymorphisms in the Dopamine Receptor 2 (DRD2) Predict Acute Pain Severity after Motor Vehicle Collision. George F Sheldon UNC Resident Research Symposium, Chapel Hill, NC 5/2014 (oral)
 13. ***Qadri YJ**, Raghunathan K, Manning E, Pyati S. The Effect of Tourniquet Pressure on Tissue Oxygenation using the Oxyneurography Technique. Duke Anesthesiology's 24th Annual Academic Evening, Durham, NC 05/2016 (poster)

14. ***Qadri YJ**, Southwell B, Moyse D, Roy LD, Runyon SL, Boortz-Marx RL. Isolated sixth nerve palsy following intrathecal catheter trial. Duke Anesthesiology's 24th Annual Academic Evening, Durham, NC 05/2016 (poster)

22. Research Focus:

My PhD research focused on ion channel physiology using molecular, biophysics, and computational tools, but I gravitated towards human samples work later utilizing next generation transcriptomics and proteomics. My focus now is on advancing the interventional treatment of complex pain states, using my unique basic and clinical skillsets.

23. Grant Support:

a. Active Support:

Federally Funded:

Co-Investigator, DOD, *Single Nucleus Expression Profiling of Human Sciatic Nerve After Traumatic Amputation: Predicting Pain and Functional Outcomes*, Peer Reviewed Medical Research Program Investigator-Initiated Research Award, \$1,431,182, 2019 – 2021

b. Previous Support:

PI, AMA Foundation Seed Grant, *Cyclooxygenases and flurbiprofen in glioblastoma pathophysiology*, 2007

PI, AMA Foundation Seed Grant, *Small molecule inhibitors of Acid-Sensing Ion Channel 1*, 2008

PI, North Carolina Translational and Clinical Sciences Institute \$2K Grants, *Tracking outcomes in pain patients using personal fitness devices* 2015

PI, FAER Research Fellowship Grant, *Assessing differential microglial activation states in acute and chronic pain*, 2016 – 2017

Mentee, Integrated Training in Anesthesiology Research (NIH T32 GM08600), 2016 – 2019

PI, Duke Health Fellow, 2016

Co-PI, Richard Materson ERF New Investigator Awards, *Uncovering the Molecular Pathogenesis of Acute Spinal Cord Injury in Humans using Single Cell RNA-seq*, 2018

PI, Medtronic Fellowship Grant Application, 2018

Sub-Investigator, Sorrento Pharmaceuticals, RTX clinical trial 2018 – 2019

Sub-Investigator, Senmur Pharmaceuticals C.L.E.A.R. clinical trial 2018-2019

24. Bibliography:

a. Published and Accepted Research Articles (clinical, basic science, other) in Refereed Journals:

1. Benos DJ, Bashari E, Chaves JM, Gaggar A, Kapoor N, LaFrance M, Mans, R, Mayhew DL, McGowan S, Polter A, **Qadri Y**, Sarfare S, Schultz K, Splittgerber R, Stephenson J, Tower C, Walton RG, Zotov A. The Ups and Downs of Peer Review. *Adv Physiol Educ.* 2007 Jun;31(2):145-52.
2. Meltzer RH, Kapoor N, **Qadri YJ**, Anderson SJ, Fuller CM, Benos DJ. Heteromeric assembly of acid sensitive ion channel and epithelial sodium channel subunits. *J Biol Chem.* 2007 Jul 5.
3. Berdiev BK, Cormet-Boyaka E, Tousson A, **Qadri YJ**, Oosterveld-Hut HM, Hong JS, Gonzales PA, Fuller CM, Sorscher EJ, Lukacs GL, Benos DJ. Molecular proximity of cystic fibrosis transmembrane conductance regulator and epithelial sodium channel assessed by fluorescence resonance energy transfer. *J Biol Chem.* 2007 Dec 14;282(50):36481-8. Berdiev BK, **Qadri YJ**, Benos DJ. Assessment of the CFTR and ENaC association. *Mol Biosyst.* 2009 Feb;5(2):123-7. PMC2666849
4. Bashari E, **Qadri YJ**, Zhou ZH, Kapoor N, Anderson SJ, Meltzer RH, Fuller CM, Benos

- DJ. Two PKC consensus sites on human acid-sensing ion channel 1b differentially regulate its function. *Am J Physiol Cell Physiol*. 2009 Feb;296(2):C372-84. PMC2643847
5. **Qadri YJ**, Berdiev BK, Song Y, Lipton HL, Fuller CM, Benos DJ. Psalmotoxin-1 docking to human acid sensing ion channel-1. *J Biol Chem*. 2009 Jun 26;284(26):17625-33. PMC2719401
 6. Kapoor, N, Bartoszewski R, **Qadri YJ**, Bebok Z, Bubien JK, Fuller CM, Benos DJ. Knockdown of ASIC1 and ENaC subunits inhibits glioblastoma whole cell current and cell migration. *J Biol Chem*. 2009 Sep 4;284(36):24526-41. PMC2782044 *cover figure
 7. **Qadri YJ**, Song Y, Fuller CM, Benos DJ. Amiloride docking to human acid sensing ion channel-1. *J Biol Chem*. 2010 Mar 26;285(13):9627-35. PMC2843212
 8. **Qadri YJ**, Cormet-Boyaka E, Rooj AK, Lee W, Parpura V, Fuller CM, Berdiev BK. Low Temperature and Chemical Rescue Affect Molecular Proximity of Δ F508-Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) and Epithelial Sodium Channel (ENaC). *J Biol Chem*. 2012 May 11;287(20):16781-90. PMC3351335
 9. **Qadri YJ**, Bortsov AV, Orrey DC, Swor RA, Peak DA, Jones JS, Rathlev NK, Lee DC, Domeier RM, Hendry PL, Mclean SA. Genetic Polymorphisms in the Dopamine Receptor 2 Predict Acute Pain Severity after Motor Vehicle Collision. *Clin J Pain*. 2014 Nov 3.
 10. **Qadri YJ**, Kumar PA, Lateef B, Arora H. An Unusual Presentation of a Mediastinal Mass. *J Cardiothorac Vasc Anesth*. 2015 Jul 9. pii: S1053-0770(15)00677-1. doi: 10.1053/j.jvca.2015.07.005.
 11. Chamesian AG, **Qadri YJ**, Cummins M, Hendrickson M, Berta T, Buchheit T, Van de Ven T. 5-Hydroxymethylcytosine (5hmC) and Ten-eleven translocation 1-3 (TET1-3) proteins in the dorsal root ganglia of mouse: Expression and dynamic regulation in neuropathic pain. *Somatosens Mot Res*. 2017 Jun;34(2):72-79. doi: 10.1080/08990220.2017.1292237. Epub 2017 Mar 1. PMID: 28276837
 12. Chamesian A, Young M, **Qadri Y**, Berta T, Ji RR, Van de Ven T. Transcriptional Profiling of Somatostatin Interneurons in the Spinal Dorsal Horn. *Sci Rep*. 2018 May 1;8(1):6809. doi: 10.1038/s41598-018-25110-7. PMID: 29717160
 13. Yahara Y, Barrientos T, Tang YJ, Puvindran V, Nadesan P, Zhang H, Gibson JR, Gregory SG, Diao Y, Xiang Y, **Qadri YJ**, Souma T, Shinohara ML, Alman BA. Erythromyeloid progenitors give rise to a population of osteoclasts that contribute to bone homeostasis and repair. *Nat Cell Biol*. 2020 Jan;22(1):49-59. doi: 10.1038/s41556-019-0437-8. Epub 2020 Jan 6. PMID: 31907410
 14. Billesberger LM, Fisher KM, **Qadri YJ**, Boortz-Marx RL. Procedural Treatments for Knee Osteoarthritis: A Review of Current Injectable Therapies. *Pain Res Manag*. 2020 Feb 18;2020:3873098. doi: 10.1155/2020/3873098. eCollection 2020. PMID: 32148599
 15. Fudim M, **Qadri YJ**, Waldron NH, Boortz-Marx RL, Ganesh A, Patel CB, Podgoreanu MV, Sun AY, Milano CA, Tong BC, Harpole DH Jr, Mathew JP, Piccini JP. Stellate Ganglion Blockade for the Treatment of Refractory Ventricular Arrhythmias. *JACC Clin Electrophysiol*. 2020 May;6(5):562-571. doi: 10.1016/j.jacep.2019.12.017. Epub 2020 Feb 26. PMID: 32439042
 16. Fudim M, **Qadri YJ**, Ghadimi K, MacLeod DB, Molinger J, Piccini JP, Whittle J, Wischmeyer PE, Patel MR, Ulloa L. Implications for Neuromodulation Therapy to Control Inflammation and Related Organ Dysfunction in COVID-19. *J Cardiovasc Transl Res*. 2020 Dec;13(6):894-899. doi: 10.1007/s12265-020-10031-6. Epub 2020 May 26. PMID: 32458400
 17. Ganesh A, **Qadri YJ**, Boortz-Marx RL, Al-Khatib SM, Harpole DH Jr, Katz JN, Koontz JI, Mathew JP, Ray ND, Sun AY, Tong BC, Ulloa L, Piccini JP, Fudim M. Stellate Ganglion Blockade: an Intervention for the Management of Ventricular Arrhythmias. *Curr Hypertens Rep*. 2020 Oct 23;22(12):100. doi: 10.1007/s11906-020-01111-8. PMID: 33097982

b. Manuscripts Submitted:

c. Review Articles:

1. **Qadri YJ**, Rooj AK, Fuller CM. ENaCs and ASICs as therapeutic targets. *Am J Physiol Cell Physiol*. 2012 Apr;302(7):C943-65. PMC3330738
 2. Berta T, **Qadri YJ**, Chen G, Ji RR. Microglial Signaling in Chronic Pain with a Special Focus on Caspase 6, p38 MAP Kinase, and Sex Dependence. *J Dent Res*. 2016 Sep;95(10):1124-31. doi: 10.1177/0022034516653604. Epub 2016 Jun 15. Review. PMID: 27307048
 3. Berta T, **Qadri Y**, Tan PH, Ji RR. Targeting dorsal root ganglia and primary sensory neurons for the treatment of chronic pain. *Expert Opin Ther Targets*. 2017 Jul;21(7):695-703. doi: 10.1080/14728222.2017.1328057. Epub 2017 May 16. Review. PMID: 28480765
 4. Fudim M, Boortz-Marx R, Ganesh A, Waldron NH, **Qadri YJ**, Patel CB, Milano CA, Sun AY, Mathew JP, Piccini JP. Stellate ganglion blockade for the treatment of refractory ventricular arrhythmias: A systematic review and meta-analysis. *J Cardiovasc Electrophysiol*. 2017 Aug 18. doi: 10.1111/jce.13324. PMID: 28833780
 5. Chen G, Zhang YQ, **Qadri YJ**, Serhan CN, Ji RR. Microglia in Pain: Detrimental and Protective Roles in Pathogenesis and Resolution of Pain. *Neuron*. 2018 Dec 19;100(6):1292-1311. doi: 10.1016/j.neuron.2018.11.009. Review. PMID: 30571942
- d. Book Chapters:
1. **Qadri YJ**, Cormet-Boyaka E, Benos DJ, Berdiev BK. CFTR Regulation of Epithelial Sodium Channel. In: *Methods in Molecular Medicine: Cystic Fibrosis-Methods and Protocols*, Edited by Margarida D. Amaral and Karl Kunzelmann, Humana Press, Totowa, NJ, *Methods Mol Biol*. 2011;742:35-50.
- e. Book Reviews:
1. **Qadri YJ**, Roy LA. *Physical Diagnosis of Pain: an Atlas of Signs and Symptoms - 3rd Edition*. *Can J Anesth/J Can Anesth* (2016) 63: 1001. doi:10.1007/s12630-016-0670-6.
- f. Published Abstracts:
1. **Qadri Y**, Fuller CM, Benos DJ. Inhibition of hASIC-1b by Ibuprofen. *FASEB J*. 2007 21: 772.10
 2. Berdiev BK , Cormet-Boyaka E , Oosterveld-Hut R, Tousson A, Kovacs GG, **Qadri Y,C** Fuller, Lukacs G, and Benos DJ. Visualizing the CFTR and ENaC association in living cells. *FASEB J*. 2007 21:606.13
 3. **Qadri YJ**, Fuller CM, and Benos DJ. Molecular Modeling of Acid Sensing Ion Channels *FASEB J*. 2008 22:937.28
 4. Kohler ME, **Qadri YJ**, Fuller CM, and Benos DJ. Flurbiprofen Inhibits Glioblastoma Proliferation and Migration by a COX-Independent Mechanism. *FASEB J*. 2008 22:1168.2
 5. Berdiev BK, Tousson A, Oosterveld-Hut R, **Qadri YJ**, Cormet-Boyaka E, Hong JS, Fuller CM, Sorscher EJ, Lukacs GL, and Benos DJ. FRET assessment of CFTR molecular assembly. *FASEB J*. 2008 22:934.17
 6. **Qadri YJ**, Fuller CM, and Benos DJ. Molecular Modeling of Acid Sensing Ion Channels. *FASEB J*. 2008 22:937.28
 7. Kohler ME, **Qadri YJ**, Fuller CM, and Benos DJ. Flurbiprofen Inhibits Glioblastoma Proliferation and Migration by a COX-Independent Mechanism. *FASEB J*. 2009 23: 615.3
 8. **Qadri YJ**, Berdiev BK, Song Y, Lipton HL, Fuller CM, and Benos DJ. Psalmitoxin-1 docking to human Acid Sensing Ion Channel 1. *FASEB J*. 2009 23: 1000.3
 9. Berdiev BK, **Qadri YJ**, Tousson A, Oosterveld-Hut H, Hong JS, Fuller CM, Lukacs G, Benos DJ. Fluorescence Microscopy Assessment of CFTR Molecular Assembly, XXXVI International Congress of Physiological Sciences
 10. **Qadri YJ**, Song YH, Fuller CM, and Benos DJ. Small Molecule Inhibitors of Acid Sensing Ion Channel-1. *FASEB J*. 2010 24:608.11
 11. Khristoforov RR, **Qadri YJ**, Fuller CM, Benos DJ, Cormet-Boyaka E, Berdiev BK. CFTR regulation of epithelial Na⁺ channels. *Actual Problems of Modern Physiology and*

Biophysics. Tashkent State Technical University Press, Tashkent, p173, 2010.

12. Khristoforov RR, Rennolds J, **Qadri YJ**, Fuller CM, Benos DJ, Cormet-Boyaka E, Berdiev BK. DF508-CFTR and ENaC association. *J. Cyst. Fibrosis*, Volume 9, Supplement 1:S15, 2010.
13. Joung I, **Qadri YJ**, Lukacs GL, Berdiev BK. Probing the oligomeric state of CFTR. *J. Cyst. Fibrosis*, Volume 10, Supplement 1:S13, 2011.
14. Rennolds J, **Qadri YJ**, Khristoforov RR, Kapoor N, Fuller CM, Cormet-Boyaka E, Berdiev BK. Low temperature and chemical rescue affect the molecular proximity of DF508-CFTR and ENaC. *J. Cyst. Fibrosis*, Volume 10, Supplement 1:S13, 2011.
15. Rooj AK, Cormet-Boyaka E, Clark EB, **Qadri YJ**, Sorscher EJ, Fuller CM, Berdiev BK. Association of CFTR with ENaC subunits carrying Liddle's syndrome mutations. *Ped. Pulmonol.*, Suppl. 47, S35:245, 2012.
16. **Qadri YJ**, Boortz-Marx R. A Tale of Two Trials: The Case for Intrathecal Catheter Trials. NANS 2017. Las Vegas, NV, USA January 19-22, 2017

g. Other Publications:

1. Khristoforov RR, **Qadri YJ**, Fuller CM, Benos DJ, Cormet-Boyaka E, Berdiev BK. CFTR, ENaC, and Pathophysiology of Cystic Fibrosis. *The Uzbek Biological Journal, The Special Edition*, pp18-22, 2010
2. Boortz-Marx R, **Qadri MYJ**, Roy L, Pope JE, Deer TR, Runyon SL. Letter to the Editor: Through the Looking Glass: Specialty Influence on SCS Outcomes. *Neuromodulation: Technology At The Neural Interface*. Volume 20, Issue 7, October 2017, Pages: 740–741,
3. **Qadri YJ**, Ji RR. Dorsal root ganglia pulsed radiofrequency treatment alters the spinal immune environment. *Brain Behav Immun*. 2018 May;70:6-7. doi: 10.1016/j.bbi.2018.03.024. Epub 2018 Mar 21. Commentary. PMID: 29574259

25. Contributions Not Otherwise Noted:

MCAT Physics Instructor, TCNJ, 2002 – 2003

Physics Instructor, Summer Minority Medical Education Program, UAB, 2004

Introduction to Clinical Medicine Trainer, UAB, 2005 – 2007

Student Representative, Medical Scientist Training Program, UAB, 2006 – 2007

APS Physiology Understanding Week volunteer, Birmingham, AL, 2007

AUPN/ANA/NINDS Medical Students Mentoring Workshop, Washington, DC, 2007

Lecturer, Biomolecular Modeling, UAB, 2009

Communications Committee Chair, Medical Scientist Training Program, UAB, 2008 – 2010

NASA Aerospace Medicine Clerkship, Houston, TX, 2011

EPIC Super-user, UNC Hospitals, Chapel Hill, NC, 2014

Resident Recruitment Host, Department of Anesthesiology, UNC, 2013 – 2015

Medical Student Lecturer, Department of Anesthesiology, UNC, 2013 – 2015

Pain Medicine Fellowship Interviewer, Duke, 2018, 2019



EMORY
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Perioperative Analgesia: ERAS Analgesics and Beyond

Yawar J. Qadri, MD PhD

yawar.qadri@emory.edu

@Qadri_YJ



Outline

Summarize current medication options for optimizing perioperative analgesics

Describe novel medication agents for perioperative analgesia

Describe novel interventions for perioperative analgesia

Integrate patient and surgical factors for optimizing perioperative pain plans





Perioperative Analgesia

From the clinic to the PACU and beyond

Pain

An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage

Predictive Factors of Postoperative Pain After Day-case Surgery

Hans-Fritz Gramke, MD, Janneke M. de Rijke, PhD,† Maarten van Kleef, MD, PhD,*
Alfons G. H. Kessels, MD, MSc,‡ Madelon L. Peters, PhD,§ Michael Sommer, MD,*
and Marco A. E. Marcus, MD, PhD**

(Clin J Pain 2009;25:455–460)

Predictors of Acute Postoperative Pain After Elective Surgery

Michael Sommer, MD, Janneke M. de Rijke, PhD,* Maarten van Kleef, MD, PhD,*
Alfons G. H. Kessels, MD, MSc,† Madelon L. Peters, PhD,‡ José W. Geurts, MSc,*
Jacob Patijn, MD,* Hans-Fritz Gramke, MD,* and Marco A. E. Marcus, MD, PhD**

(Clin J Pain 2010;26:87–94)

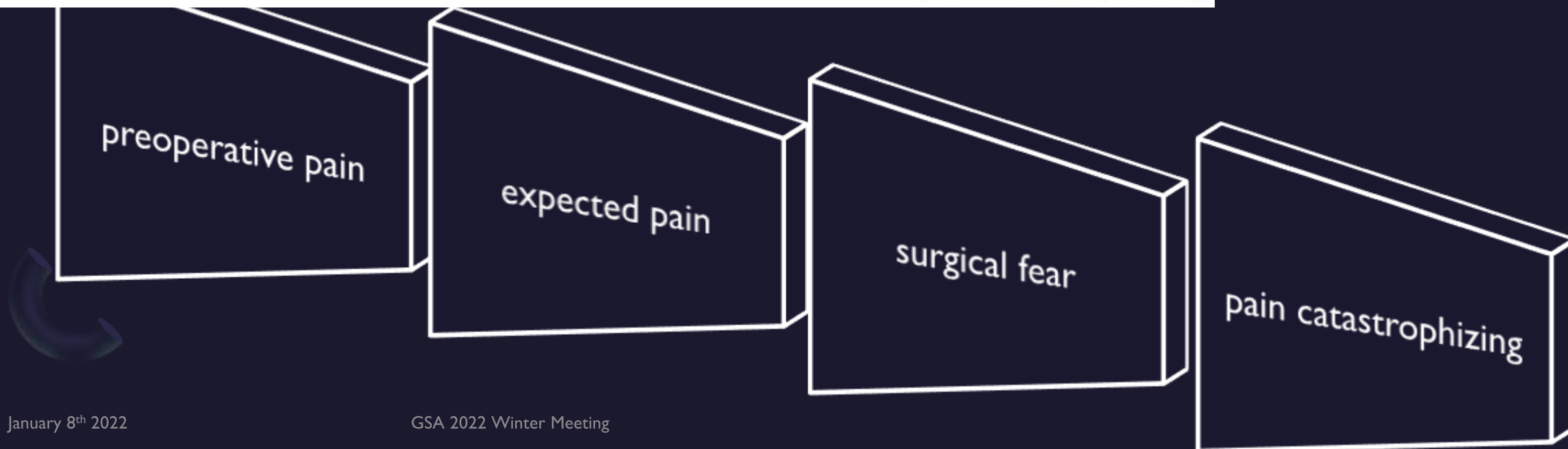
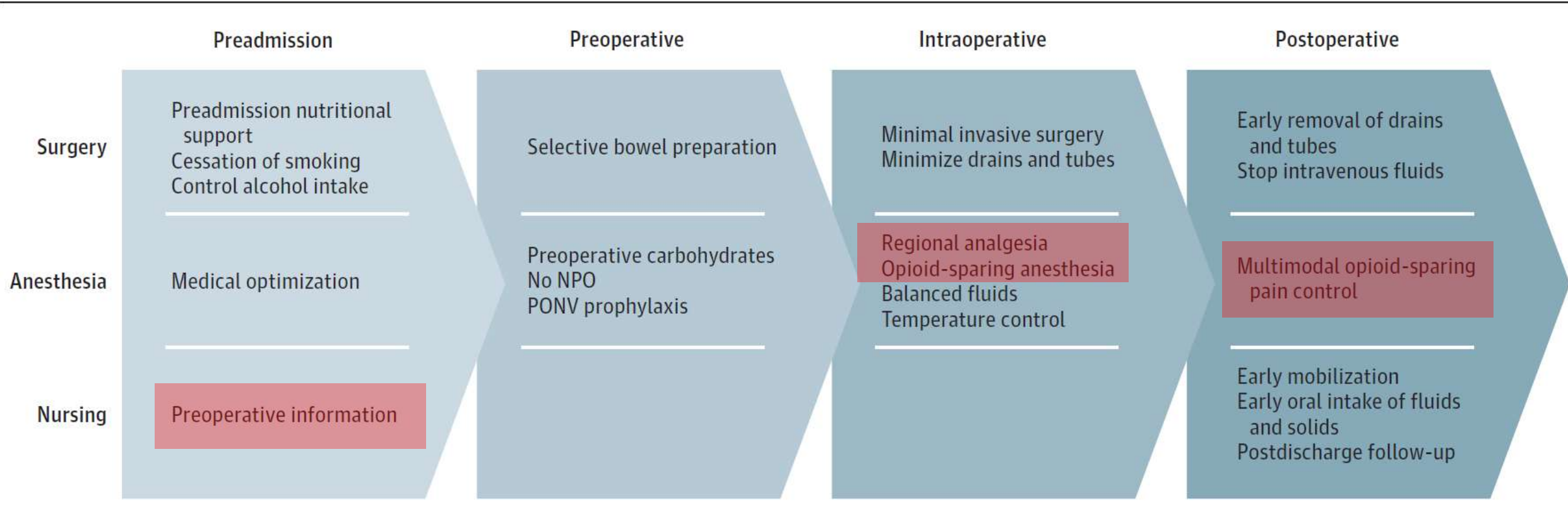


Figure. Enhanced Recovery After Surgery (ERAS) Flowchart



A typical ERAS flowchart overview indicating different ERAS protocol items to be performed by different professions and disciplines in different parts of the hospital during the patient journey. The wedge-shaped arrows depicting each time period move into the period to follow to indicate that all treatments given

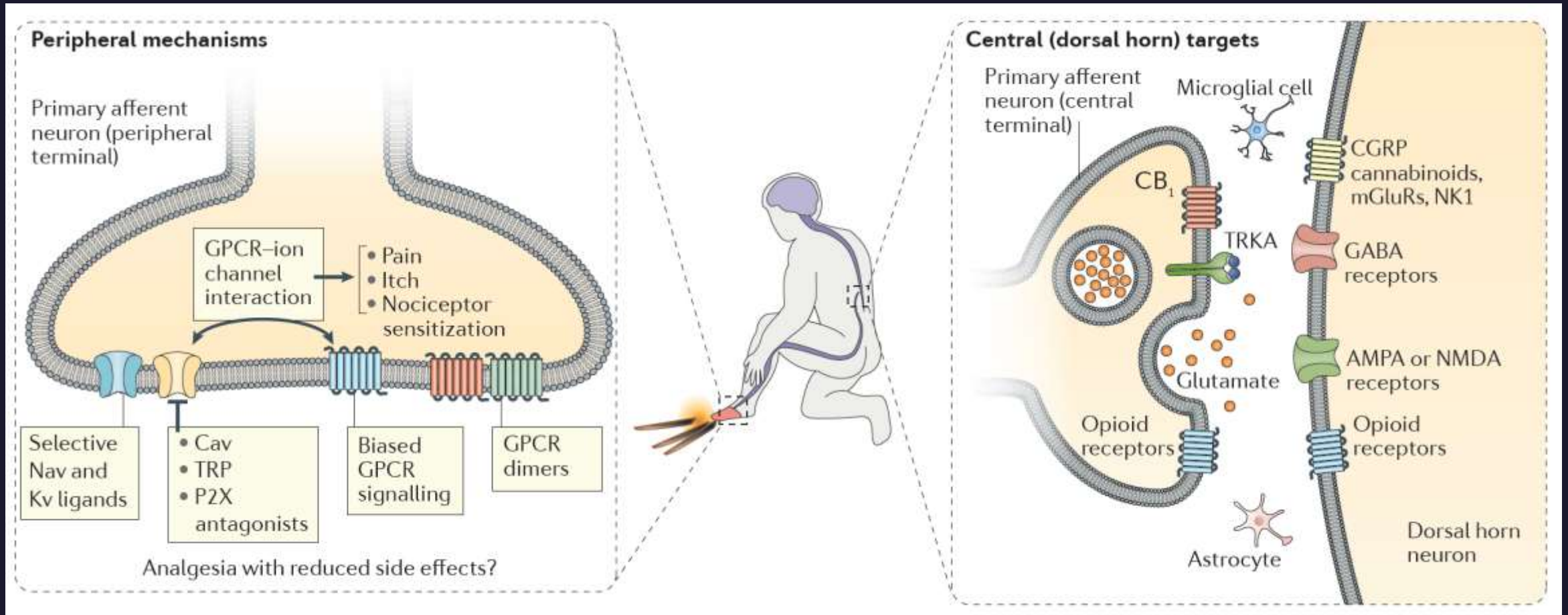
affect later treatments. No NPO indicates fasting guidelines recommending intake of clear fluids and specific carbohydrate drinks until 2 hours before anesthesia; PONV, postoperative nausea and vomiting. Reprinted with permission from Olle Ljungqvist, MD, PhD.

<https://pubmed.ncbi.nlm.nih.gov/28097305/>

Analgesic Medications



Analgesic Pathways



Yekkirala AS, Roberson DP, Bean BP, Woolf CJ. Nat Rev Drug Discov. 2017 Nov;16(11):810. doi: 10.1038/nrd.2017.202. Epub 2017 Oct 6.

Analgesic Medications

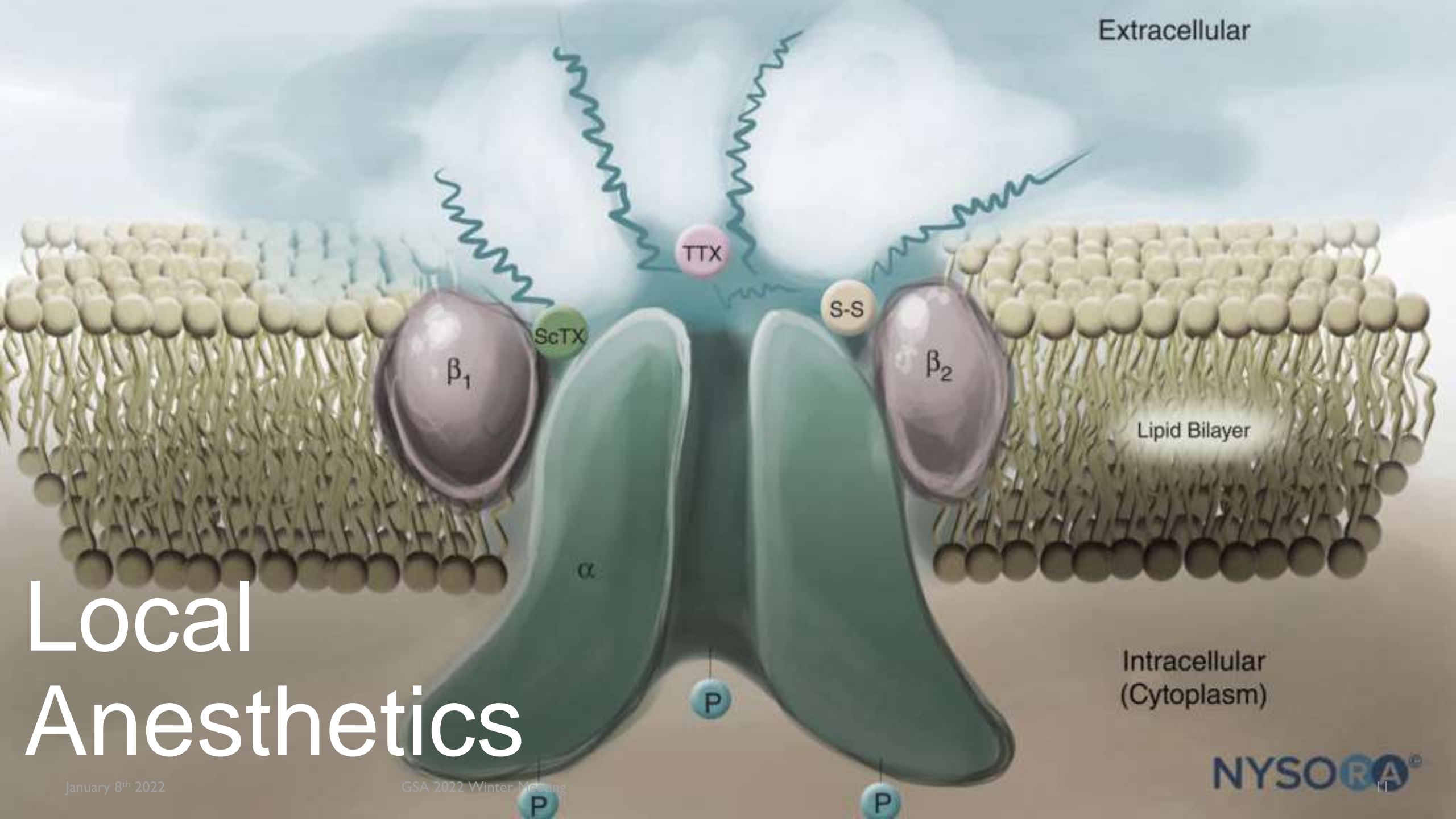
NON-CONTROLLED SUBSTANCES

- Local anesthetics
- Acetaminophen
- NSAIDs/Steroids
- Muscle relaxers
- Sympatholytics
- Atypical agents

CONTROLLED SUBSTANCES

- **Opioids**
- Ketamine
- Gabapentinoids
- Benzodiazepines

Local Anesthetics



Extracellular

Lipid Bilayer

Intracellular
(Cytoplasm)

Local Anesthetics



SURGICAL FIELD

- By surgical team
- Exparel (liposomal bupivacaine)
- Xaralcoll(bupivacaine gel)
- Zynrelef(bupivacaine/meloxicam)

REGIONAL BLOCKS

- Brachial plexus
- Sciatic
- Femoral
- Fascial plane blocks
 - TAP
 - ESP
 - PECS1/2
 - TTP
- Neuraxial


INTRAVENOUS

- Lidocaine infusions

Long lasting formulations



EXPAREL®

- Bupivacaine liposome injectable suspension
 - Indication:
single-dose infiltration for post-surgical anesthesia or interscalene brachial plexus nerve block for postsurgical regional analgesia
- 

XARALCOLL®

- Bupivacaine hydrochloride implant
- Indication:
postsurgical analgesia for up to 24h for open inguinal hernia repair

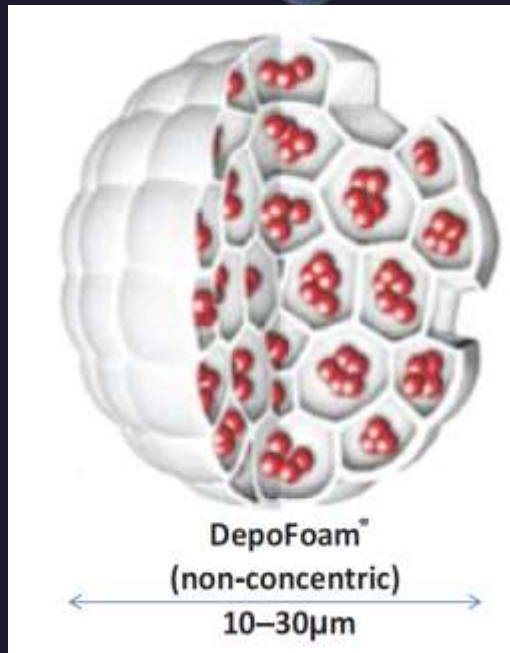
ZYNRELEF®

- Bupivacaine/meloxicam ER formulation
- Indication:
Soft tissue or periarticular instillation to produce postsurgical analgesia for up to 72 hours after foot and ankle, small-to-medium open abdominal, and lower extremity total joint arthroplasty surgical procedures.

Long lasting formulations

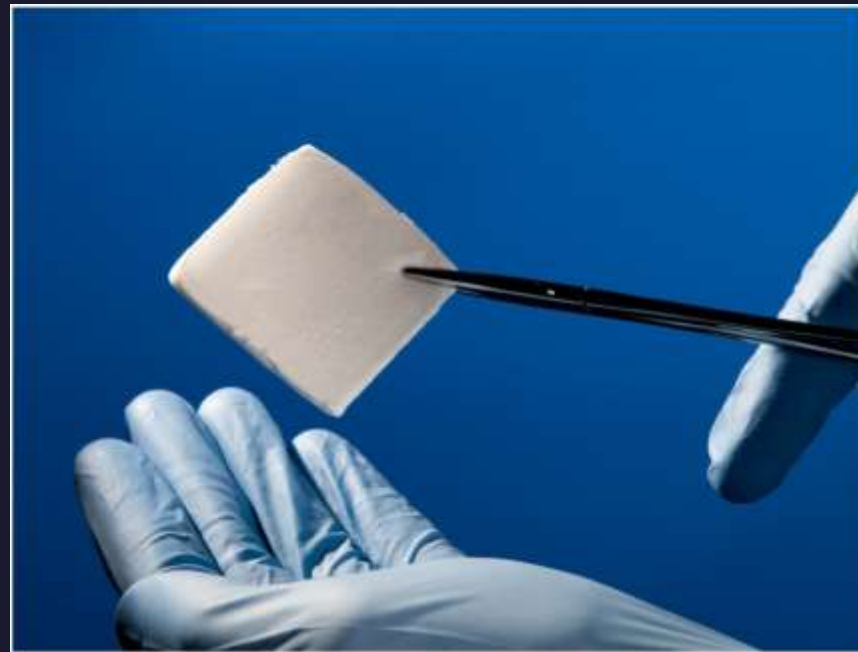
EXPAREL®

- Liposomes



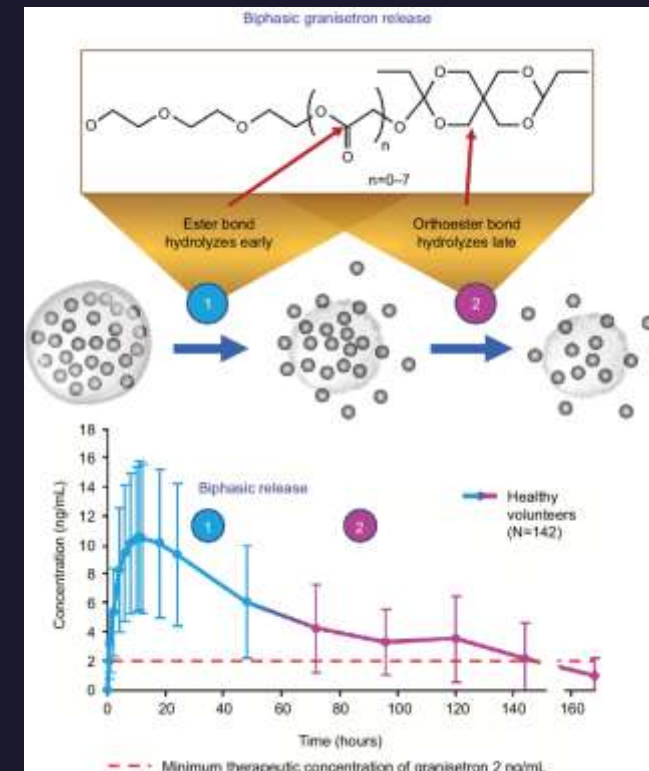
XARACOLL®

- Bovine collagen implant



ZYNRELEF®

- Polymer gel



PMID: 23049275

January 8th 2022

PMID: 23152696

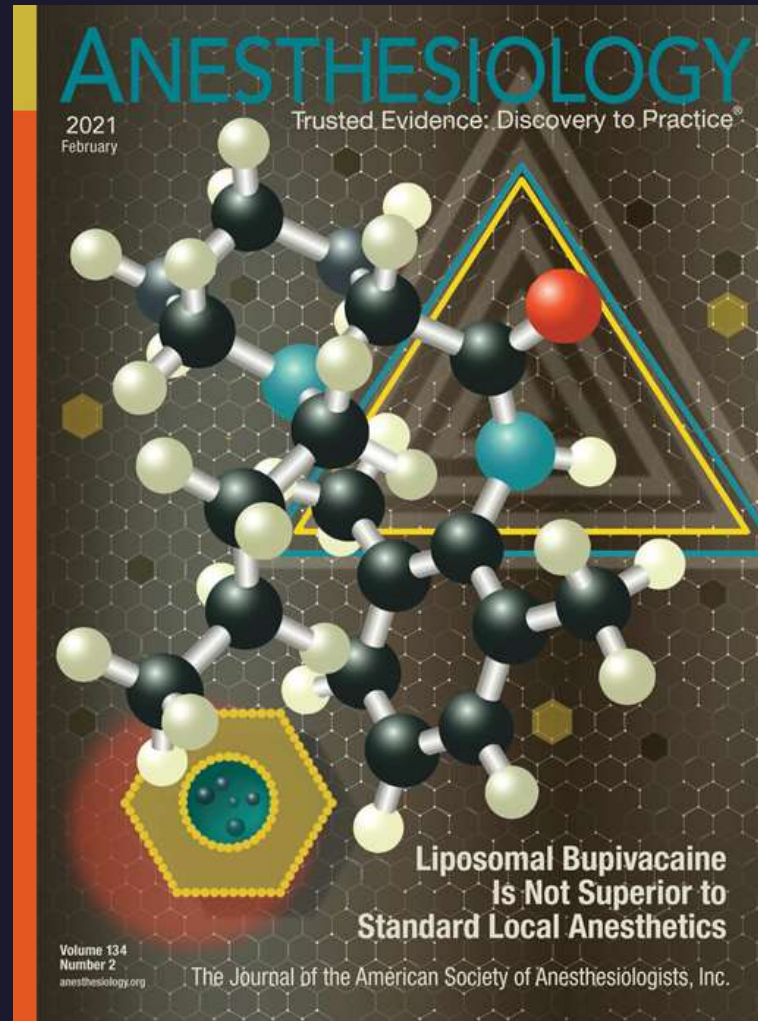
GSA 2022 Winter Meeting

PMID: 30013391

Long lasting formulations

EXPAREL®

- Expensive as compared to regular bupivacaine
- Unclear value



ZYNRELEF®

- Risk of NSAID systemic effects
- Limits local anesthetics for 96h
- Monitor for toxicity if using other NSAIDs

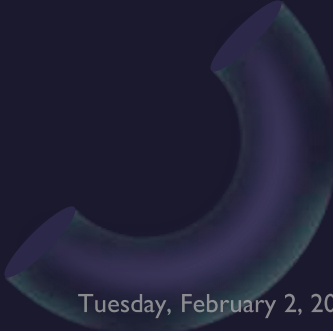
XARALCOLL®

- Placed by surgical team
- Limits local anesthetics for 96h

Local Anesthetics



SURGICAL FIELD

- By surgical team
 - Exparel (liposomal bupivacaine)
 - Xaralcoll(bupivacaine gel)
 - Zynrelef(bupivacaine/meloxicam)
- 

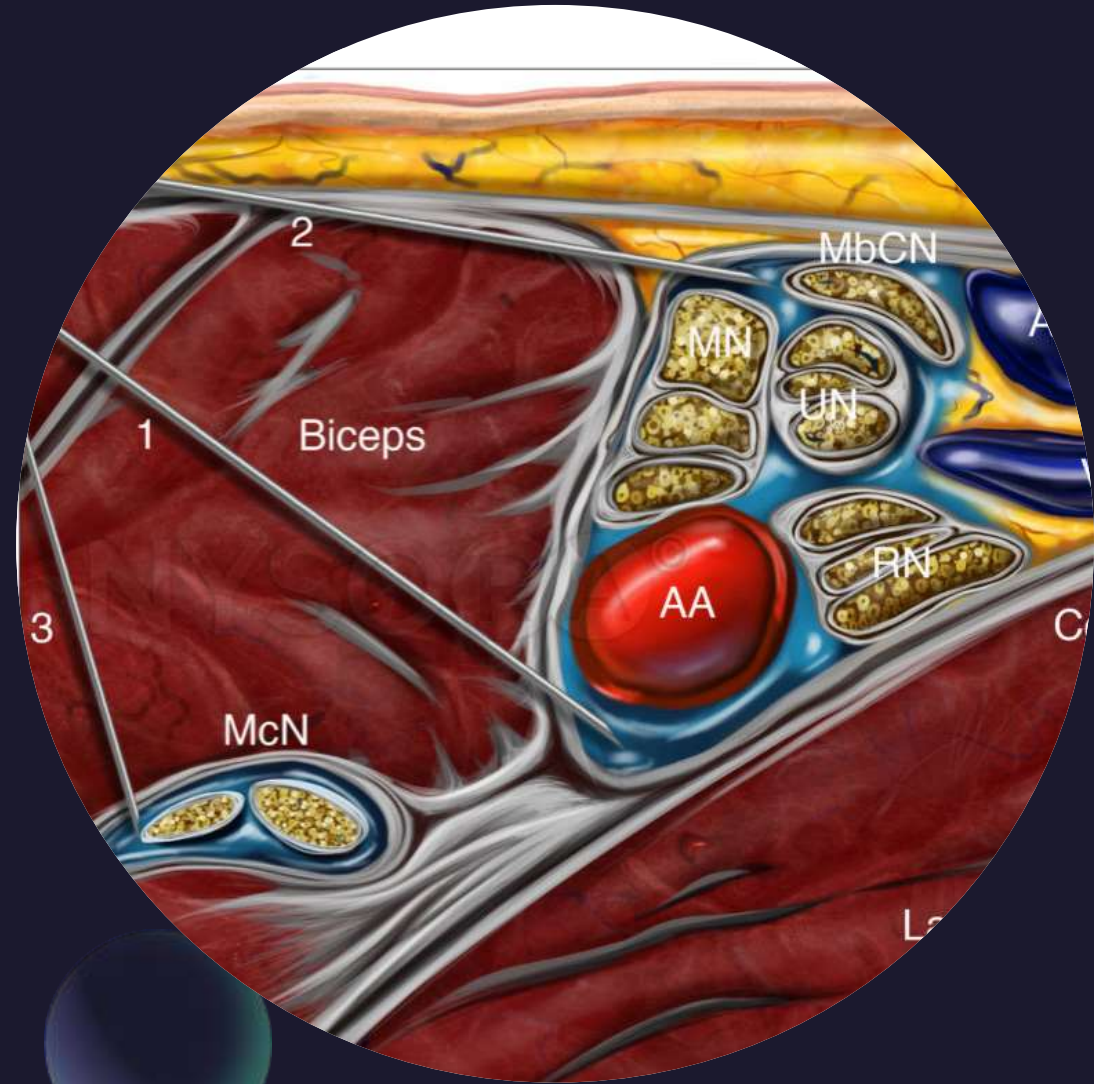
REGIONAL BLOCKS

- Brachial plexus
- Sciatic
- Femoral
- Fascial plane blocks
 - TAP
 - ESP
 - PECS1/2
 - TTP
- Neuraxials

INTRAVENOUS

- Lidocaine infusions


Regional Anesthesia Techniques



Regional Blocks



COMMON

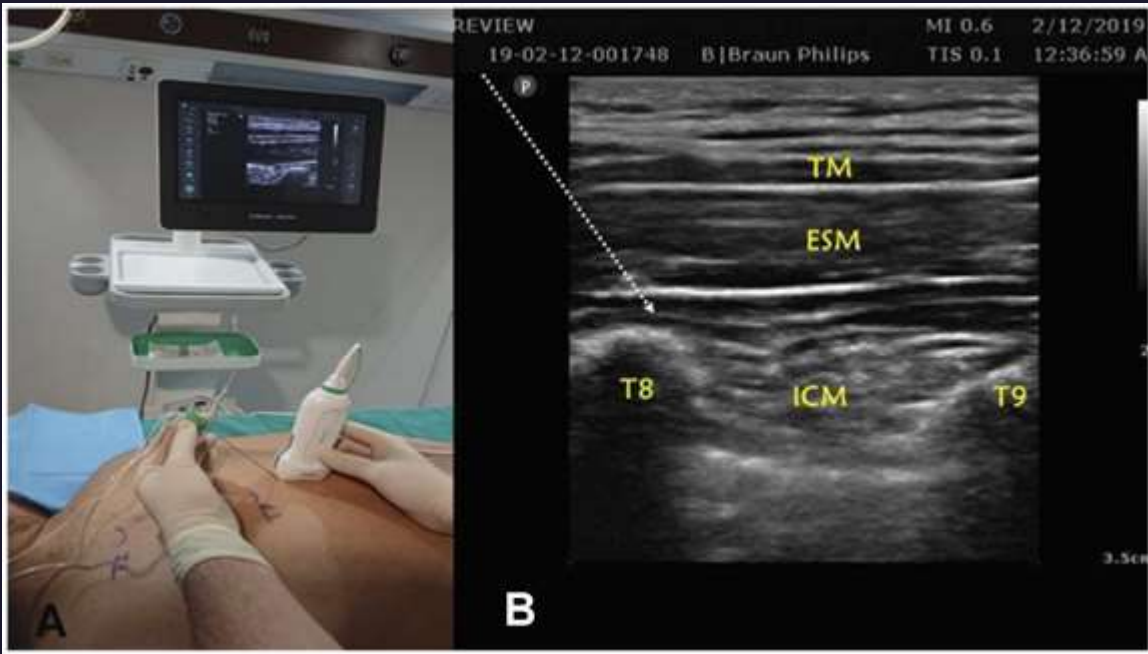
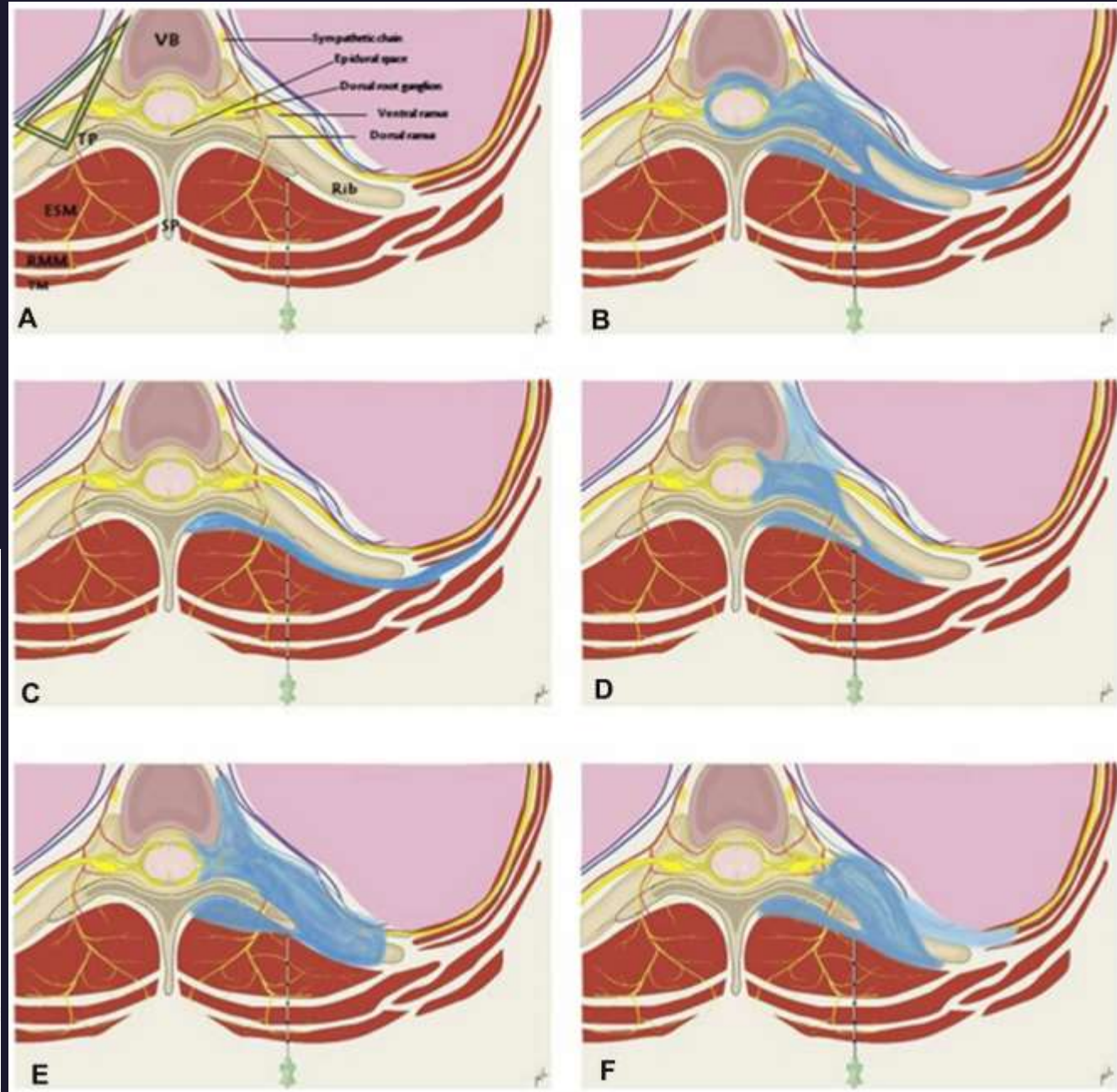
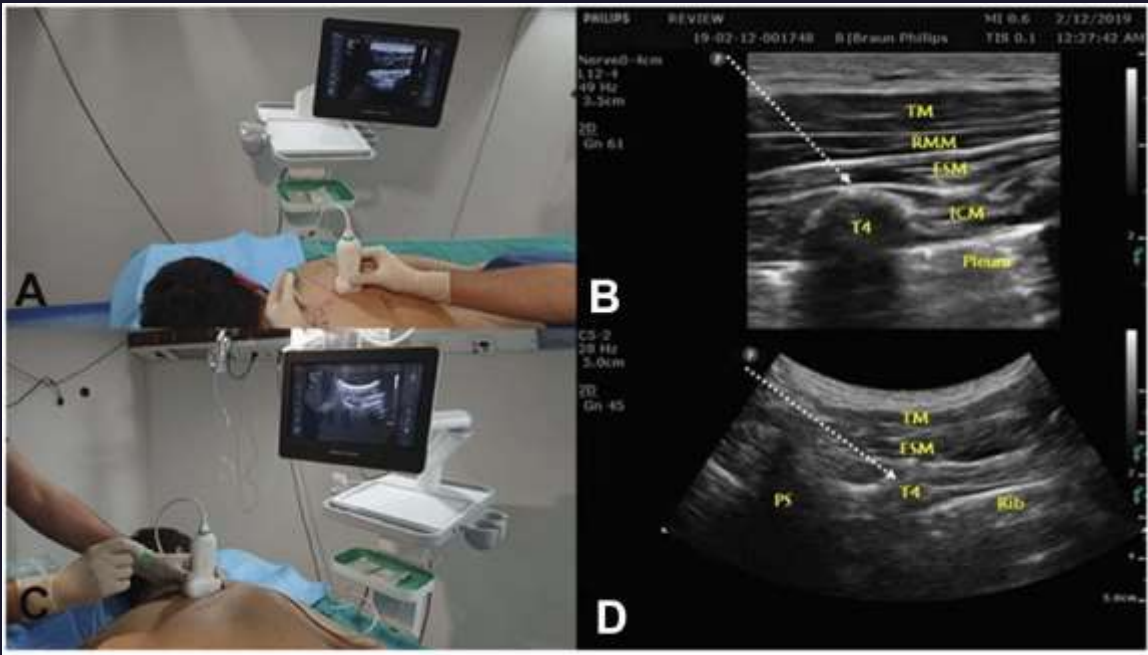
- Brachial plexus
 - Sciatic
 - Femoral
 - Transversus abdominal plane blocks
- 

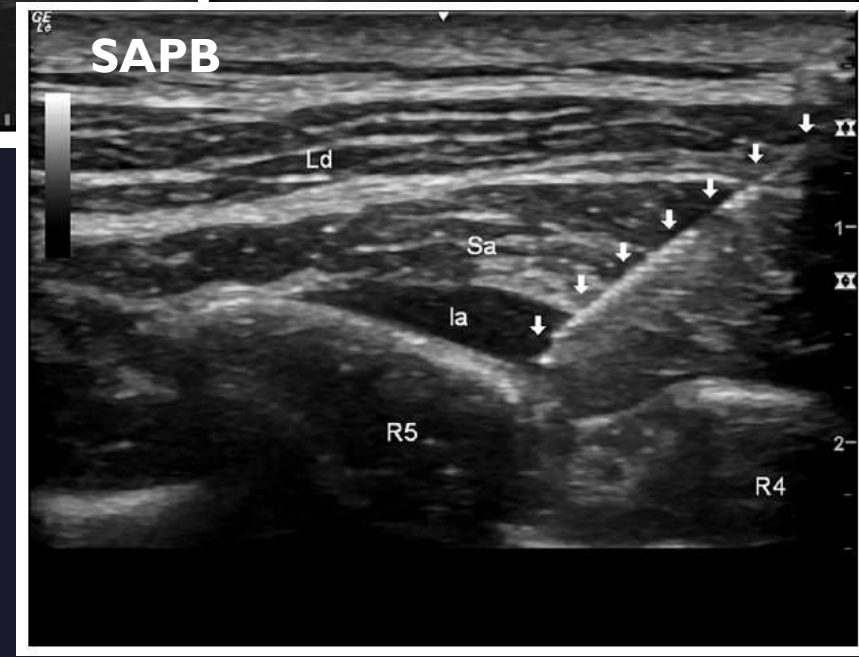
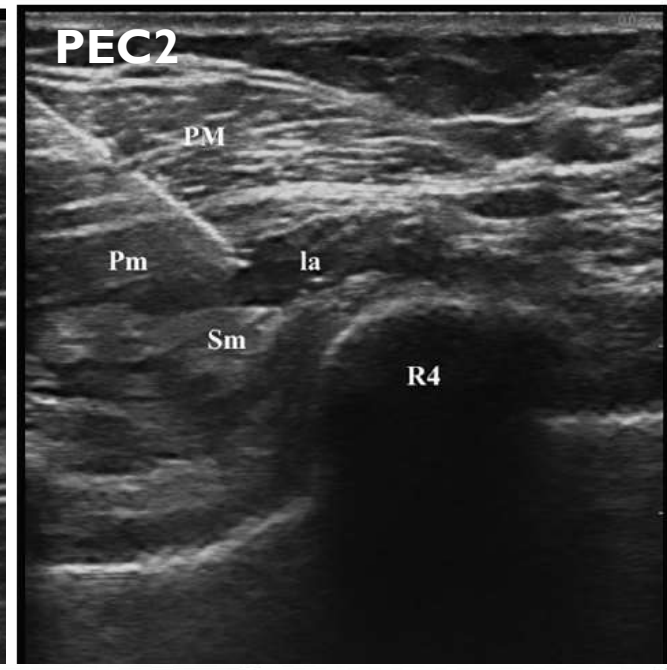
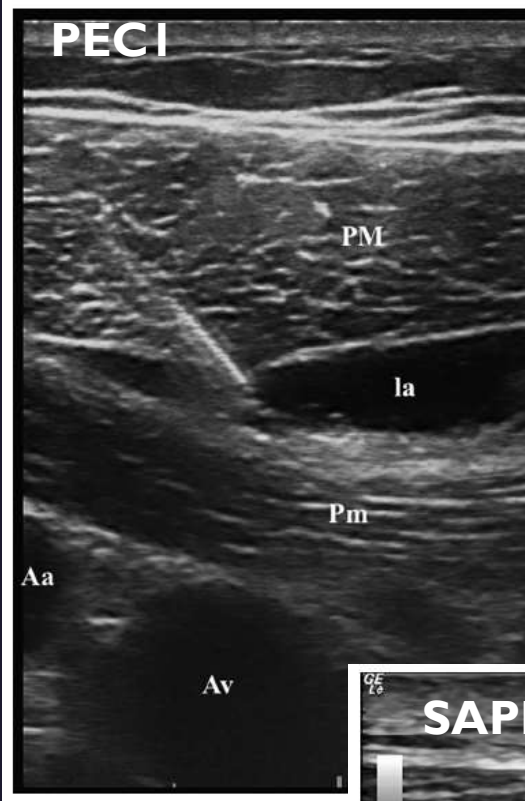
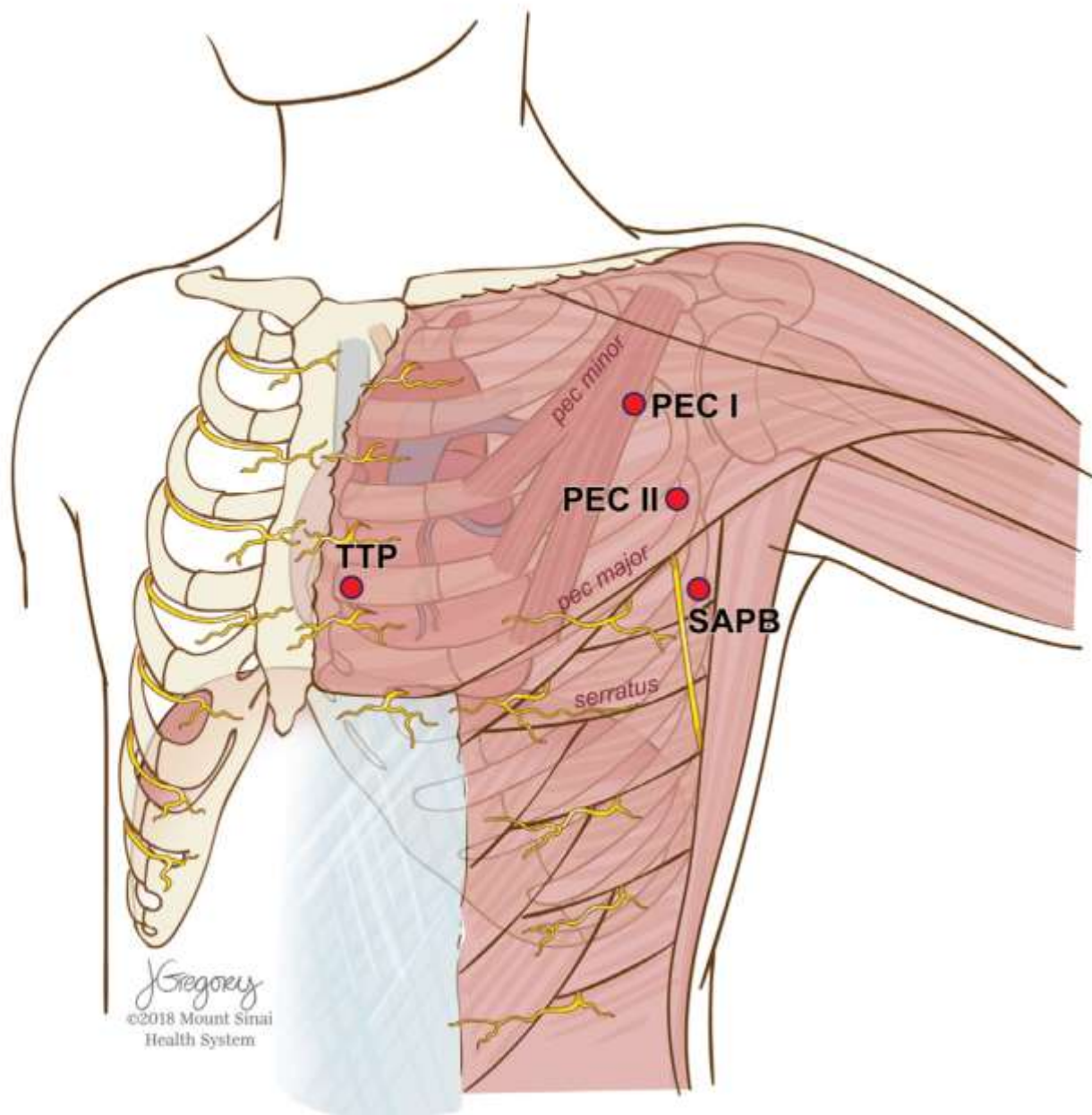
EASY TO LEARN

- Erector Spinae Plane Blocks
- PECS1/2 Blocks
- Serratus Anterior Plane
- Transversus Thoracic Plane
- PENG Block
- Genicular Nerve Blocks

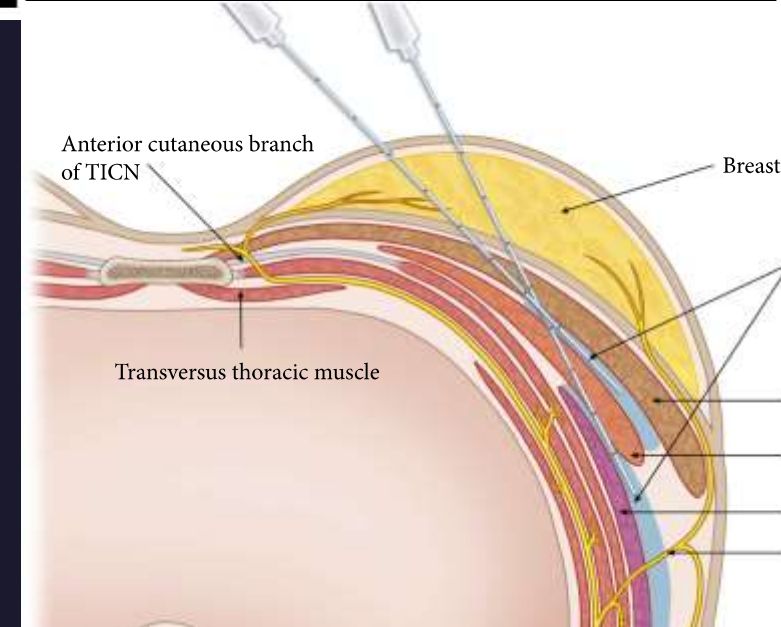
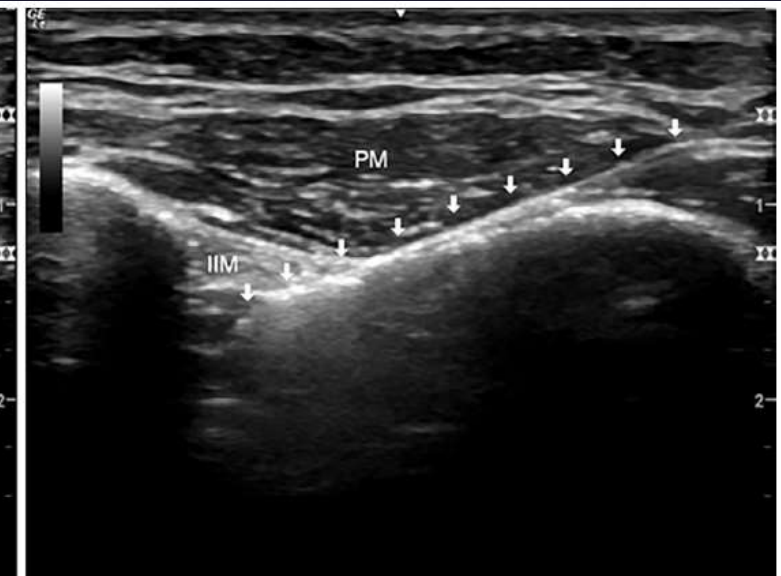
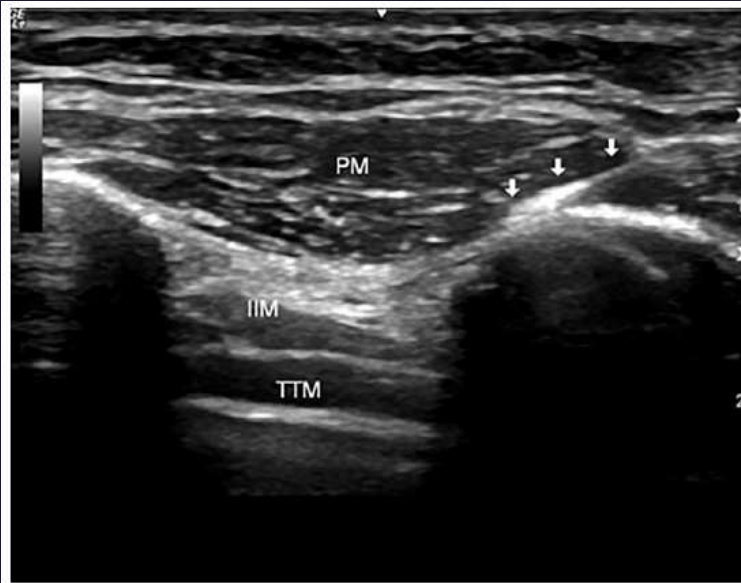
HARDER TO MASTER

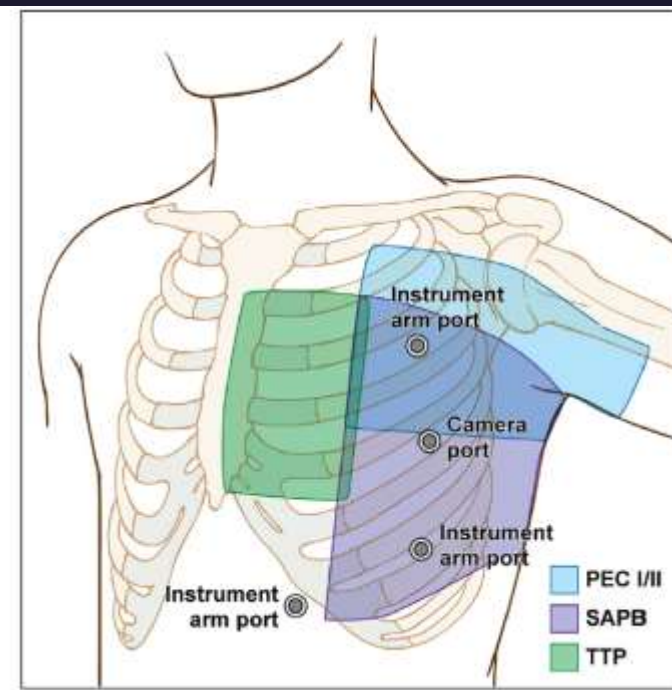
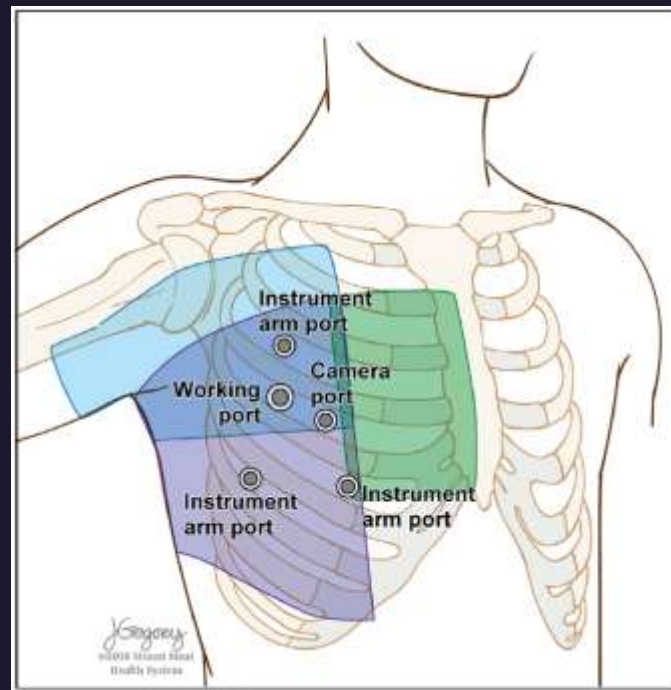
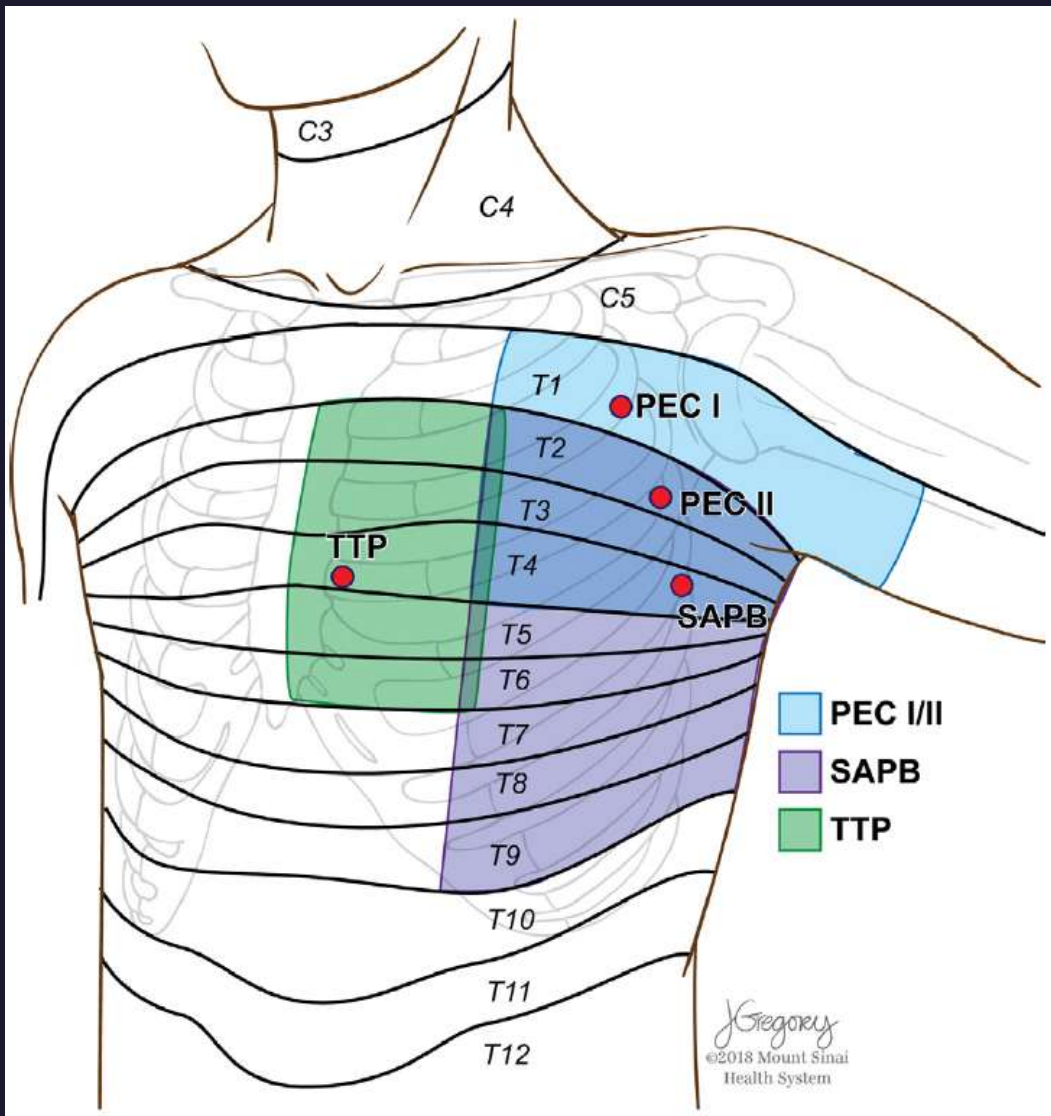
- Suprascapular Nerve Blocks
- Quadratus Lumborum Blocks





Transversus Thoracic Plane

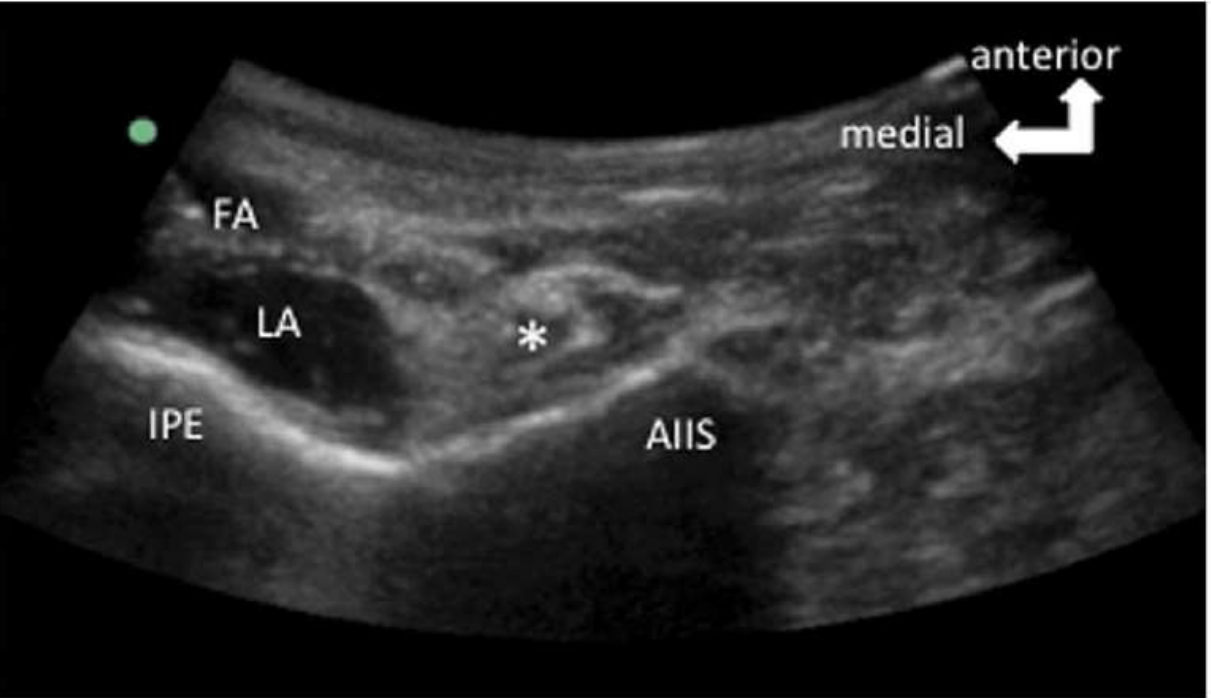
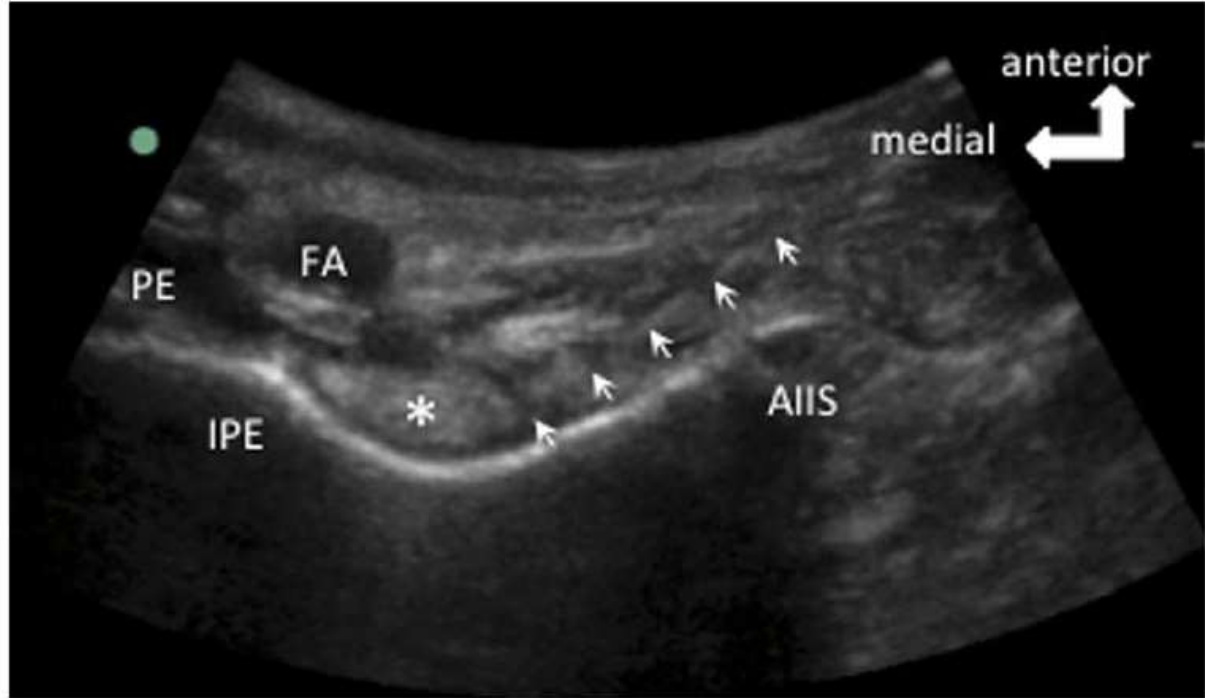




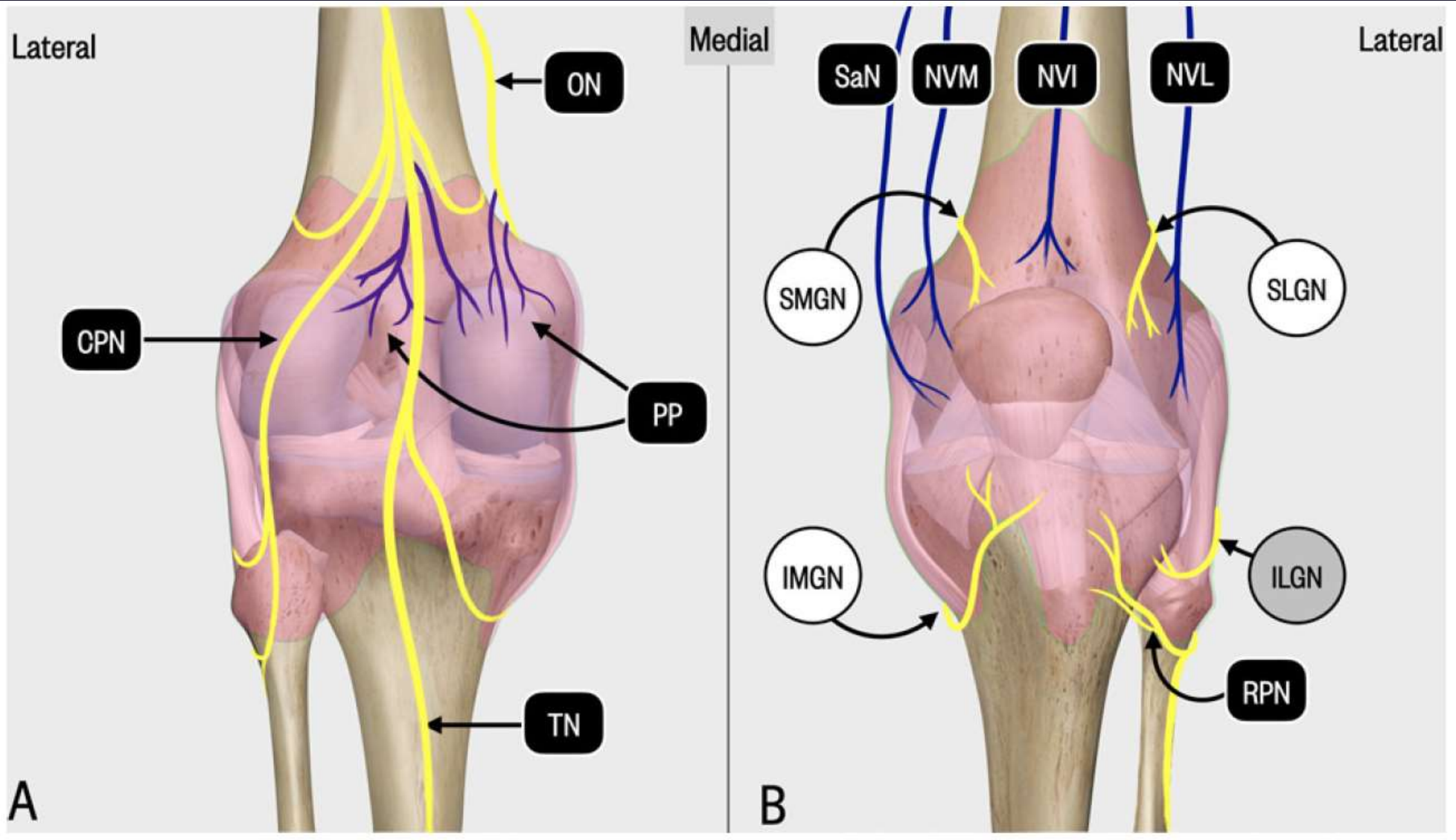
PMID: 30529177

PENG (PERicapsular Nerve Group) block

PMID: 30063657



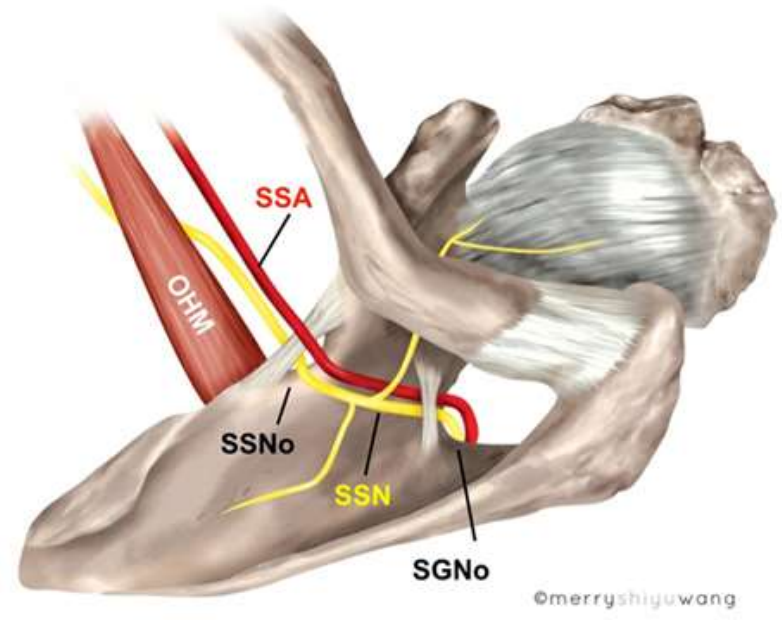
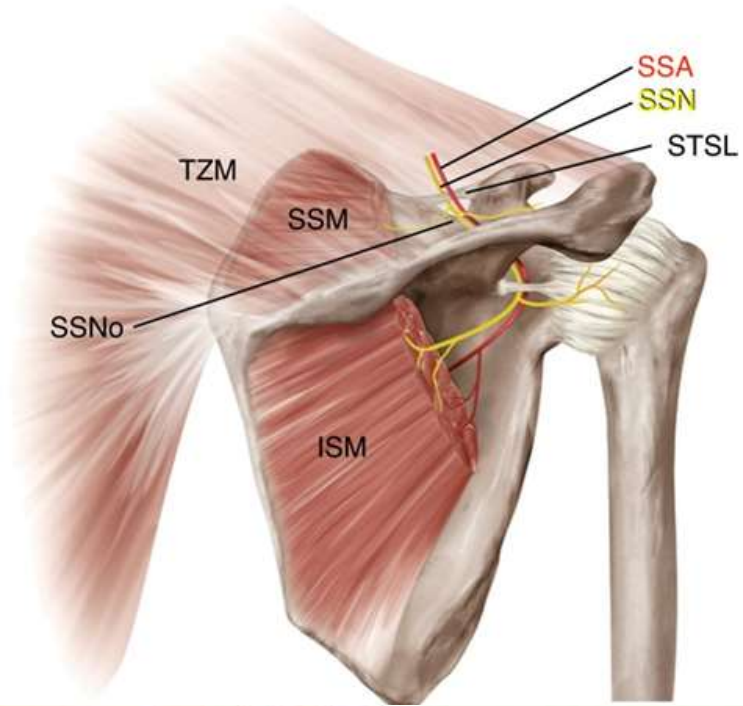
Genicular Nerve Blocks



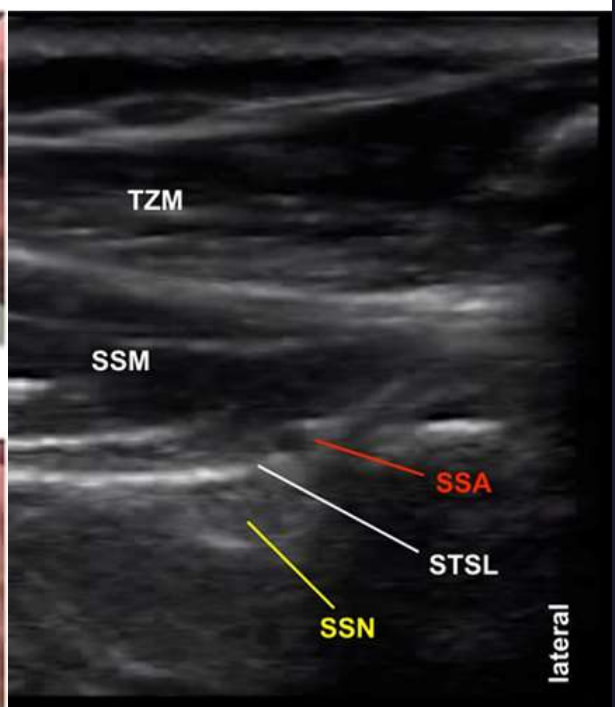
Genicular Nerve Blocks

PMID: 34261807

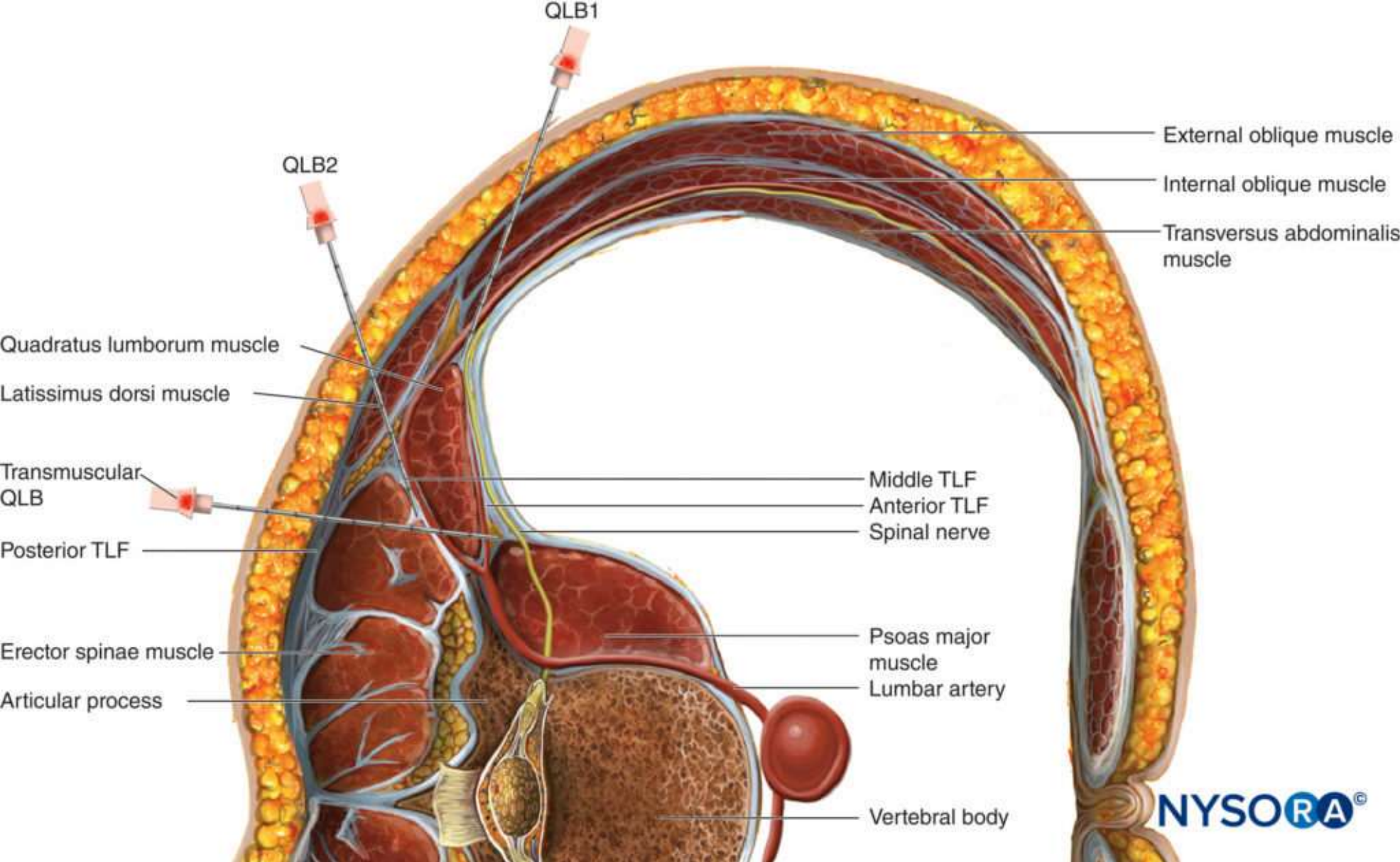




Suprascapular Nerve Block

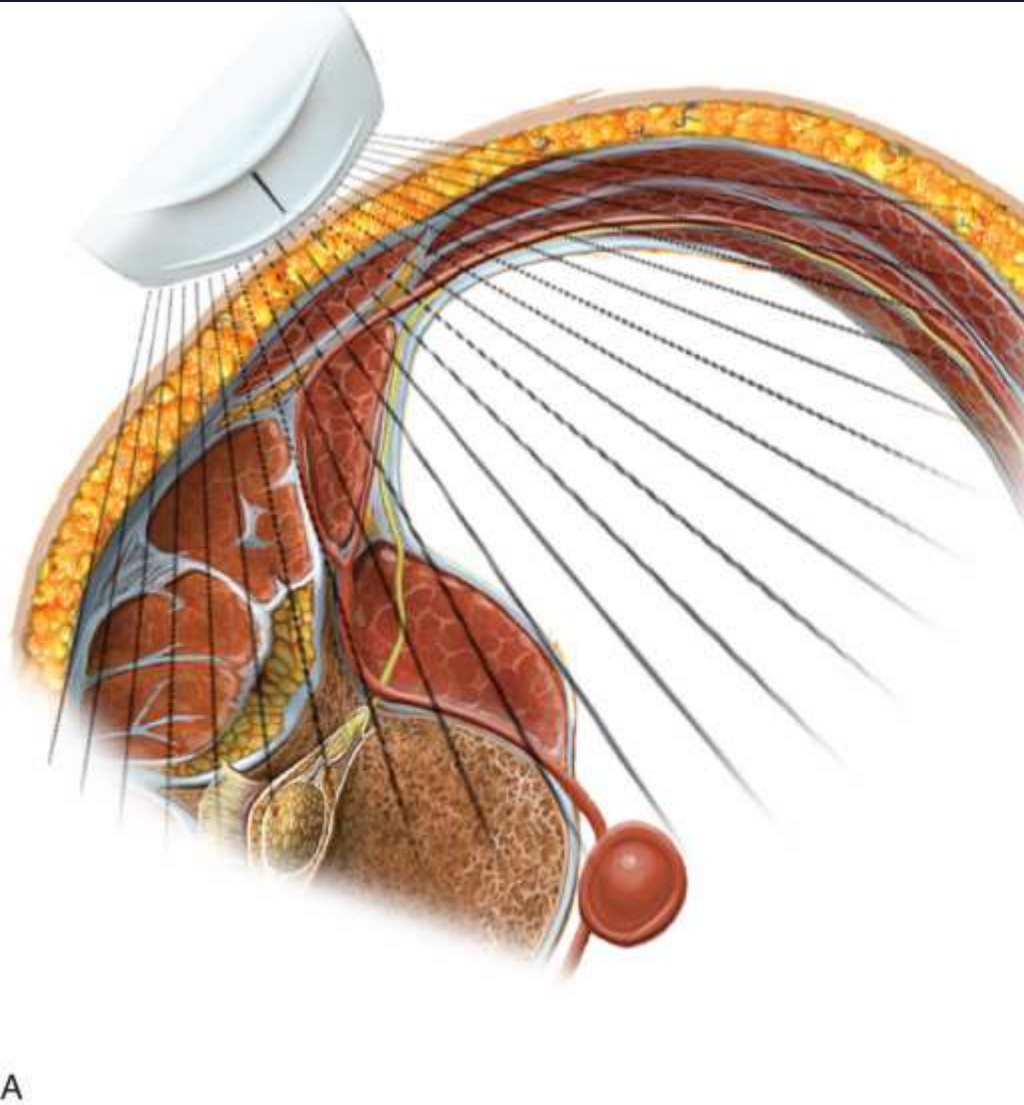


<http://www.usra.ca/pain-medicine/specific-blocks/peripheral-nerves/suprascapular.php>



Quadratus Lumborum Blocks

<https://www.nysora.com/regional-anesthesia-for-specific-surgical-procedures/abdomen/ultrasound-guided-transversus-abdominis-plane-quadratus-lumborum-blocks/>



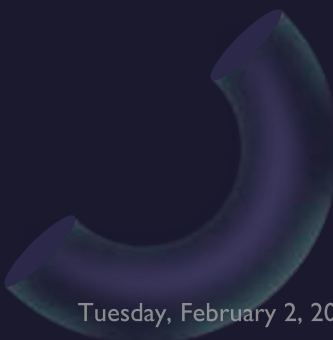
Quadratus Lumborum Blocks

<https://www.nysora.com/regional-anesthesia-for-specific-surgical-procedures/abdomen/ultrasound-guided-transversus-abdominis-plane-quadratus-lumborum-blocks/>

Local Anesthetics



SURGICAL FIELD

- By surgical team
 - Exparel (liposomal bupivacaine)
 - Xaralcoll(bupivacaine gel)
 - Zynrelef(bupivacaine/meloxicam)
- 

REGIONAL BLOCKS

- Brachial plexus
- Sciatic
- Femoral
- Fascial plane blocks
 - TAP
 - ESP
 - PECS1/2
 - TTP
- Neuraxials

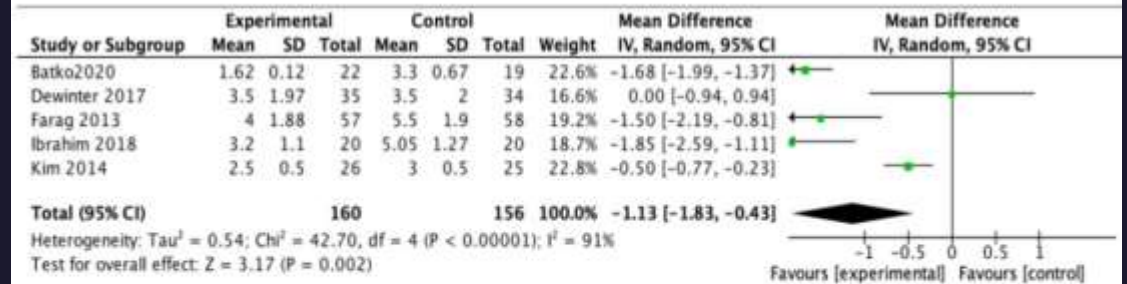
INTRAVENOUS

- Lidocaine infusions

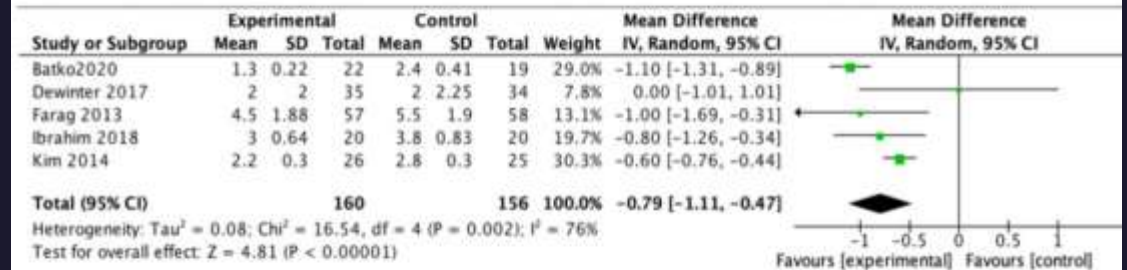
Intravenous Lidocaine

- Bolus 1.5 - 2 mg/kg
- Infusion 1.5 to 3 mg/kg/h
- “Perioperative intravenous lidocaine infusion consistently improves analgesic measures in adult and pediatric populations in the first 24 hours...”

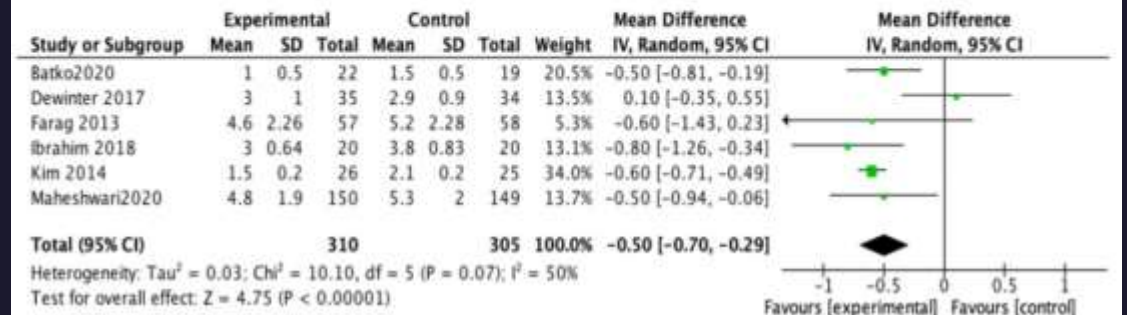
1a) 2 hours post-operatively;



1b) 4-6 hours post-operatively;



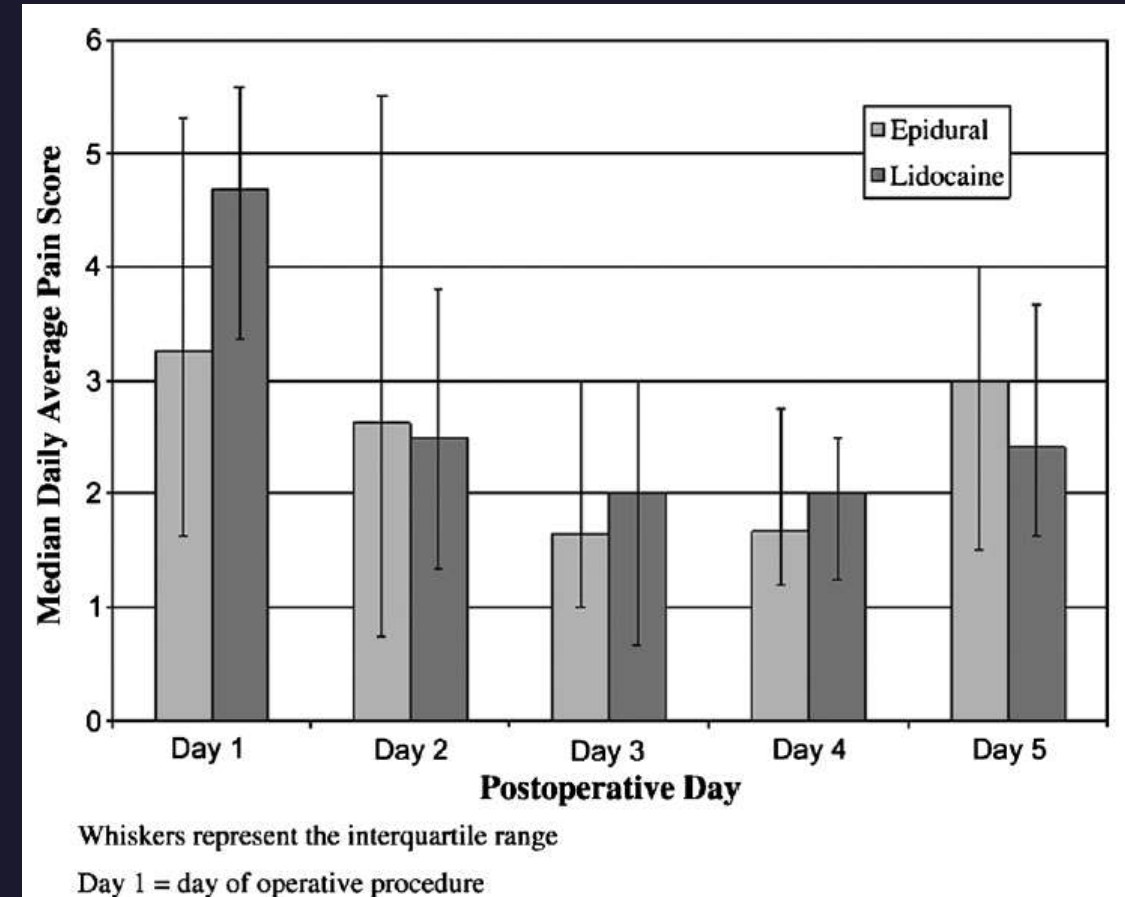
1c) 24 hours post-operatively;



PMID: 34196720

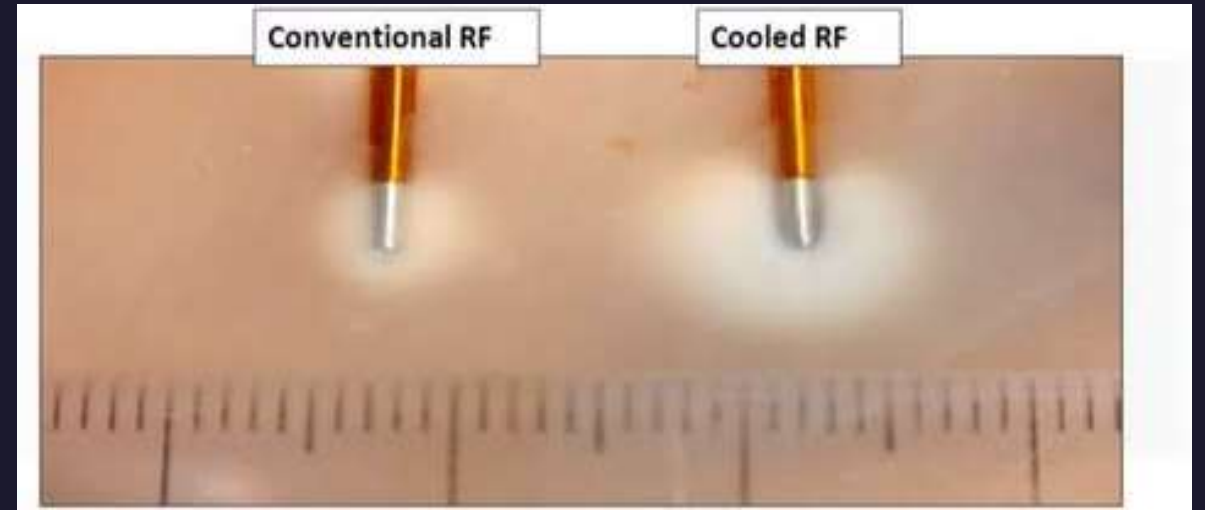
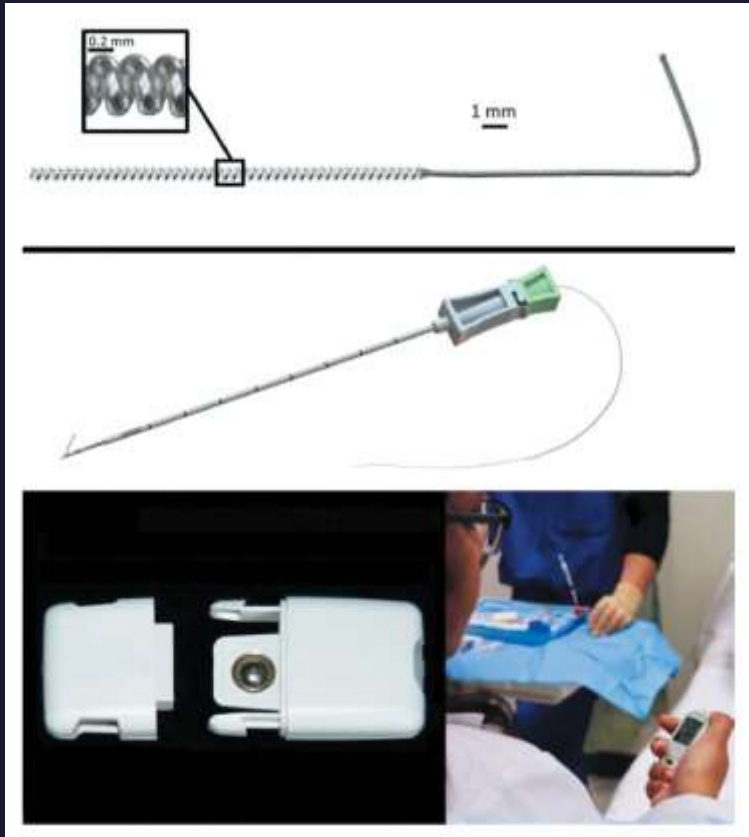
Intravenous Lidocaine

- RCT of IV vs Epidural Local Anesthetic
- Similar outcomes
- Small samples, non-inferiority design



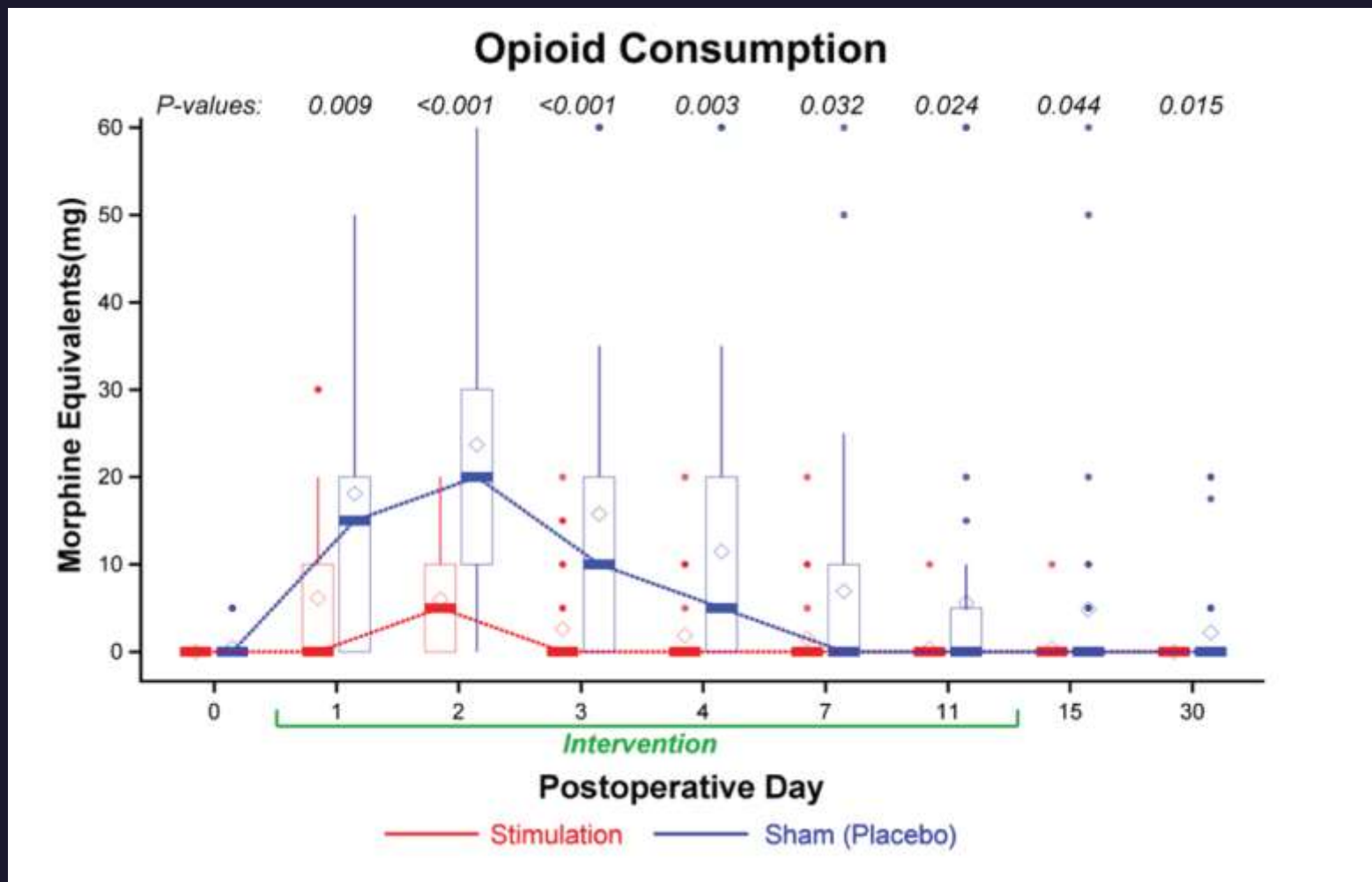
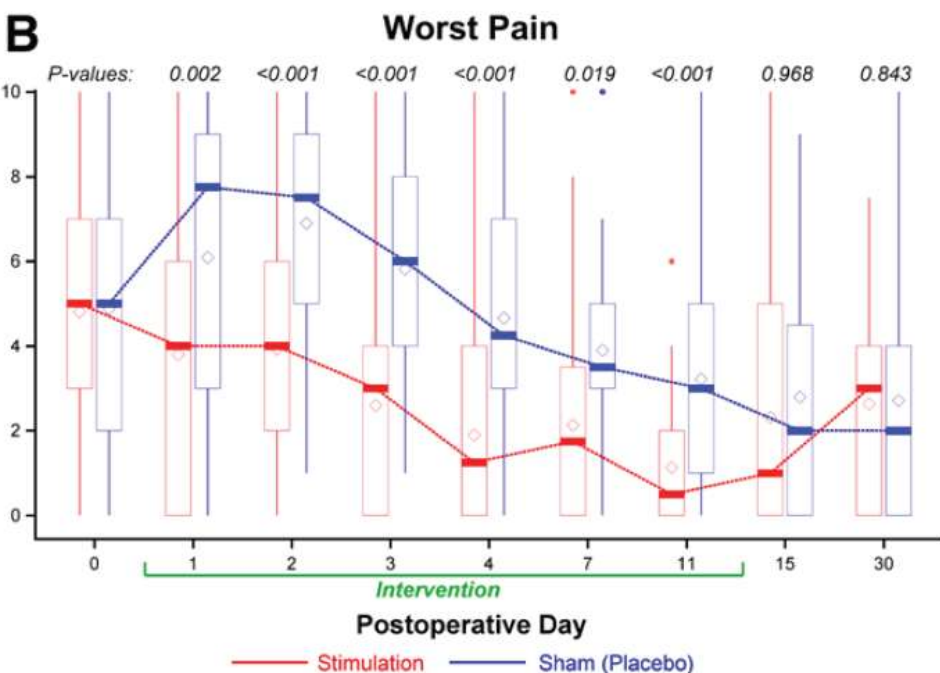
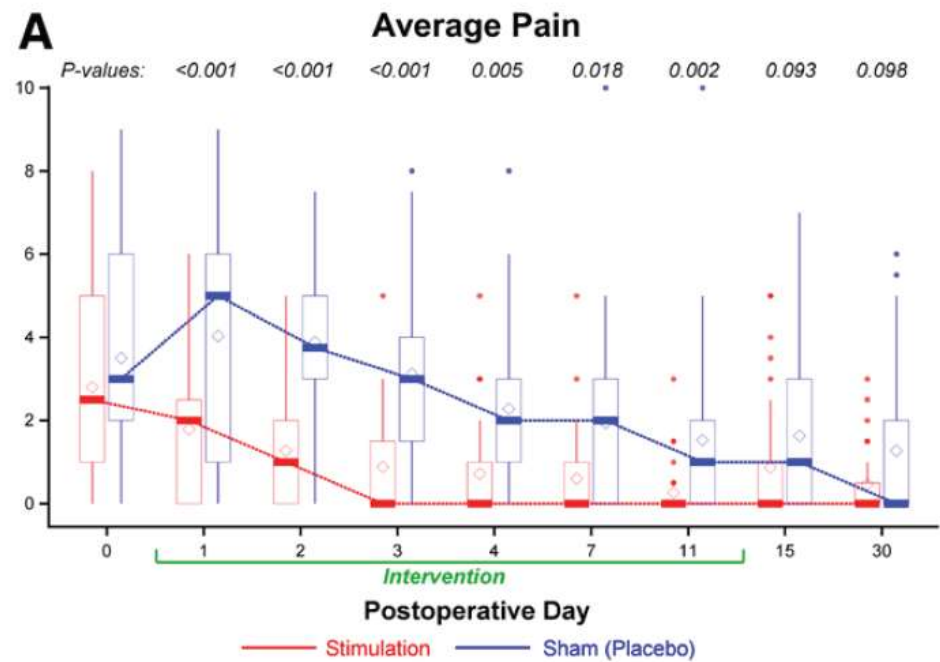
Regional Blocks Extended

Ablation vs Stimulation



PMID: 33446005

RCT of PNS for Acute Pain after Extremity Surgery



PMID: 33856424

Analgesic Medications

NON-CONTROLLED SUBSTANCES

- Local anesthetics
- Acetaminophen
- NSAIDs/Steroids
- Muscle relaxers
- Sympatholytics
- Atypical agents

CONTROLLED SUBSTANCES

- **Opioids**
- Ketamine
- Gabapentinoids
- Benzodiazepines

APAP/NSAIDs/Steroids



ACETAMINOPHEN

- IV, PO, PR formulations
- 

NSAIDS

- Celecoxib 200 – 400 mg PO pre-operatively
- Ketorolac IV 10 mg = 15 or 30 mg
 - Nasal spray for home use
- IV formulations of Ibuprofen and Meloxicam FDA approved

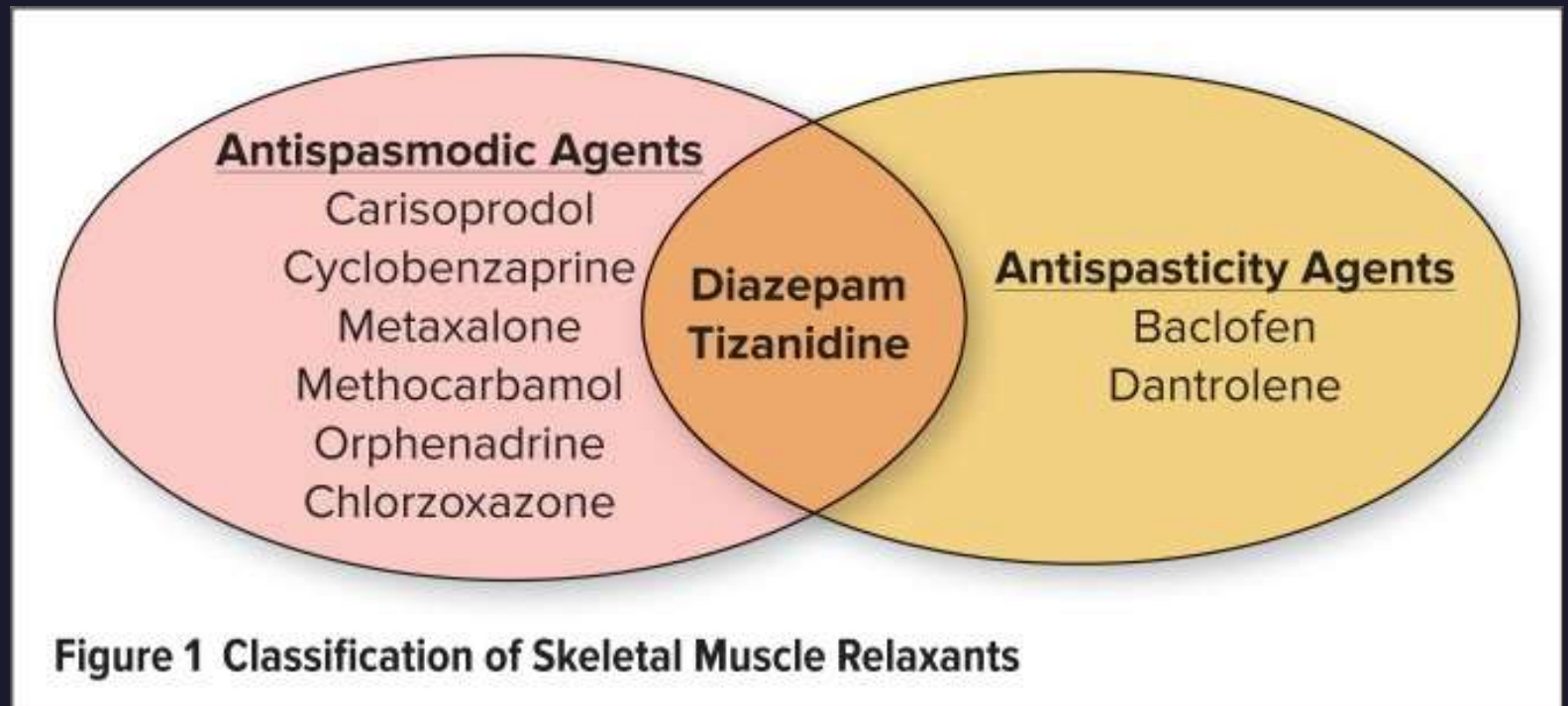
STEROIDS

- Dexamethasone 4 – 10 mg IV

Skeletal Muscle Relaxers

MYALGIAS

- Multiple oral agents used for chronic pain but indicated for acute musculoskeletal pain
- IV Methocarbamol, Orphenadrine, Dantrolene, or Diazepam
- IM Methocarbamol

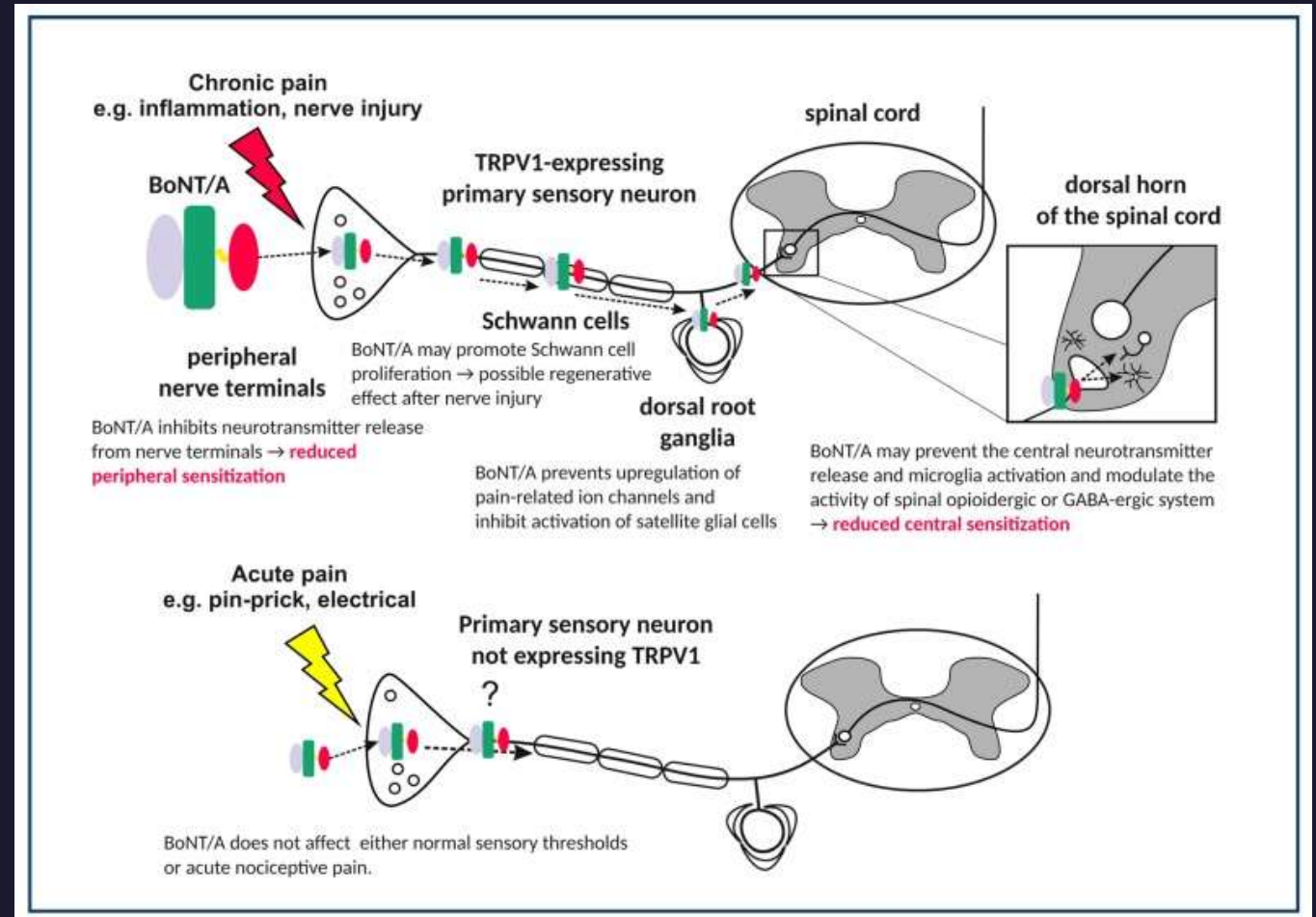


PMID: 25050056

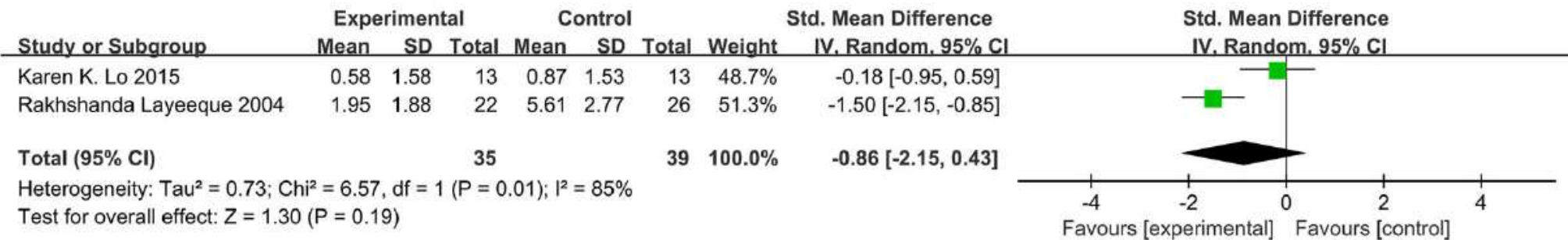
Skeletal Muscle Relaxers

BOTOX

- Indicated for chronic daily headache
- May prevent central sensitization in chronic pain states
- May also be useful for perioperative pain

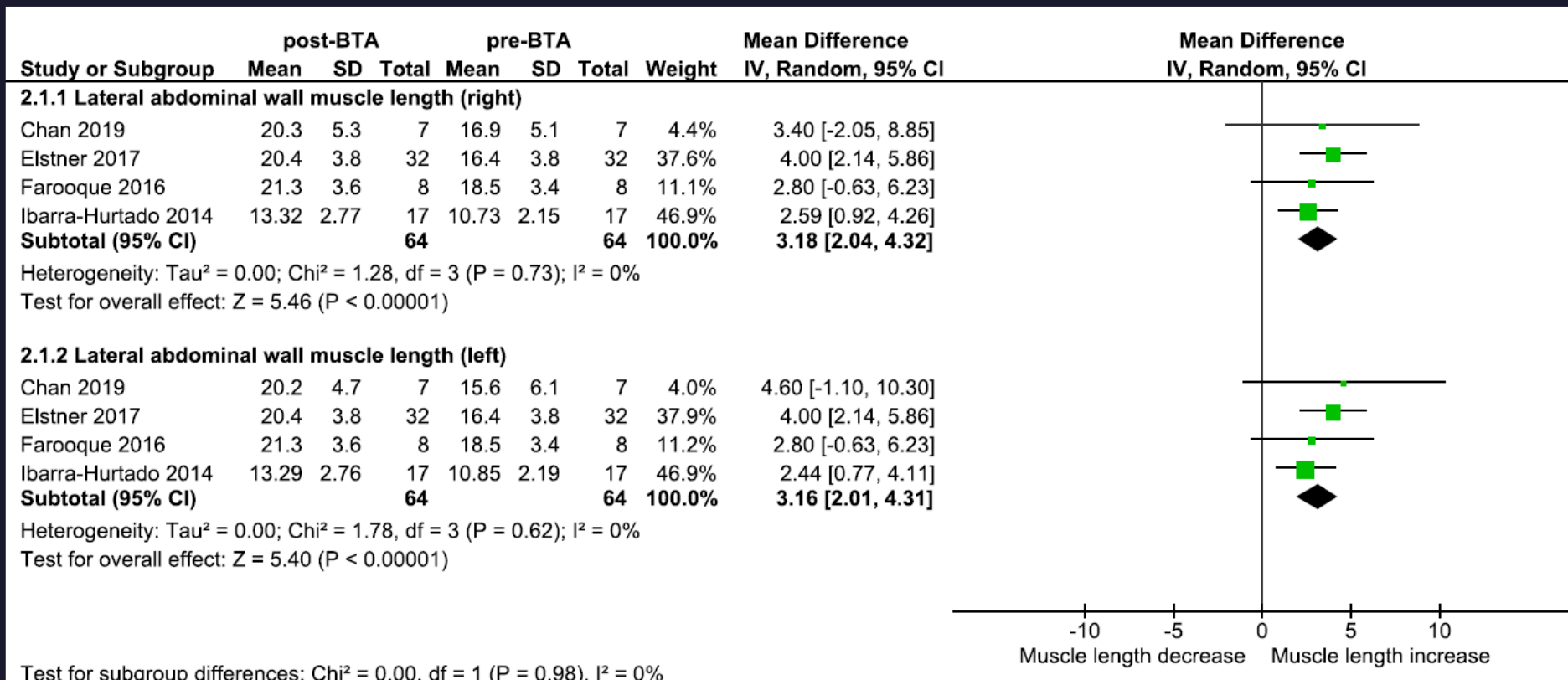


Mammoplasty Botox to Pectorals



PMID: 30083802

Hernias Botox to Abdominal Wall Muscles



PMID: 34546475

GSA 2022 Winter Meeting

PMID: 34546475



Ian Preyra

@Preyratology



Breaking news:

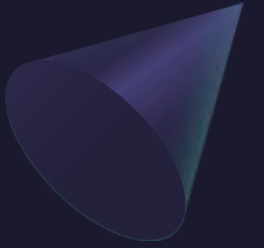
The CDC is now recommending the phrase 'calm down' to deescalate domestic disagreements.

3:12 PM · 12/28/21 · [Twitter for iPhone](#)


Sympatholytics

Calm down pain

Sympatholytics



BETA BLOCKERS

- Esmolol 
- Propranolol

ALPHA-2 AGENTS


- Clonidine
- Tizanidine
- Dexmedetomidine
- Lofexidine



Sympatholytics



BETA BLOCKERS

- Esmolol 
- Propranolol

ESMOLOL

- Reduces intraoperative opioid use
- Reduces immediate PACU pain scores
- Unclear if any durable effects


PROPRANOLOL

- Used for chronic pain states such as fibromyalgia and TMJ disorder
- Unclear if benefit for perioperative acute pain outside of anxiolysis

Sympatholytics



ALPHA-2 AGENTS

- Clonidine 
- Tizanidine
- Dexmedetomidine
- Lofexidine

CLONIDINE

DEXMEDETOMIDINE

- Clonidine reduces pain, nausea, and opioid usage
 - Marked hypotension
- Dexmedetomidine
 - IV infusions
 - IV PCA
 - Perineural
 - Epidural
 - Intrathecal

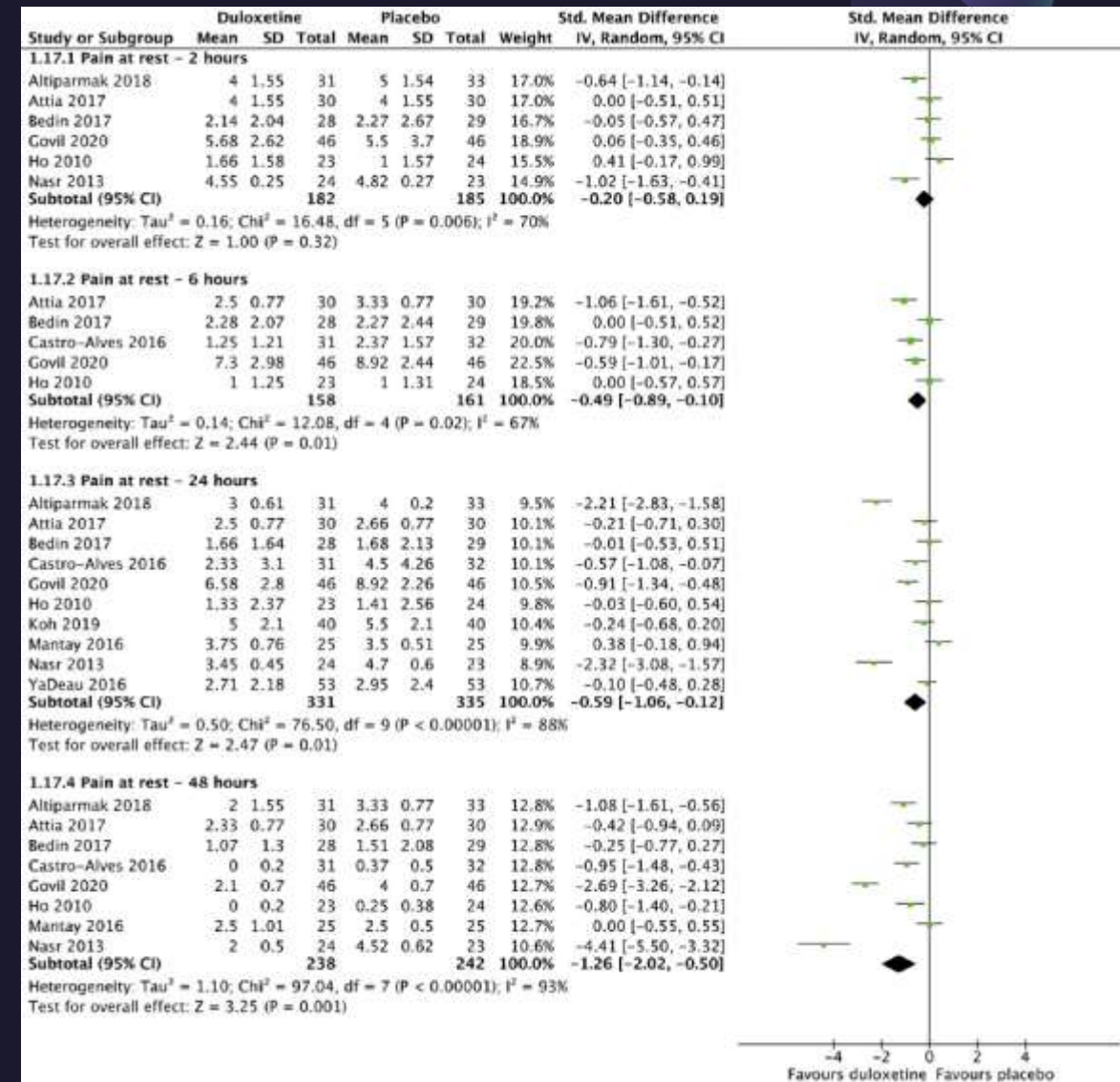
LOFEXIDINE

- Indicated for opioid withdrawal symptoms
- Reduced hypotensive effects as compared with clonidine
- No studies yet on perioperative analgesia

SNRIs: Perioperative Pain

ORAL OPTIONS

- Duloxetine most studied
 - Small but statistically significant effect
- Venlafaxine
 - Few studies but longer dosing
- Consider Venlafaxine XR 37.5 mg PO qAM ~ 2 weeks around surgery

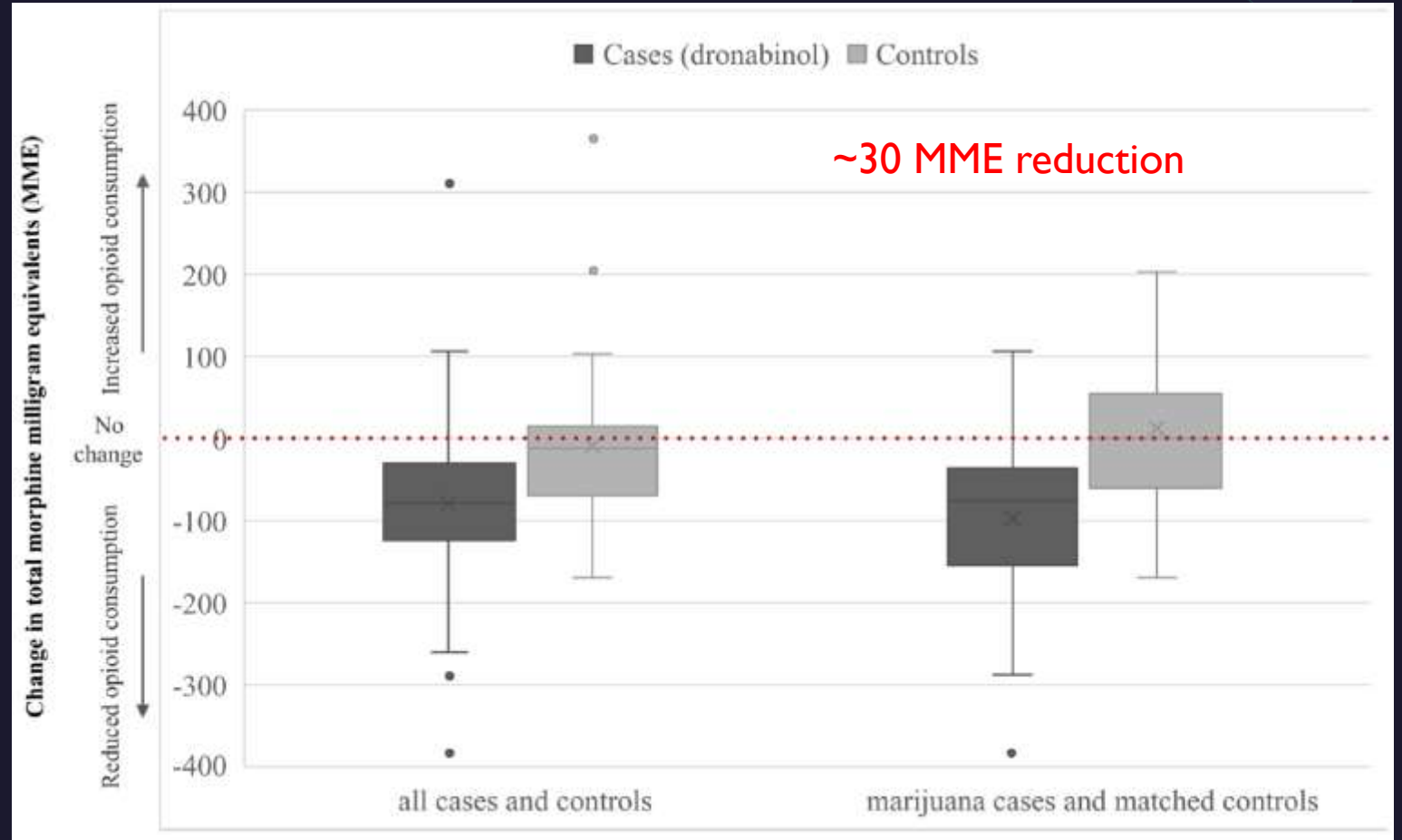


PMID: 32179396

Marinol

$\Delta 9$ -THC

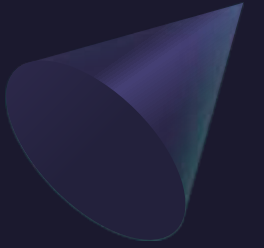
- Reduces opioid consumption
- No change in VAS/Pain scores




Pain

An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage

Opioids



FULL AGONISTS

- Morphine 
- Hydromorphone
- Fentanyl
- Sufentanil
- Remifentanyl

PARTIAL AGONISTS

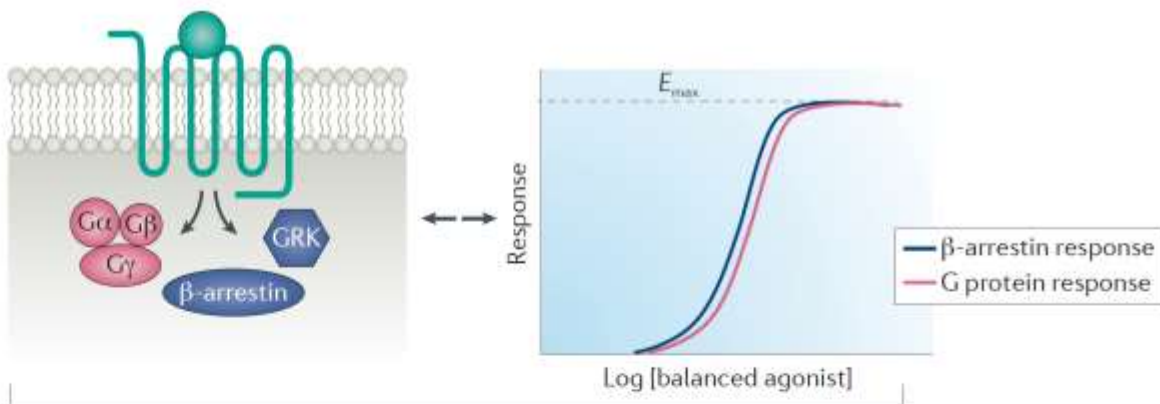
- Buprenorphine
- Nalbuphine

BIASED AGONISTS

- Oliceridine



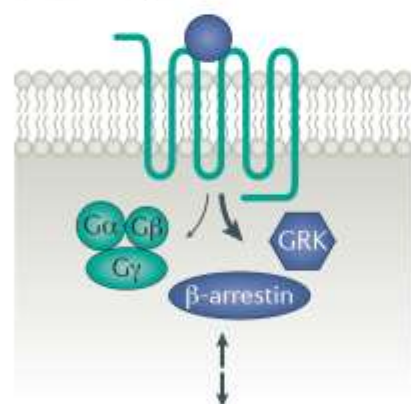
a Balanced ligand and receptor in an unbiased system



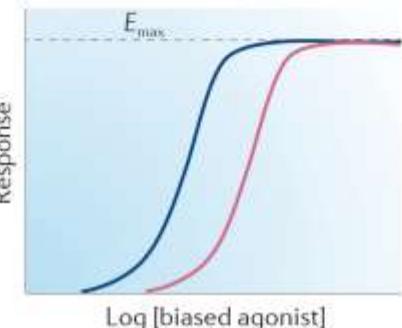
Biased signalling: from simple switches to allosteric microprocessors

Jeffrey S. Smith¹, Robert J. Lefkowitz¹⁻³ and Sudarshan Rajagopal^{1,2}

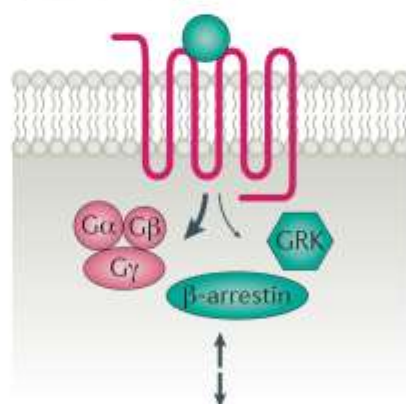
b Biased ligand



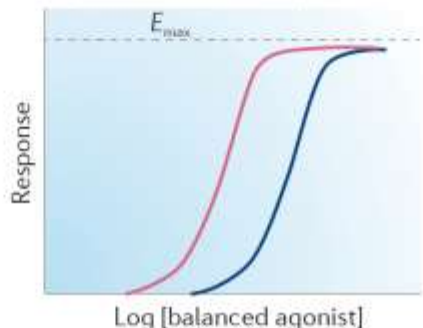
β -arrestin-biased agonist



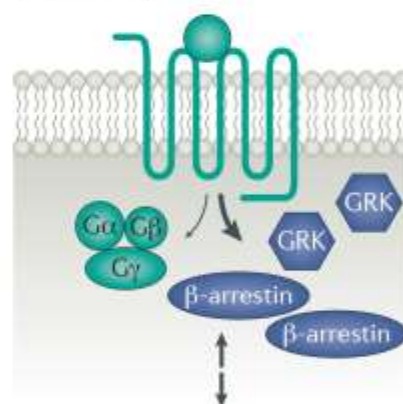
c Biased receptor



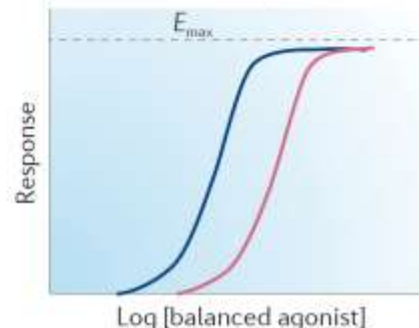
G protein-biased receptor



d Biased system



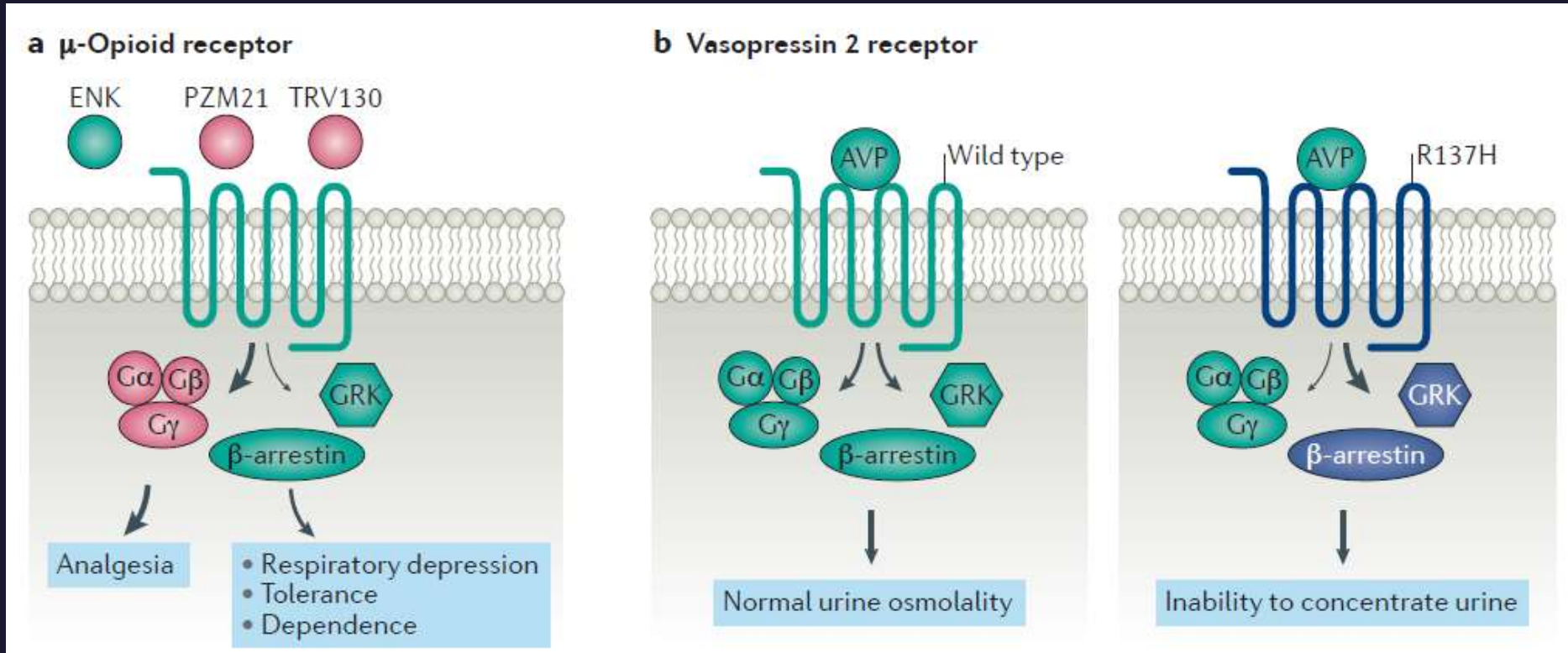
β -arrestin-biased system



Biased agonism allows for separating end effects from a receptor

Drug based Bias

Receptor based Bias



familial
nephrogenic
diabetes insipidus

PMID: 29302067

Oliceridine *versus* Morphine

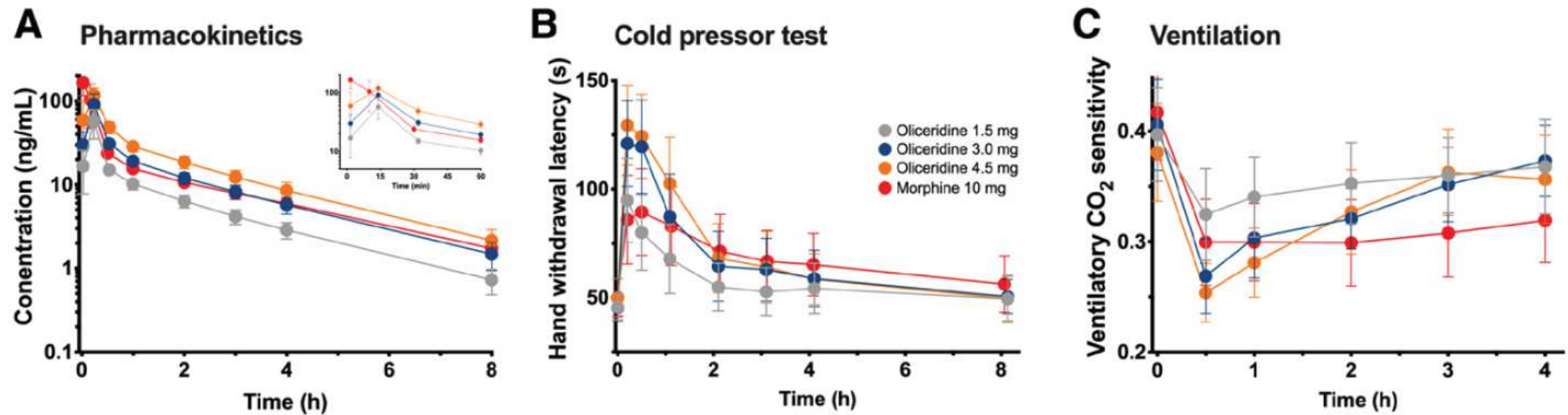




Fig. 1. Pharmacokinetic and pharmacodynamic data after intravenous injection with oliceridine and morphine in healthy volunteers. (A) Plasma oliceridine and morphine concentrations. (B) Hand withdrawal latencies. (C) Ventilatory responses to hypercapnia. Three oliceridine doses were injected, 1.5 mg (*gray symbols*), 3 mg (*blue symbols*), and 4.5 mg (*orange symbols*), and one morphine dose of 10 mg (*red symbols*). Data are mean \pm 95% CI.

Opioids



FULL AGONISTS

- Morphine 
 - Hydromorphone
 - Fentanyl
 - Sufentanil
 - Remifentanyl
- 

PARTIAL AGONISTS

- Buprenorphine
- Nalbuphine



BIASED AGONISTS

- Oliceridine
 - ? Less respiratory risk
 - ? Less tolerance
 - ? Less OIH
 - ? Equal or better analgesia

Opioids



FULL AGONISTS

- Morphine 
 - Hydromorphone
 - Fentanyl
 - Sufentanil
 - Remifentanyl
- 

PARTIAL AGONISTS

- **Buprenorphine**
- Nalbuphine

BIASED AGONISTS




- Oliceridine

Buprenorphine

PARTIAL AGONIST

- Approved for acute or chronic pain
- Approved for opioid use disorder
- Sublingual, Transdermal, or IV formulations
- Ceiling Effect on Respiratory Depression

Guidelines for the use of buprenorphine for opioid use disorder in the perioperative setting

Lynn Kohan ¹, Sudheer Potru ², Antje M Barreveld,³ Michael Sprintz,⁴ Olabisi Lane,⁵ Anuj Aryal,⁶ Trent Emerick,⁷ Anna Dopp,⁸ Sophia Chhay,⁸ Eugene Viscusi ⁹

Opioid Use Disorder Guidelines

Patients taking buprenorphine for OUD:

Grade B
(moderate level of evidence):

PREOPERATIVE:

- Continue buprenorphine at home dose if possible.
- Discontinuing increases risk of harm

Grade B
(moderate level of evidence):

POSTOPERATIVE:

- Use multimodal analgesia.
- Can consider short-acting full mu agonists if needed.

Patients with untreated, active OUD:

Grade B
(moderate level of evidence):

PREOPERATIVE:

- Consider starting buprenorphine for analgesia in patients with OUD.
- Provide "warm hand-off" if possible.

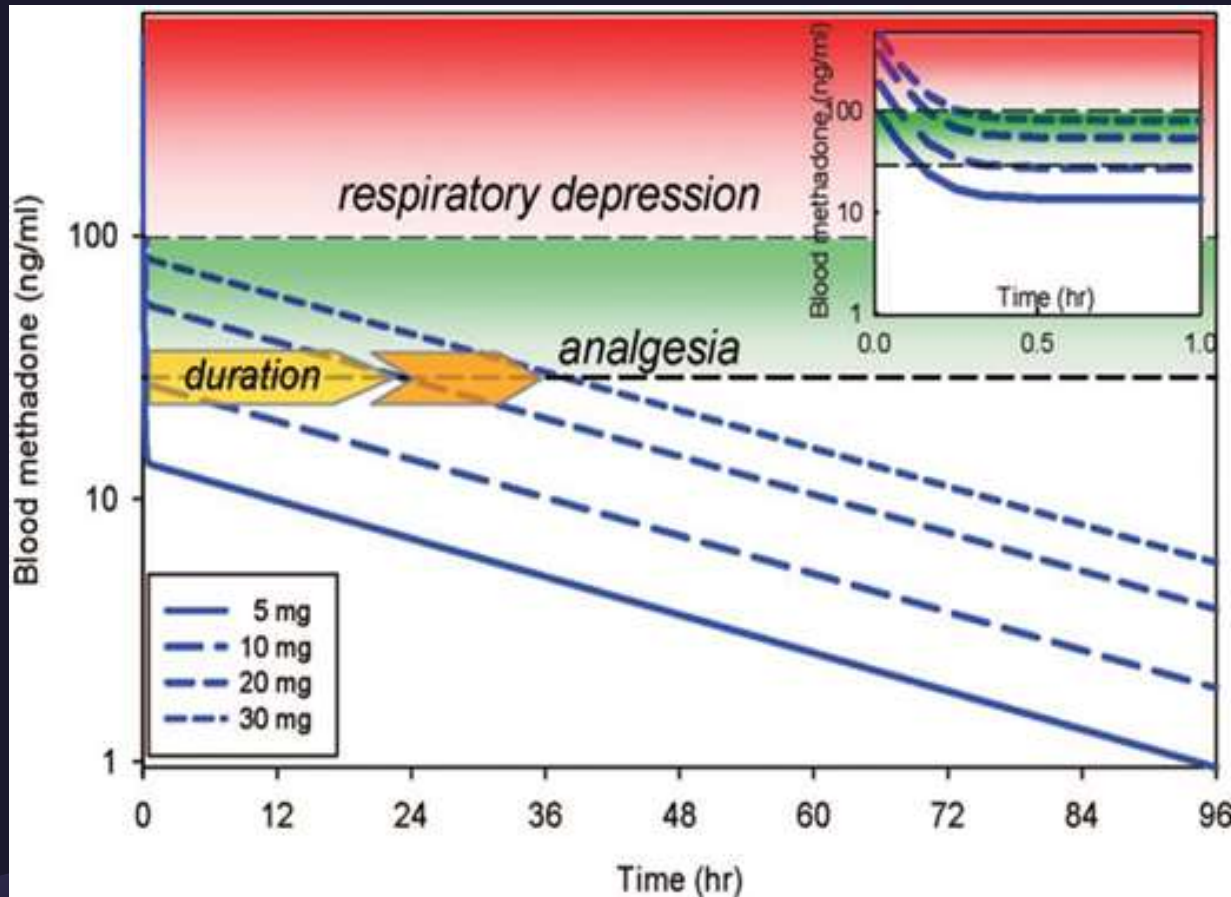
Grade C
(low level of evidence):

PREOPERATIVE:

- Can consider buprenorphine initiation, even if follow up has not been established, to treat pain and OUD.

PMID: 34446543

Methadone



- Opioid agonist + NMDA antagonist
- Rapid onset, long tail
- Limited respiratory depression
- One time IV bolus of 0.15 mg/kg ideal body weight may be optimal for outpatient surgery with reduced postoperative opioid consumption

PMID: 29847382, 31094758

Analgesic Medications

NON-CONTROLLED SUBSTANCES

- Local anesthetics
- Acetaminophen
- NSAIDs/Steroids
- Muscle relaxers
- Sympatholytics
- Atypical agents

CONTROLLED SUBSTANCES

- Opioids
- Ketamine
- Gabapentinoids
- Benzodiazepines

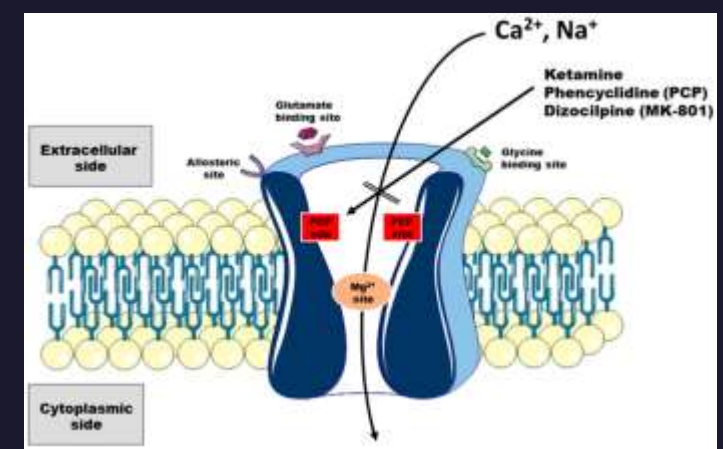
Ketamine

NMDA ANTAGONIST

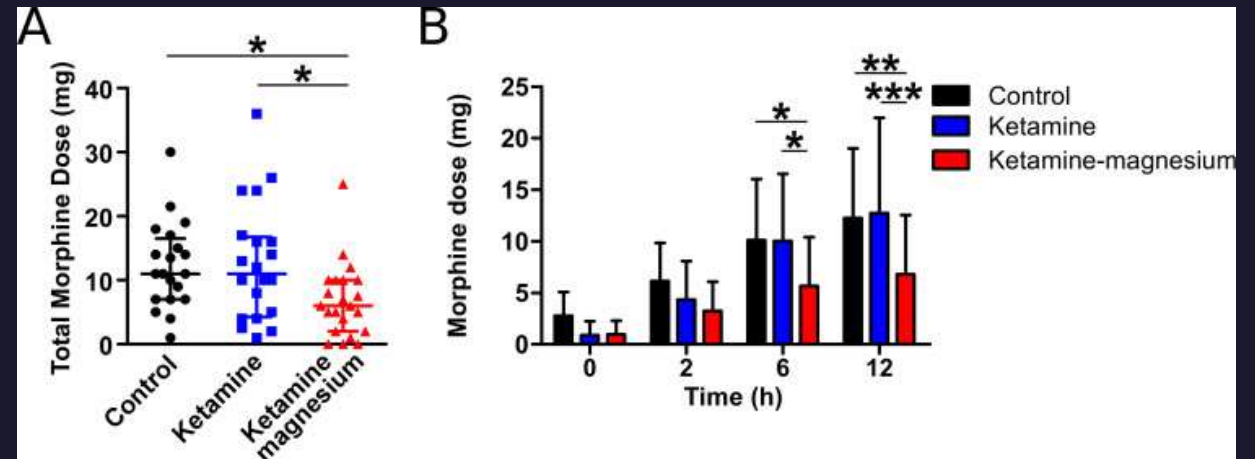
- FDA approved for anesthesia and also treatment resistant depression
- Bolus 0.25 – 0.5 mg/kg IBW
Infusion of 0.1 – 0.5 mg/kg/h
- Higher doses for chronic pain/opioid tolerant

MAGNESIUM

- Synergistic effect with Ketamine
- Bolus of 50 mg/kg IBW
Infusion of 10 mg/kg/h



PMID: 33182497



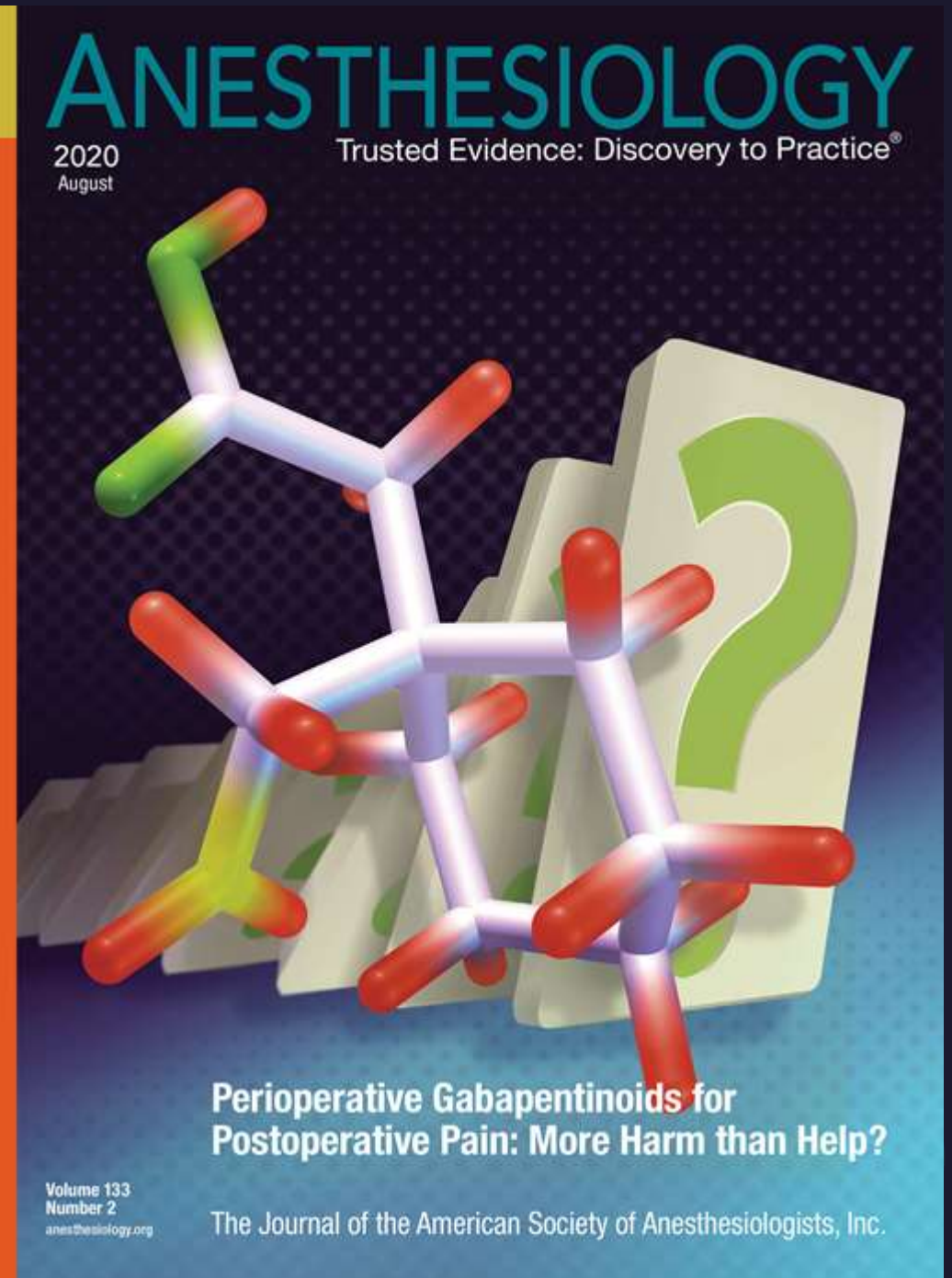
PMID: 33235492

Gabapentinoids

GABAPENTIN
PREGABALIN

- Targets Alpha(2)Delta subunit of spinal N-type $\text{Ca}(2+)$ channels
- Unclear efficacy/benefit
- Risk of potentiating respiratory depression, dizziness, visual disturbances

PMID: 32667154



Benzodiazepines

GABA_A AGONIST

- Anxiolysis
- Minimal direct analgesia
- Possible reduction in central sensitization for some agents (clonazepam)
- Increased risk for chronic opioid use with pre-operative usage

Pain

An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage



Perioperative Analgesia

From the clinic to the PACU and beyond



EMORY
UNIVERSITY
SCHOOL OF
MEDICINE

Perioperative Analgesia: ERAS Analgesics and Beyond

Yawar J. Qadri, MD PhD

yawar.qadri@emory.edu

@Qadri_YJ



1. Name: Andrew Jay Patterson, MD, PhD, FCCM

2. Office Address:

Department of Anesthesiology
3B South, Emory University Hospital
1364 Clifton Road, NE
Atlanta, GA 30322
Telephone: 404-778-0695

3. E-mail address: andrew.patterson@emory.edu

4. Citizenship: United States of America

5. Current Titles and Affiliations:

a. Academic Appointments:

i. Primary Appointments: Professor of Anesthesiology, Emory University
School of Medicine, January 1, 2019

b. Clinical Appointments: Chair, Emory University School of Medicine, January 1,
2019

6. Previous Academic and Professional Appointments:

Instructor, Department of Anesthesia, Stanford University, 1996 – 2001

Assistant Professor, Department of Anesthesia, Stanford University, 2001 – 2006

Associate Professor, Department of Anesthesia, Stanford University, 2006 – 2015

Associate Professor (Courtesy), Department of Surgery, Stanford University, 2007 –
2015

Professor with Tenure, Department of Anesthesiology, University of Nebraska Medical
Center, October 2015 – December 2018

7. Previous Administrative and/or Clinical Appointments:

Director, Critical Care Research, Stanford University Department of Anesthesia,
2008-2013

Director, Critical Care Journal Club, Stanford University Critical Care Anesthesiology,
Critical Care Medicine, and Critical Care Surgery, 2008-2013

Division Chief, Critical Care Anesthesiology, Department of Anesthesia, Stanford
University, 2013-2015

Program Director, Critical Care Anesthesiology Fellowship, Department of Anesthesia,
Stanford University, 2013-2015

Executive Vice Chair, Department of Anesthesiology, University of Nebraska Medical
Center, 2015-2018

Interim Vice Chair for Education, Department of Anesthesiology, University of Nebraska
Medical Center, 2015-2016

8. Licensures/Boards/Certifications:

Massachusetts, January 27, 1993 – present

California, July 31, 1996 – present

Nebraska, May 19, 2015 – present

Georgia, December 26, 2018 – present

Advanced Cardiac Life Support, renewed May 4, 2021

Pediatric Advanced Life Support, renewed May 4, 2021

Advanced Trauma Life Support, renewed August 11, 2019

9. Specialty Boards:

Anesthesiology, American Board of Anesthesiology

- Initial Certification April 26, 1996
- Recertification in 2005 and 2016

Critical Care Medicine, American Board of Anesthesiology,

- Initial Certification September 18, 1999
- Recertification in 2008 and 2019

10. Education:

1983 – 1987: BS, University of Michigan, Ann Arbor

1987 – 1991: MD, Emory University

1996 – 2001: PhD, Stanford University

11. Postgraduate Training:

1991-1992: Internship, Internal Medicine, Emory University and Affiliated Hospitals,
Atlanta, Georgia, Program Director - H. Kenneth Walker, MD

1992-1995: Residency, Anesthesiology, Massachusetts General Hospital, Boston,
Massachusetts, Program Director - Greg Koski, PhD, MD

1995: Chief Residency, Anesthesiology, Massachusetts General Hospital, Boston,
Massachusetts, Program Director - Michael Bailin, MD

1995-1996: Fellowship, Critical Care Medicine, Massachusetts General Hospital,
Boston, Massachusetts, Program Directors - Richard Teplick, MD/William
Hurford, MD

12. Continuing Professional Development Activities:

Stanford Leadership Development Program, 2009 - 2010
Advanced Stanford Leadership Development Program, 2012

13. Committee Memberships:

a. National and International:

Association of American Medical Colleges (AAMC) Council of Faculty and Academic Societies (CFAS)

Senior Representative for Emory University, 2019-2022

Accreditation Council for Graduate Medical Education

Review Committee (RC) for Anesthesiology, Member, 2013-2019

Anesthesiology Critical Care Medicine Milestones Writing Group, Member, 2014

Neurocritical Care Program Requirements Working Group, 2019-2021

American Board of Anesthesiology (ABA)

Structured Oral Examination, Examiner, 2006 – present

Research Committee, Member, 2008-2018

Critical Care Medicine Examination Committee, Question Writer, 2008-2017

Critical Care Medicine Examination Committee, Member, 2011-2017

Board of Directors, Member, 2011-present

Maintenance of Certification Committee, Member, 2011-2018

Technology Committee, Chair, 2012-2015

Adult Cardiothoracic Anesthesiology Examination Task Force, Chair, 2012-2013

Structured Oral Examination Committee, Chair, 2012-2018

Maintenance of Certification Redesign Task Force, Chair, 2013-2016

Adult Cardiothoracic Anesthesiology Examination Task Force, Chair, 2016-2018

Task Force on Subspecialty Certification and Focused Practice, Member, 2018

Credentialing and Continuing Certification Committee, Member, 2018-2019

STEEP (Strategy Advisory) Committee, Member, 2018-present

Task Force on Director Age Limits, Chair, 2019

Credentialing and Continuing Certification Committee, Chair, 2019-present

Board of Directors, Vice President, 2019-present

American Medical Association (AMA)

Physician Consortium for Performance Improvement (PCPI), Co-Chair, 2012-2014

American Society of Anesthesiologists (ASA)

ASA/ABA Joint Council on Anesthesiology Examinations, Member, 2011-2013
Committee on Performance and Outcomes Measurement, Member, 2013-2016

Society of Critical Care Medicine (SCCM)

Annual Congress Program Planning Committee, Member, 2006-2012
Strategic Education Committee, Member, 2009-2012
41st Annual SCCM Congress in Houston Texas, Co-Chair, 2012
SCCM Council (Board of Directors), Member, 2014-2015
SCCM Strategic Planning Committee, Member, 2015-2016
SCCM Career Advancement Program Taskforce, 2019-present

b. Regional:

California Society of Anesthesiologists (CSA)

Education Programs Division (Committee), Member, 2008-2015
Division of Legislative and Practice Affairs, Member, 2010-2012
CSA Annual Meeting/Educational Symposium Program Committee,
San Jose California, Chair, 2011
CSA 2011 Fall Seminar Program Committee Kauai Hawaii, Chair, 2011

c. Institutional:

Stanford University

Stanford University School of Medicine Admissions Committee, Interviewer,
1997-2007
Stanford University Department of Anesthesiology Clinical
Competency Committee, Member, 2001-2003
Stanford University School of Medicine Bioterrorism and Emergency
Preparedness Task Force, Member, 2001-2006
Stanford University Hospital Infection Control Committee, Member, 2001-2011
Stanford University Department of Anesthesia Resident Education
Committee, Co-Chair, 2002-2004.
Stanford University Hospital Pharmacy and Therapeutics Committee,
Member, 2004-2009
Stanford University Administrative Panel on Laboratory Animal
Care (A-PLAC) Committee, Member, 2006-2011
Stanford University Hospital Trauma Quality Improvement Committee,
Member, 2006-2011
Stanford University Chair Search Committee for Department of
Comparative Medicine, Member, 2007-2008
Stanford University Department of Anesthesia Research Committee,
Member, 2008-2013

Stanford University Hospital Pharmacy and Therapeutics Committee, Chair,
2009-2013
Stanford University Department of Anesthesia Incentive Pay
Committee, Member, 2010-2011
Stanford University Hospital Technology Assessment Committee, Member,
2010-2011
Stanford University Department of Surgery, Trauma Professional
Practice Executive Committee, Member, 2010-2013
Stanford University Department of Anesthesia Clinical Commitment
Committee, Member, 2013-2014
Stanford University Department of Anesthesia Appointments and
Promotions Committee, Member, 2013-2015
Stanford University Department of Anesthesia Governance Committee, Member,
2013-2015
Stanford University Undergraduate Admissions Committee, Member, 2015-
2017

University of Nebraska Medical Center

University of Nebraska Interprofessional Academy of Educators,
Associate Director, 2015-2018
Neurosurgery Department Internal Review Committee, Chair, 2017-2018

Emory University

Otolaryngology Chair Search Committee, Member, 2019-2020
Director of Emory Critical Care Center Search Committee, Member,
2019-2020
Emory Representative to the Association of American Medical Colleges (AAMC)
Council of Faculty and Academic Societies (CFAS), 2020-present

14. Peer Review Activities:

a. Manuscripts:

- a. Anesthesiology (2002 to present; ad hoc)
- b. Anesthesia & Analgesia (2007 to present; ad hoc)
- c. Critical Care Medicine (2007 to present; ad hoc)
- d. JAMA Surgery (2015 to present; ad hoc)

b. Conference Abstracts:

- a. National and International:
 - i. Society of Critical Care Medicine Congress
 - a. San Francisco California, January 6-11, 2006

- b. Orlando Florida, February 16-20, 2007
- c. Honolulu Hawaii, February 1-6, 2008
- d. Nashville Tennessee, January 30-February 4, 2009
- e. Miami Florida, January 9-13, 2010
- f. San Diego California, January 15-19, 2011
- g. Houston Texas, February 3-8, 2012

15. Consultantships/Advisory Boards:

- a. Consultant, Bostwick & Associates, P.C., medical/legal, 2004
- b. Consultant, PDL Biopharma, regarding the hemodynamic pharmaceutical Nicardipine, 2005-2007
- c. Consultant, The Medicines Company, regarding development of the hemodynamic pharmaceutical Clevidipine, 2006-2007
- d. Consultant, MagArray, Inc., regarding nanoparticle arrays, 2006-2008
- e. Consultant, Dickie, McCamey & Chilcote, P.C., medical/legal, 2007-present
- f. Consultant, Poore, Roth & Robinson, P.C., medical/legal, 2007-2008
- h. Consultant, Rigel Pharmaceuticals Inc., 2012

16. Honors and Awards:

- a. H. Barrie Fairley Excellence in Teaching Award, Stanford University, 2001
- b. Excellence in Teaching Award, Stanford University School of Medicine, 2008
- c. CPR Specialty Award, Society of Critical Care Medicine, 2010
- d. Fellow, American College of Critical Care Medicine (FCCM), 2011

17. Society Memberships:

- a. American Society of Anesthesiologists, Member, 1992-present
- b. California Society of Anesthesiologists, Member, 1996-2015; Member Education Programs Division (Committee), 2008-2015; Member Division of Legislative and Practice Affairs, 2010-2012
- c. Society of Critical Care Medicine, Member, 2000 to present; Member Program Planning Committee, 2006-2012; Member Strategic Education Committee, 2009-2013; Co-Chair, Program Planning Committee, 2011-2012; Member of the Council (Board of Directors), 2014-2015; Member, Strategic Planning Committee, 2015-2016; Career Advancement Program Taskforce, 2019-present
- d. Society of Critical Care Anesthesiologists, Member, 2001-present
- e. International Anesthesia Research Society, Member, 2007-present
- f. Association of University Anesthesiologists, Member, 2008-present

- g. American College of Critical Care Medicine, Member, 2011-present
- h. Society of Academic Associations of Anesthesiology and Perioperative Medicine (SAAAPM), Member, 2013-present
- i. Nebraska Society of Anesthesiologists, Member, 2015-2018
- j. Georgia Society of Anesthesiologists, Member, 2019-present

18. Organization of Conferences:

a. National and International

i. Administrative Positions

- Moderator, Cardiovascular Basic Science Session. Society of Critical Care Medicine 35th Critical Care Congress. San Francisco California. January 9, 2006.
- Moderator, Novel Therapies to Address Vexing Clinical Disorders Session. Society of Critical Care Medicine 36th Critical Care Congress. Orlando Florida. February 20, 2007.
- Moderator, Cardiovascular and Vascular Session. International Anesthesia Research Society. Orlando Florida. March 24, 2007.
- Moderator, Critical Care Inflammation and Metabolic Effects Session. American Society of Anesthesiologists Annual Meeting. San Francisco California. October 14, 2007.
- Moderator, Basic Science Shock Session. Society of Critical Care Medicine 37th Critical Care Congress. Honolulu Hawaii. February 3, 2008.
- Moderator, Critical Care Genetic and Molecular Mechanisms in Critical Care Session. American Society of Anesthesiologists Annual Meeting. Orlando Florida. October 21, 2008.
- Moderator, CPR/Cardiology Session. Society of Critical Care Medicine 38th Critical Care Congress. Nashville Tennessee. February 1, 2009.
- Instructor, Society of Critical Care Medicine's Fundamentals of Critical Care Ultrasound. San Francisco California. July 12-13, 2009.
- Instructor, Society of Critical Care Medicine's Fundamentals of Critical Care Ultrasound. Chicago Illinois. July 24-26, 2010.
- Instructor, Society of Critical Care Medicine's Fundamentals of Critical Care Ultrasound. Chicago Illinois. August 18-19, 2011.

Instructor, Society of Critical Care Medicine's
Fundamentals of Critical Care Ultrasound.
Chicago Illinois. July 29-30, 2012.

Moderator, Changing Epidemiology of Sepsis Across the
Globe: Are We Prepared for the Epidemic Session.
Society of Critical Care Medicine 46th Critical Care
Congress. Honolulu Hawaii. January 22, 2017.

ii. Sessions as Chair

Conference Chair, California Society of Anesthesiologists' Fall
Hawaiian Seminar. Kauai, Hawaii.
October 24-28, 2011.

Conference Co-Chair, Society of Critical Care Medicine's 41st
Critical Care Congress. Houston Texas.
February 3-8, 2012.

Conference Chair, Society of Critical Care Medicine's
Fundamentals of Critical Care Ultrasound. Abu
Dhabi United Arab Emirates. April 2-4, 2015.

b. Regional

i. Sessions as Chair

Conference Chair, California Society of Anesthesiologists' Annual
Meeting. San Jose California. May 13-15, 2011.

c. Institutional

i. Sessions as Chair

Chair, Stanford University Department of Anesthesia 1st Annual
Resident Refresher and Board Review Course. Stanford
California. 2003.

Chair, Stanford University Department of Anesthesia 2nd Annual
Resident Refresher and Board Review Course. Stanford
California. 2004.

Chair, Stanford University Department of Anesthesia 3rd Annual
Resident Refresher and Board Review Course. Stanford
California. 2005.

Chair, Stanford University Department of Anesthesia 4th Annual
Resident Refresher and Board Review Course. Stanford
California. 2006.

Co-Chair, Stanford University School of Medicine's 20th Annual
Anesthesia Update. Copper Mountain Colorado.
March 4-9, 2007.

Co-Chair, Stanford University School of Medicine's 21st Annual Anesthesia Update. Big Sky Montana, February 17-22, 2008.

Co-Chair, Stanford University School of Medicine's 22nd Annual Anesthesia Update. Big Sky Montana, February 15-20, 2009.

Co-Chair, Stanford University School of Medicine's 23rd Annual Anesthesia Update. Big Sky Montana, February 14-19, 2010.

19. Clinical Service Contributions:

- a. Locum Tenens Anesthesia Staff, Good Samaritan Medical Center, Stoughton, Massachusetts, 1995 (concurrent with Chief Residency at Massachusetts General Hospital). I established a moonlighting opportunity for senior Massachusetts General Hospital anesthesiology residents at the Good Samaritan Medical Center and served as the scheduler for this activity.
- b. Assistant in Anesthesia/Staff Physician, Multispecialty Division, Massachusetts General Hospital, Boston, Massachusetts, 1995-1996 (concurrent with Critical Care Medicine Fellowship). I helped set up a system by which critical care anesthesiology fellows could work in the operating room as anesthesiology staff (and be paid as staff physicians) during their non-critical care medicine work days. The goal was to ensure that these individuals would not lose their anesthesiology clinical skills during their critical care fellowships.
- c. Locum Tenens Surgical Intensive Care Unit Staff Physician, Shriners' Hospital for Crippled Children (Burns Institute), Boston, Massachusetts, 1995-1996. I helped to establish a supervised moonlighting opportunity for critical care anesthesiology faculty and fellows in the Burn Unit of the Shriners' Hospital for Crippled Children. I worked with the Trauma and Burn surgeons to establish the work expectations and the system of supervision by the surgical attending physicians.
- d. Attending Anesthesiology Physician, Multispecialty Division, Stanford University Medical Center, Stanford California, 1996-2015. I began a refresher course for Anesthesiology residents and directed this course for four years. I established a research rotation for Anesthesiology residents in my laboratory that allowed several residents to participate in scientific investigations and present their work at national meetings. This rotation ranged from one to six months in duration.
- e. Attending Critical Care Medicine Physician, Surgical Intensive Care Unit, VA Palo Alto Health Care System, Palo Alto California, 1996-1998

- f. Attending Critical Care Medicine Physician, Medical-Surgical Intensive Care Unit, VA Palo Alto Health Care System, Palo Alto California, 1998-2001
- g. Attending Critical Care Medicine Physician, Medical-Surgical Intensive Care Unit, Stanford University Medical Center, Stanford California, 2001-2015. In 2008, I became the Director of Critical Care Research and established research rotations for Critical Care Anesthesiology, Critical Care Medicine, and Emergency Medicine Critical Care fellows. These rotations ranged from one to six months in duration. Several trainees participated in existing projects and presented their work at national meetings. Other designed and carried out their own projects and published manuscripts (some as first author) in journals such as *Critical Care Medicine*. In 2013, I became the Stanford Critical Care Anesthesiology division chief and fellowship program director. I expanded the Stanford Critical Care Anesthesiology fellowship from one fellow per year to nine fellows per year, created a chief fellow position together with the Critical Care Medicine program director, and made diversity a primarily goal in fellow selection.
- h. Attending Anesthesiology Physician, Preoperative Assessment Clinic, 2002-2013.
- i. Attending Critical Care Medicine Physician, Trauma-Surgery Intensive Care Unit, Stanford University Medical Center, Stanford California, 2004-2015. I served as the first anesthesiologist attending physician in the Trauma Surgery Intensive Care Unit at Stanford University Hospital and received an appointment in the Department of Surgery. I became a member of the Department of Surgery didactic education team and surgery resident “boot camp” and provided lectures on airway management, ventilatory management, anaphylaxis, and hemodynamic pharmacology. I created a trauma surgery ICU rotation for Anesthesiology residents and Critical Care Anesthesiology, Critical Care Medicine, and Critical Care Emergency Medicine fellows.
- j. Attending Anesthesiology Physician, Multispecialty Division, University of Nebraska Medical Center, Omaha, Nebraska, 2015-2018. I initiated a global health rotation for anesthesiology faculty and trainees in the rural village of Gitwe Rwanda. I petitioned and received permission from the American Board of Anesthesiology (ABA) and the Accreditation Council for Graduate Medical Education (ACGME) to provide residents and pediatric anesthesiology fellows credit toward completion of training for participating in this global health elective.
- k. Attending Critical Care Medicine Physician, Cardiovascular Intensive Care Unit, University of Nebraska Medical Center, Omaha, Nebraska, 2015-2018. I helped guide the establishment of a critical care anesthesiology service that now co-manages patients in the Cardiovascular Intensive Care Unit at the University of Nebraska

Medical Center in Omaha. I guided the critical care anesthesiology program director through the ACGME application process as well as through the fellow recruitment process to expand the critical care anesthesiology fellowship four-fold over the course of two years. I helped design a hand-off process for the Cardiovascular Intensive Care Unit for faculty, fellows, and residents that adheres to the standards of the ACGME. I established a global health rotation at Mount Everest Nepal for critical care anesthesiology and emergency medicine faculty, critical care anesthesiology and emergency medicine fellows, and critical care nurses. I arranged for the critical care anesthesiology service to participate in the phase III critical trial "Xenon for Post Cardiac Arrest Syndrome (XePoCAS)."

- I. Attending Critical Care Medicine Physician and Anesthesiologist, Nebraska Biocontainment Unit, University of Nebraska Medical Center, Omaha, Nebraska, 2015-2018. I helped lead and participated in training exercises at the University of Nebraska Medical Center for the National Ebola Training and Education Center (NETEC) in conjunction with Emory University and NYC Health Hospitals/Bellevue Hospital.
- m. Attending Critical Care Medicine Physician, Buffett Cancer Center Intensive Care Unit, University of Nebraska Medical Center, Omaha Nebraska, 2017-2018. I served as one of the initial critical care anesthesiologists in the Cancer Center Intensive Care Unit and helped to establish the daytime and nighttime work flow for the critical care teams that included advanced practice providers.

20. Community Outreach:

- a. Staff Physician, Interplast Inc., Loja Ecuador, April 1998
- b. Staff Physician, Interplast Inc., La Ceiba Honduras, January-February 1999
- c. Staff Physician, Interplast Inc., Santa Cruz Bolivia, December 1999
- d. Staff Physician, Hospital de la Familia, Nuevo Progreso Guatemala, August 2001
- e. Staff Physician, Hospital de la Familia, Nuevo Progreso Guatemala, August 2003
- f. Staff Physician, Medical Missions for Children, Cusco Peru, September 2004
- g. Staff Physician, Hospital de la Familia, Nuevo Progreso Guatemala, August 2005
- h. Staff Physician, Medical Missions for Children, Gitwe Rwanda, December 2006
- i. Staff Physician, Medical Missions for Children, Gitwe Rwanda, December 2007

- j. Staff Physician, Medical Missions for Children, Gitwe Rwanda, March 2009
- k. Staff Physician, Medical Missions for Children, Gitwe Rwanda, March 2010
- l. Staff Physician, Medical Missions for Children, Gitwe Rwanda, March 2011
- m. Staff Physician, Medical Missions for Children, Gitwe Rwanda, March 2012
- n. Staff Physician, Medical Missions for Children, Gitwe Rwanda, October 2016

21. Formal Teaching:

a. Medical Student Teaching.

- i. Lecturer and Assistant Course Director. MCP200. Cardiovascular Physiology. Stanford University School of Medicine.
 - “Congestive Heart Failure.” May 20, 2002 (2 hours)
 - “Congestive Heart Failure.” May 16, 2003 (2 hours)
 - “Congestive Heart Failure.” April 28, 2004 (2 hours)
 - “Congestive Heart Failure.” April 28, 2005 (2 hours)
 - “Congestive Heart Failure.” June 2, 2006 (2 hours)
 - “Congestive Heart Failure.” June 1, 2007 (2 hours)
 - “Congestive Heart Failure.” May 30, 2008 (2 hours)
 - “Congestive Heart Failure.” May 8, 2009 (2 hours)
 - “Congestive Heart Failure.” May 27, 2010 (2 hours)
- ii. Co-Course Director. HHD 221. Human Health and Disease. Cardiovascular Physiology Block. Stanford University School of Medicine. 2011-2012. (9 hours)
- iii. Lecturer. Surgery 231. Healthcare in Resource Poor Countries. Stanford University School of Medicine.
 - “Gitwe Rwanda.” May 14, 2012 (1 hour)
- iv. Lecturer. HHD 221. Human Health and Disease. Cardiovascular Physiology Block. Stanford University School of Medicine. “ECG Interpretation.” May 17, 2012 (2 hours)
- v. Course Director. HHD 221. Human Health and Disease. Cardiovascular Physiology Block. Stanford University School of Medicine. 2013-2014 (9 hours)
- vi. Lecturer. HHD 221. Human Health and Disease. Cardiovascular Physiology Block. Stanford University School of Medicine.
 - “Arterial Pressure Regulation.” May 16, 2013 (2 hours)
 - “ECG Interpretation.” May 23, 2013 (2 hours)
 - “ECG Interpretation.” May 8, 2014 (2 hours)

- “Hypertension.” May 23, 2014 (2 hours)
- “Antihypertensives.” May 23, 2014 (2 hours)
- vii. Lecturer. LK101/102. Practice of Medicine. Master Clinician Lecture. Stanford University School of Medicine. “A Patient with Vasodilation-induced Hypotension.” May 19, 2014 (2 hours)
- viii. Lecturer. Anes 202. Anesthesiology and Pathophysiologic Implications for the Perioperative Patient. Stanford University School of Medicine.
 - “Advanced Hemodynamic Physiology and Pathophysiology.” January 30, 2007 (3 hours)
 - “Advanced Hemodynamic Physiology and Pathophysiology.” January 15, 2008 (3 hours)
 - “The Management of Hemodynamic Insufficiency and Shock.” January 13, 2009 (3 hours)
 - “The Management of Hemodynamic Insufficiency and Shock.” January 19, 2010 (3 hours)
 - “The Management of Hemodynamic Insufficiency and Shock.” January 11, 2011 (3 hours)
 - “The Management of Hemodynamic Insufficiency and Shock.” January 17, 2012 (3 hours)
 - “The Management of Hemodynamic Insufficiency and Shock.” January 15, 2013 (3 hours)
 - “The Management of Hemodynamic Insufficiency and Shock.” January 14, 2014 (3 hours)

b. Graduate Programs.

i. Residency Programs.

- “Volatile Anesthesia Monitoring.” Stanford University. Anesthesiology. September 24, 1997 (1 hour)
- “Anesthesia and the Liver.” Stanford University. Anesthesiology. March 9, 2000 (1 hour)
- “Hemodynamic Monitoring, part I.” Stanford University. Anesthesiology. September 6, 2001 (1 hour)
- “Hemodynamic Monitoring, part II.” Stanford University. Anesthesiology. September 13, 2001 (1 hour)
- “Anaphylaxis.” Stanford University. Anesthesiology. January 24, 2002 (1 hour)
- “Monitoring of Respiration.” Stanford University. Anesthesiology. June 19, 2002 (1 hour)
- “Bioterrorism.” Stanford University. Internal Medicine. December 27, 2002 (1 hour)
- “Invasive Hemodynamic Monitoring.” Stanford University. Anesthesiology. December 3, 2003 (1 hour)

“Anaphylaxis.” Stanford University. Anesthesiology. January 7, 2004 (1 hour)

“Anaphylaxis and Anaphylactoid Reactions. Stanford University. Anesthesiology. January 11, 2006 (1 hour)

“Anaphylaxis and Anaphylactoid Reactions.” Stanford University. Surgery. February 6, 2006 (1 hour)

“Hemodynamic Monitoring.” Stanford University. Surgery. April 17, 2006 (1 hour)

“Anaphylaxis and Anaphylactoid Reactions.” Stanford University. Anesthesiology. January 9, 2008 (1 hour)

“Anaphylaxis and Anaphylactoid Reactions.” Stanford University. Anesthesiology. August 26, 2009 (1 hour)

“Anaphylaxis and Anaphylactoid Reactions.” Stanford University. Anesthesiology. September 1, 2010 (1 hour)

“Anaphylaxis and Anaphylactoid Reactions.” Stanford University. Anesthesiology. September 14, 2011 (1 hour)

“Hemodynamic Pharmacology.” Stanford University. Surgery. June 1, 2012 (1 hour)

“Introduction to Ventilator and Pressor Management.” Stanford University. Surgery. July 16, 2013 (1 hour)

“Hemodynamic Pharmaceuticals.” Stanford University. Surgery. December 20, 2013 (1 hour)

“Anaphylaxis and Anaphylactoid Reactions.” Stanford University. Anesthesiology. April 23, 2014 (1 hour)

“Anaphylaxis and Anaphylactoid Reactions.” Stanford University. Anesthesiology. October 6, 2014 (1 hour)

“American Board of Anesthesiology Oral Board Examination.” Stanford University. Anesthesiology. October 20, 2014 (1 hour)

“Anaphylaxis and Anaphylactoid Reactions.” Stanford University. Anesthesiology. March 4, 2015 (1 hour)

“American Board of Anesthesiology Oral Board Examination.” University of Nebraska Medical Center. Anesthesiology. September 10, 2015 (1 hour)

- “Anaphylaxis and Anaphylactoid Reactions.”
University of Nebraska Medical Center.
Anesthesiology. August 25, 2016 (1 hour)
- “American Board of Anesthesiology Oral Board
Examination.” University of Nebraska Medical
Center. Anesthesiology. May 26, 2017 (1 hour)
- “American Board of Anesthesiology Oral Board
Examination.” Emory University. Anesthesiology.
April 2, 2019 (1 hour)
- “American Board of Anesthesiology Oral Board
Examination.” Emory University. Anesthesiology.
September 9, 2020 (1 hour)
- “American Board of Anesthesiology Oral Board
Examination.” Emory University. Anesthesiology.
October 20, 2021 (1 hour)

ii. Fellowship Programs.

- “Cardiovascular Monitoring.” Stanford University.
Critical Care Anesthesiology and Critical Care Medicine.
February 20, 2002 (1 hour)
- “Mechanical Ventilation.” Stanford University.
Critical Care Anesthesiology and Critical Care Medicine.
July 15, 2002 (1 hour)
- “Hemodynamic Pharmacology.” Stanford University.
Critical Care Anesthesiology and Critical Care Medicine.
October 24, 2002 (1 hour)
- “Bioterrorism.” Stanford University. Cardiovascular Medicine.
January 3, 2003 (1 hour)
- “Fluids and Electrolytes.” Stanford University. Critical Care
Anesthesiology and Critical Care Medicine.
May 28, 2003 (1 hour)
- “Hemodynamic Monitoring.” Stanford University. Critical Care
Anesthesiology and Critical Care Medicine.
October 16, 2003 (1 hour)
- “Cardiovascular Pharmacology.” Stanford University. Critical Care
Anesthesiology and Critical Care Medicine.
May 17, 2004 (1 hour)
- “Basics of Airway Management.” Stanford University. Critical Care
Anesthesiology and Critical Care Medicine.
May 18, 2004 (1 hour)
- “Intravenous Fluids.” Stanford University. Critical Care
Anesthesiology and Critical Care Medicine.
May 24, 2004 (1 hour)

“Hemodynamic Pharmacology.” Stanford University. Critical Care Anesthesiology and Critical Care Medicine. November 18, 2004 (1 hour)

“Hemodynamic Pharmacology.” Stanford University. Critical Care Anesthesiology and Critical Care Medicine. October 6, 2005 (1 hour)

“Hemodynamic Pharmacology.” Stanford University. Critical Care Anesthesiology and Critical Care Medicine. October 19, 2006 (1 hour)

“Non-Invasive Hemodynamic Monitoring.” Stanford University. Critical Care Anesthesiology and Critical Care Medicine. August 22, 2007 (1 hour)

“Acute Hypertension.” Stanford University. Critical Care Anesthesiology and Critical Care Medicine. August 22, 2007 (1 hour)

“Hemodynamic Pharmacology.” Stanford University. Critical Care Anesthesiology and Critical Care Medicine. October 18, 2007 (1 hour)

“Hemodynamic Pharmacology.” Stanford University. Critical Care Anesthesiology and Critical Care Medicine. August 14, 2008 (1 hour)

“Hemodynamic Pharmacology.” Stanford University. Critical Care Anesthesiology and Critical Care Medicine. August 6, 2009 (1 hour)

“Hemodynamic Pharmacology.” Stanford University. Critical Care Anesthesiology and Critical Care Medicine. August 19, 2010 (1 hour)

“Hemodynamic Pharmacology.” Stanford University. Critical Care Anesthesiology and Critical Care Medicine. August 16, 2012 (1 hour)

“Hemodynamic Pharmacology.” Stanford University. Critical Care Anesthesiology and Critical Care Medicine. August 29, 2013 (1 hour)

“Hemodynamic Pharmacology.” Stanford University. Critical Care Anesthesiology and Critical Care Medicine. August 14, 2014 (1 hour)

“American Board of Anesthesiology Oral Board Examination.” Critical Care Anesthesiology. March 2, 2015 (1 hour)

“Hemodynamic Pharmaceuticals.” University of Nebraska Medical Center. Critical Care Anesthesiology. September 6, 2017 (1 hour)

“Neuromuscular Blockade.” University of Nebraska Medical Center. Critical Care Anesthesiology. October 11, 2017 (1 hour)

“Fluid Resuscitation.” University of Nebraska Medical Center. Critical Care Anesthesiology. December 20, 2017 (1 hour)

“Hemodynamic Pharmaceuticals – Things that Make the Blood Pressure Go Up.” Emory University. Critical Care Anesthesiology. October 12, 2020 (1 hour)

“Hemodynamic Pharmaceuticals – Things that Make the Blood Pressure Go Up.” Emory University. Critical Care Anesthesiology. November 30, 2020 (1 hour)

c. University Undergraduate and High School.

i. Course Director. Stanford University. Human Biology 20 Understanding the Drug Development Process.” Stanford University. 2002 (12 hours)

ii. Lecturer. “Ebola.” Mountain View High School. Mountain View California. December 5, 2014 (1 hour)

22. Supervisory Teaching:

a. Postdoctoral Fellows Directly Supervised:

- i. Euan Ashley, 2003-2006, Professor of Cardiovascular Medicine and Genetics, Stanford University, California.
- ii. Allen Namath, 2003-2007, Community Physician, Pulmonary and Critical Care Medicine, Stanford Health Care, California.
- iii. Hyung Chun, 2005-2009, Associate Professor of Medicine (Cardiology), Yale University, Connecticut.
- iv. Jim Wong, 2005-2010, Clinical Associate Professor, Stanford University and VA Palo Alto Health Care System, California.
- v. Gareth Ackland, 2007-2009, Senior Lecturer, Perioperative Medicine, Queen Mary University, London UK.
- vi. Scott Ahlbrand, 2007-2009, Vice Chairman, Department of Anesthesiology, Santa Clara Valley Medical Center.
- vii. Joe Hsu, 2007-2012, Assistant Professor of Medicine (Pulmonary & Critical Care), Stanford University, California.

b. Residency/Fellowship Programs:

- i. G. Brant Walton, 2006-2007, Died from Colon Cancer.

ii. Craig Chen, 2011-2015, Attending Anesthesiologist, El Camino Hospital, Mountain View California.

c. Undergraduates:

- i. Amy Chow, 1996-2006, Attending Pediatrician, Palo Alto Medical Foundation, Dublin California.
- ii. Raina Mahajan, 2003-2006, Attending Oncologist, Dominican Hospital, Santa Cruz California.
- iii. Ashwin Murthy, 2004-2008, Assistant Clinical Professor and Interventional Cardiologist, University of California San Francisco.
- iv. Meghaan Walsh, 2005-2006, Attending Internal Medicine Physician, Seattle Washington.
- v. Amy Romer, 2005, Attending Pediatrician, San Francisco California.
- vi. Tahmina Samad, 2005-2007, Pediatric Cardiology Attending Physician, New York-Presbyterian Hospital, Columbia & Cornell, New York.
- vii. Brandon Penn, 2005-2006, Emergency Medicine Physician, WellStar Hospital System, Georgia.
- viii. Christine Chang-Halpenny, 2008-2012, Radiation Oncologist, Kaiser Permanente Southern California.
- ix. Jessie Hammes, 2011-2013, Medical Student, University of Wisconsin.

23. Lectureships, Seminar Invitations, and Visiting Professorships:

a. National and International:

- i. Duke University Department of Anesthesia Grand Rounds. "Novel Approaches to Manipulation of beta Receptor Signaling In Vivo: Implications for the Treatment of Heart Failure in the ICU." Durham North Carolina. May 12, 1999.
- ii. Society of Critical Care Medicine 8th Critical Care Refresher Course. "Bioterrorism and Chemical Injuries: How to Recognize and Respond." Orlando Florida. February 20, 2004.
- iii. Society of Critical Care Medicine 9th Critical Care Refresher Course. "Bioterrorism and Chemical Injuries: How to Recognize and Respond." Phoenix Arizona. January 14, 2005.
- iv. University of Washington Department of Anesthesia Grand Rounds. "Perioperative Hypertension." Seattle Washington. November 2, 2005.
- v. Loma Linda University and Medical Center Department of Anesthesia Grand Rounds. "Pharmacologic Control of Perioperative Cardiac Risk." Loma Linda California. November 30, 2005.

- vi. Society of Critical Care Medicine 10th Critical Care Refresher Course. “Bioterrorism and Chemical Injuries: How to Recognize and Respond.” San Francisco California. January 6, 2006.
- vii. Society of Critical Care Medicine 11th Critical Care Refresher Course. “Bioterrorism and Chemical Injuries: How to Recognize and Respond.” Orlando Florida. February 16, 2007.
- viii. Duke University Medical Center Critical Care Grand Rounds. “Treatment of Hypertensive Emergencies.” Durham North Carolina. May 3, 2007.
- ix. University of Iowa Department of Anesthesia Grand Rounds. “The Beta2 Adrenergic Receptor: Its Role in the Heart – Its Relevance to Clinicians.” Iowa City Iowa. September 17, 2007.
- x. University of Iowa Department of Anesthesia Research Symposium. “Gene Expression Studies: What Can they Do for You in the ICU?” Iowa City Iowa. September 17, 2007.
- xi. City of Hope Medical Center Hospital Grand Rounds. “Hypertensive Emergencies: Pathophysiology and Perioperative Management.” Duarte California. September 25, 2007.
- xii. University of Vermont Department of Anesthesia Grand Rounds. “The Beta2 Adrenergic Receptor: Its Role in the Heart – Its Relevance to Clinicians.” Burlington Vermont. October 2, 2007.
- xiii. University of Vermont Education Lecture. “Perioperative Hypertension.” Burlington Vermont. October 2, 2007.
- xiv. Society of Critical Care Medicine’s 12th Critical Care Refresher Course. “Bioterrorism and Chemical Injuries: How to Recognize and Respond.” Honolulu Hawaii. February 1, 2008.
- xv. Vanderbilt University Department of Anesthesia Grand Rounds. “Perioperative Beta Blockade Protocol: A Bureaucrats Guide to Forcing Clinicians into Unsafe Clinical Practice.” Nashville Tennessee. November 12, 2008.
- xvi. University of Cincinnati Department of Anesthesia Grand Rounds. “Perioperative Beta Blockers: The Quality/Performance Measure that Caused Strokes.” Cincinnati Ohio. November 25, 2009.
- xvii. University of Michigan’s 32nd Annual Cardiology at Big Sky Meeting. “Anesthesia: What Every Cardiologist Should Know.” Big Sky Montana. February 18, 2010.
- xviii. University of Michigan Cardiovascular Medicine Grand Rounds. “Anesthesia: What Every Cardiologist Should Know.” Ann Arbor Michigan. September 21, 2010.
- xix. University of Michigan Department of Anesthesia Educational Lecture. “International Medical Missions.” Ann Arbor Michigan. September 22, 2010.

- xx. University of Michigan Department of Anesthesia Grand Rounds.
“Perioperative Beta Blockers: The Quality/Performance Measure that Caused Strokes.” Ann Arbor Michigan. September 23, 2010.
- xxi. Emory University Department of Anesthesiology Grand Rounds.
“Perioperative Beta Blockers: The Quality/Performance Measure that Caused Strokes.” Atlanta Georgia. November 23, 2010.
- xxii. Emory University Multidisciplinary Critical Care Medicine Conference.
“Evidence-based Medical Management of Left Ventricle Failure.” Atlanta Georgia. November 24, 2010.
- xxii. Society of Critical Care Medicine’s Fundamentals of Critical Care Ultrasound Course. “Evaluation of Left Ventricle Systolic Function.” Chicago Illinois. August 19, 2011.
- xxiii. Society of Critical Care Medicine Fundamentals of Critical Care Ultrasound Course. “Basic Evaluation of Left Ventricle Systolic Function.” Chicago Illinois. July 29, 2012.
- xxiv. University of Nebraska Department of Anesthesia Grand Rounds.
“Vasopressin and Septic Shock: Are We Using this Drug Appropriately?” Omaha Nebraska. March 20, 2013.
- xxv. Massachusetts General Hospital Department of Anesthesia, Critical Care, and Pain Medicine Grand Rounds. “Development of Health Care Resources in Sub-Saharan Africa: The Gitwe Rwanda Project.” Boston Massachusetts. October 17, 2013.
- xxvi. Society of Critical Care Medicine. Fundamentals of Critical Care Ultrasound Course. “Transthoracic Views and the FATE Exam.” Abu Dhabi, United Arab Emirates. April 3, 2015.
- xxvii. Montefiore Medical Center/Albert Einstein College of Medicine.
“Surviving Sepsis in Resource Limited Environments.” Bryan-Brown Grand Rounds Lecture. Bronx, New York City, New York. June 1, 2018.

b. Regional:

- i. El Camino Hospital Stroke Seminar. “Blood Pressure Management for the Critically Ill Neurology Patient.” Mountain View California. June 14, 2005.
- ii. UCSF East Bay General Surgery Program Grand Rounds.
“Pharmacologic Control of Perioperative Cardiac Risk.” Oakland California. August 18, 2005.
- iii. Mt. Diablo Medical Center Grand Rounds. “Vasoactive Therapy in the Critically Ill Patient.” Concord California. September 9, 2005.

- iv. El Camino Hospital Grand Rounds. "Vasoactive Therapy: Management of Acute Hypertension." Mountain View California. May 16, 2006.
- v. Dameron Hospital Grand Rounds. "Blood Pressure Management in Surgery, Intracranial Hemorrhage, and Stroke." Stockton California. November 3, 2006.
- vi. Sequoia Hospital Grand Rounds. "Treatment of Hypertensive Emergencies." Redwood City California. June 12, 2007.
- vii. California Society of Anesthesiologists' 2009 Program Directors Conference on Perioperative Education. "Anesthesiologists as Hospitalists." UCLA Ronald Regan Medical Center. Los Angeles California. March 20, 2009.
- viii. California Society of Anesthesiologists 2011 Fall Hawaiian Seminar. "Qualitative and Quantitative Considerations for Fluid Resuscitation." Kauai Hawaii. October, 25, 2011.
- ix. California Society of Anesthesiologists 2011 Fall Hawaiian Seminar. "Hemodynamic Pharmacology: Things that Make the Blood Pressure Go Down." Kauai Hawaii. October, 27, 2011.
- x. California Society of Anesthesiologists 2011 Fall Hawaiian Seminar. "Hemodynamic Pharmacology: Things that Make the Blood Pressure Go Up." Kauai Hawaii. October, 27, 2011.
- xi. California Society of Anesthesiologists 2011 Fall Hawaiian Seminar. "Service-oriented Medical Missions." Kauai Hawaii. October, 28, 2011.
- xii. Santa Barbara Cottage Hospital's 13th Annual Trauma/Critical Care Symposium. "Cardiovascular Management of Shock." Santa Barbara California. July 11, 2014.

c. Institutional:

- i. Stanford University Career Development Center. "Careers in International Development." Stanford California. November 18, 2004.
- ii. Stanford University Department of Surgery Grand Rounds. "Vasoactive Therapy in Critically Ill Patients." Stanford California. May 31, 2005.
- iii. Stanford University Division of Emergency Medicine Grand Rounds. "Vasoactive Therapy in Critically Ill Patients." Stanford California. September 14, 2005.
- iv. Stanford University Division of Emergency Medicine Grand Rounds. "Hemodynamic Pharmaceuticals." Stanford California. April 12, 2006.

- v. Stanford University Department of Anesthesia Grand Rounds. "Service-oriented International Medical Missions." Stanford California July 9, 2007.
- vi. Stanford University Division of Emergency Medicine Grand Rounds. "Hemodynamic Pharmaceuticals: Things that Make the Blood Pressure Go Up." Stanford California. January 21, 2009.
- vii. Stanford University, Department of Anesthesia Grand Rounds. "International Medical Missions." Stanford California. December 12, 2011.
- viii. University of Nebraska Medical Center Department of Anesthesiology Grand Rounds. "Accreditation Council for Graduate Medical Education (ACGME)." Omaha Nebraska. November 11, 2015.
- ix. University of Nebraska Medical Center. Performance Improvement in Teaching Series. "Designing Learning Objectives that Matter." Omaha Nebraska. June 20, 2016.
- x. University of Nebraska Medical Center Department of Anesthesiology Grand Rounds. "Hemodynamic Pharmaceuticals: Things that Make the Blood Pressure Go Up." Omaha Nebraska. July 20, 2016.
- xi. University of Nebraska Medical Center Department of Anesthesiology Grand Rounds. "Hemodynamic Pharmaceuticals: Things that Make the Blood Pressure Go Down." Omaha Nebraska. August 24, 2016.
- xii. University of Nebraska Medical Center. Performance Improvement in Teaching Series. "Designing Learning Objectives that Matter." Omaha Nebraska. September 16, 2016.
- xiii. University of Nebraska Medical Center Department of Anesthesiology Grand Rounds. "MOCA 2.0." Omaha Nebraska. May 17, 2017.

24. Invitations to National/International, Regional, and Institutional Conferences:

- a. National and International:
 - i. Society of Critical Care Medicine 29th Educational & Scientific Symposium. "Molecular Biology of Adrenoreceptors." Orlando Florida. February 13, 2000.
 - ii. American Society of Anesthesiologists' Annual Meeting. "Genetic Testing and Genetic Engineering: Ethical Considerations for the Intensivist." New Orleans Louisiana. October 16, 2001.
 - iii. American Society of Anesthesiologists' Annual Meeting. "Perioperative Hypertension: Evaluation and Management." San Francisco California. October 15, 2003.

- iv. American Society of Critical Care Anesthesiologists' Annual Meeting. "Beta Blockers: How Do they Really Work?" Las Vegas Nevada. October 2004.
- v. American Society of Anesthesiologists' Annual Meeting. "Overseas Volunteering in Anesthesiology: A Guide to Program Selection, Personal Goals and Issues Vital to Successful Overseas Volunteer Work." Atlanta Georgia. October 26, 2005.
- vi. Society of Cardiovascular Anesthesiologists' 28th Annual Meeting. "Arrhythmias and Amiodarone: Magic Bullet or Sledgehammer?" San Diego California. May 2, 2006.
- vii. American Society of Anesthesiologists' Annual Meeting. "Beta Blockade: Is it for Everyone?" Chicago Illinois. October 14, 2006.
- ix. American Medical Writers Association Pacific Coast Conference. "Jumping to Inaccurate Conclusions: How Health Care Watch Dog Groups are Forcing Physicians to Treat Patients Inappropriately." Asilomar California. April 2, 2008.
- x. American Society of Anesthesiologists' Annual Meeting. "beta Blockade: Is it the Standard of Care?" Orlando Florida. October 19, 2008.
- xi. Society of Critical Care Medicine 38th Critical Care Congress. "An Update on the Management of Left Heart Failure." Nashville Tennessee. February 4, 2009.
- xii. Critical Care Canada Forum 2009. "Basic Science of beta Receptors and beta Blockers." Toronto Ontario Canada. October 23, 2009.
- xiii. Society of Cardiovascular Anesthesiologists' 15th Annual Update on Cardiopulmonary Bypass. "Evidence-based Management of Left Ventricle Failure." Whistler British Columbia Canada. March 22, 2010.
- xiv. Society of Cardiovascular Anesthesiologists' 15th Annual Update on Cardiopulmonary Bypass. "Methods to Recruit Lung and Improve Function during and after Cardiopulmonary Bypass Operations." Whistler British Columbia Canada. March 23, 2010.
- xv. Tiantan International Anesthesia Symposium. "Perioperative Management of Hemodynamics of Neurosurgical Patients." Beijing China. June 5, 2010.
- xvi. American Society of Critical Care Anesthesiologists 23rd Annual Meeting. "ICU Pharmacology: What's New in 2010?" San Diego California. October 15, 2010.
- xvii. Society of Critical Care Medicine 41st Critical Care Congress. "Fluid Status and Ventricular Function: The Essentials." Houston Texas. February 7, 2012.

- xviii. Society of Cardiovascular Anesthesiologists' 17th Annual Update on Cardiopulmonary Bypass. "Outcomes and Challenges in Managing Long-term Mechanical Ventilatory Support." Snowmass Village Colorado. March 15, 2012.
- xix. Society of Cardiovascular Anesthesiologists' 17th Annual Update on Cardiopulmonary Bypass. "Tight Glycemic Control." Snowmass Village Colorado. March 16, 2012.
- xx. American Society of Anesthesiologists' Annual Meeting. "American Board of Anesthesiology Perspective: What Type and How Many Quality Measures for MOCA Candidates?" San Francisco California. October 12, 2013.
- xxi. Society of Critical Care Medicine 43rd Critical Care Congress. "What are the Financial Impacts to a Hospital that Subspecializes ICUs?" San Francisco California. January 12, 2014.
- xxii. Society of Critical Care Medicine 43rd Critical Care Congress. "Resuscitating in Austere Environments: Lessons Learned from Developing Countries." San Francisco California. January 12, 2014.
- xxiii. Society of Academic Anesthesiology Associations (SAAA) 2016 Annual Meeting. "What the ACGME is Looking for from Fellows and from Faculty in Terms of Scholarly Activity." Chicago Illinois. November, 11, 2016.
- xxiv. Society of Critical Care Medicine 47th Critical Care Congress. "Reflections and Challenges When Researching Resource Limited Populations." San Antonio Texas. February 26, 2018.
- xxiv. Simulation Education Network Summit. "MOCA 2.0 and OSCE Update." ASA Headquarters. Schaumburg Illinois. March 16, 2019.
- xxv. Society of Academic Associations of Anesthesiology and Perioperative Medicine. "Scholarly Activity and Teaching Portfolio: Is Anyone Focusing on Developing Program Directors, and What about Your Educators?" Chicago Illinois. November 8, 2019.
- xxvi. Accreditation Council for Graduate Medical Education (ACGME)- American Board of Medical Specialties (ABMS) Parental Leave Workshop. "American Board of Anesthesiology (ABA) Absence From Training Policy." Chicago, Illinois. February 12, 2020.
- xxvii. American Society of Anesthesiologists Simulation Network. "Report from the American Board of Anesthesiology." Virtual National Meeting. September 30, 2020.

- xxviii. Society of Academic Associations of Anesthesiology & Perioperative Medicine – Association of Academic Anesthesia Chairs. “Leadership during Times of Crisis: Leading from the Front Lines.” Virtual National Meeting. November 6, 2020.
- xxix. American Society of Anesthesiologists Simulation Network. “Report from the American Board of Anesthesiology.” Virtual National Meeting. March 11, 2021.
- xxx. American Society of Anesthesiologists Annual Meeting. “American Board of Anesthesiology Forum.” San Diego, California. October 9, 2021.

b. Regional:

- i. California Society of Anesthesiologists Fall Seminar. “Qualitative and Quantitative Considerations for Fluid Resuscitation.” Kauai Hawaii, October 25, 2011.
- ii. California Society of Anesthesiologists Fall Seminar. “Hemodynamic Pharmacology: Things that Make The Blood Pressure Go Up.” Kauai Hawaii, October 27, 2011.
- iii. California Society of Anesthesiologists Fall Seminar. “Hemodynamic Pharmacology: Things that Make The Blood Pressure Go Up.” Kauai Hawaii, October 27, 2011.
- iv. California Society of Anesthesiologists Fall Seminar. “Service-Oriented Medical Missions.” Kauai Hawaii, October 28, 2011.
- v. Arizona Society of Anesthesiologists’ Annual Meeting. “Things that Make the Blood Pressure Go Up.” Phoenix Arizona, May 16, 2014.
- vi. Arizona Society of Anesthesiologists’ Annual Meeting. “Redesigning MOCA: What are the Possibilities? What are the Constraints?” Phoenix Arizona, May 17, 2014.
- vii. Arizona Society of Anesthesiologists’ Annual Meeting. “Global Health: The Gitwe Rwanda Project.” Phoenix Arizona, May 18, 2014.
- viii. Nebraska Society of Anesthesiologists’ Annual Meeting. “MOCA 2.0.” Omaha Nebraska. April 30, 2016.
- ix. Nebraska Association of Nurse Anesthetists 2018 Spring Conference. “Vasoactive Pharmaceuticals.” Omaha Nebraska. April 28, 2018.

c. Institutional:

- i. Stanford University Innovations in Pediatric and Adult Critical Care Meeting. "Response to Biologic Disasters." Kona Hawaii. September 25, 2002.
- ii. Stanford University Innovations in Pediatric and Adult Critical Care Meeting. "Hematologic Crises in the ICU." Kona Hawaii. September 26, 2002.
- iii. Stanford Hospital and Clinics Critical Care Nursing Symposium. "Fluid Resuscitation in the ICU." Redwood City California. November 11, 2004.
- iv. University of Nebraska Medical Center Symposium on Equity and Access to Education. "Board Accreditation Standards – Using Technology to Support Accreditations and Certifications." Omaha Nebraska. June 6, 2017.

25. Abstract Presentations and National/International, Regional, and Institutional Conferences:

a. National and International:

- i. "Protecting the Myocardium: A Role for the beta2 Adrenergic Receptor in the Heart." **Patterson AJ***, Chow A, Kosek J, Zhu W, Xiao RP, Kobilka BK. Association of University Anesthesiologists' 48th Annual Meeting, Rochester New York. May 17-20, 2001 (Oral Presentation).
- ii. "Intermittent beta1 Adrenergic Receptor Blockade Improves Cardiac Function in Mice with Failing Hearts." Finsterbach T*, Reid J, Desai K, Bernstein D, Kobilka B, **Patterson AJ**. Society of Critical Care Medicine 32nd Congress, San Antonio Texas. January 28 – February 2, 2003 (Oral Presentation).
- iii. "DDAH/ADMA Pathway: A Novel Regulator of Nitric Oxide Pathway and Endothelial Function." Dayoub H*, Achan V, Adimolam S, **Patterson AJ**, Cooke JP. Society of Critical Care Medicine 32nd Congress, San Antonio Texas. January 28 – February 3, 2003 (Oral Presentation).
- iv. "Hemodynamic Effects of Apelin in Mice: Initial Characterization of a Potential Inotropic Agent." Mahajan R*, Ashley E, Agrawal R, Quertermous T, **Patterson AJ**. Society of Critical Care Medicine 33rd Congress, Orlando Florida. February 20 – February 25, 2004 (Poster Presentation).
- v. "Myocyte Apoptosis and Heat Shock Protein Expression in beta2 Adrenergic Receptor Knockout Mice." **Patterson AJ***, Agrawal R, Kobilka BK. 13th World Congress of Anaesthesiologists, Paris France. April 17-23, 2004 (Poster Presentation).

- vi. "Myocyte Apoptosis and Heat Shock Protein Expression in beta2 Adrenergic Receptor Knockout Mice." **Patterson AJ***, Agrawal R, Kobilka BK. Association of University Anesthesiologists' Annual Meeting, Sacramento California. May 15, 2004.
- vii. "Preliminary Analysis of Cardiac Structure and Function in Mice with Disruption of the beta2 Adrenergic Receptor PDZ Domain. Wong J*, Hwang H, Luo, J, Nekhendzy M, Finsterbach T, Chen C **Patterson AJ**. Society of Critical Care Medicine 34th Congress, Phoenix Arizona. January 15-19, 2005 (Poster Presentation).
- viii. "Brief Reduction in beta Adrenergic Receptor Activation during Rest Lowers Mortality in a Murine Model of Heart Failure." **Patterson AJ***, Finsterbach T, Kobilka BK, Greve J. Society of Critical Care Medicine 34th Congress, Phoenix Arizona, January 15-19, 2005 (Oral Presentation).
- ix. "Disruption of the beta2 Adrenergic Receptor PDZ Motif: Impact Upon Contraction Rate of the Murine Myocardium. Walsh M*, Wong J, Feliu-Mojer M, Romer A, Xiang Y, Agrawal R, **Patterson AJ**. Society of Critical Care Medicine 34th Congress, Phoenix Arizona. January 15-19, 2005 (Poster Presentation).
- x. "The beta2 Adrenergic Receptor PDZ Binding Motif: Assessment of Its Role in Cardiac Protection." Wong J*, Chen C, Hwang H, Romer A, Walsh M, Feliu-Mojer M, Agrawal R, **Patterson AJ**. 9th Congress of the World Federation of Societies of Intensive and Critical Care Medicine, Buenos Aires Argentina, August 27-31, 2005 (Oral Presentation).
- xi. "Disruption of Phosphodiesterase 4D: Impact Upon Murine Cardiac Contraction Rate." Chang C*, Bruss M, Hwang H, Samad T, Perry E, Hawrylyshyn A, Agrawal R, Conti M, **Patterson AJ**. Society of Critical Care Medicine 35th Congress, San Francisco California. January 7-11, 2006 (Poster Presentation).
- xii. "Phosphodiesterase 4D Disruption May Cause beta2 Adrenergic Receptors to behave like beta1 Adrenergic Receptors in Vivo." Pearl N*, Chang C, Bruss M, Wong J, Agrawal R, Kobilka B, Conti M, **Patterson AJ**. 26th International Symposium on Intensive Care and Emergency Medicine, Brussels Belgium. March 21-24, 2006 (Poster Presentation).
- xiii. "Role of the beta2 Adrenergic Receptor in Stimulating Cardiac Inotropic Performance. Walton B*, Chow A, Pearl N, Penn B Agrawal R, Wong J, Rosenthal M, **Patterson AJ**. European Society of Intensive Care Medicine 19th Annual Congress, Barcelona Spain. September 24-27, 2006 (Oral Presentation).

- xiv. "How to Make a Good Receptor Misbehave: Disrupting the beta2 Adrenergic Receptor PDZ Binding Motif Causes the beta2 Receptor to Signal like a beta1 Receptor in vivo." Wong J*, Chen C, Namath A, Patterson M, Fung E, Pearl N, Agrawal R, **Patterson AJ**. American Society of Critical Care Anesthesiologists Annual Meeting, Chicago Illinois. October 13, 2006 (Oral Presentation).
- xv. "Impact of Hydrocortisone Administration on Leukocyte Gene Expression in Patients with Severe Sepsis." Namath A*, Wong J, Agrawal R, Chen C, Weinacker A, **Patterson AJ**. National Institutes of Health Functional Genomics of Critical Illness Conference, Bethesda Maryland. November 13-14, 2006 (Poster Presentation).
- xvi. "Impact of beta2 Adrenergic Receptor Signaling upon Cardiac Remodeling and Gene Expression." Murthy A*, Samad T, Pearl N, Wong J, Agrawal R, **Patterson AJ**. International Anesthesia Research Society 81st Clinical and Scientific Congress, Orlando Florida. March 23-27, 2007 (Poster Presentation).
- xvii. "Gene Expression Profiling: Prediction of Systolic Dysfunction in Mice." Wong J*, Agrawal R, Chang C, Murthy A, **Patterson AJ**. National Institutes of Health Functional Genomics of Critical Illness Conference, Bethesda Maryland. November 14-15, 2007 (Poster Presentation).
- xviii. "Nanoparticle Gene Array: The Future of Bedside Diagnostics?" Ahlbrand S*, Pourmand N, Wang S, Banai N, Rohlen B, Hsu J, Federspiel N, **Patterson AJ**. National Institutes of Health Functional Genomics of Critical Illness Conference, Bethesda Maryland. November 14-15, 2007 (Oral Presentation).
- xix. "Conditional Regulation of beta2 Adrenergic Receptor Gene Expression." Murthy A*, Mercado A, Patterson M, Chang C, Agrawal R, **Patterson AJ**. 14th World Congress of Anaesthesiologists, Cape Town South Africa. March 2-7, 2008 (Poster Presentation).
- xx. "Corticosteroids may Impair Leukocyte Survival and Antigen Presentation in Patients Suffering from Septic Shock." Wong J*, Namath A, Pallenconda V, Agrawal R, Chen C, **Patterson AJ**. 14th World Congress of Anaesthesiologists, Cape Town South Africa. March 2-7, 2008 (Poster Presentation).

- xxi. "Strain-specific Differences in Murine Sepsis-Induced Cardiac Dysfunction: A Physiologic and Genomic Analysis." **Patterson AJ***, Ackland G, Hou C, Agrawal R. Association of University Anesthesiologists 56th Annual Meeting, Galveston Texas. April 5, 2009 (Oral Presentation).
- xxii. "Vasopressin Augments the Decline of Plasma Cytokine Levels in Septic Shock." **Patterson AJ***, Russell JA, Fjell C, Hsu JL, Lee T, Boyd J, Thair S, Singer J, Walley KR. Society of Critical Care Anesthesiologists' 26th Annual Meeting and Critical Care Update, San Francisco California. October 11, 2013 (Poster Presentation).
- xxiii. "Use of Nitric Oxide during One-Lung Ventilation during Metastatic Squamous Cell Carcinoma Resection." Gozdziński J*, **Patterson AJ**. American Society of Anesthesiologists' Annual Meeting, Chicago Illinois. October 22-26, 2016 (Poster Presentation).
- xxiv. "Differential Lung Ventilation and Inhaled Nitric Oxide for a Patient with Severe Chronic Obstructive Pulmonary Disease Following a Pulmonary Wedge Resection." Ha T*, **Patterson AJ**, Etoll E. American Society of Anesthesiologists' Annual Meeting, Boston Massachusetts. October 21-25, 2017 (Poster Presentation).
- xxv. "Increasing Evidence-based Interventions for Patients with Acute Infections in a Rural Village in Rwanda." **Patterson AJ***, Urayeneza O, Farmer JC, Dunser M, Harmon L, Hoffman JT, Bagenda D. Association of University Anesthesiologists' Annual Meeting, Chicago Illinois. April 26-27, 2018 (Poster Presentation).

26. Research Focus

My research has focused on cardiovascular physiology. I began studying the impact of sepsis on cardiovascular physiology in 2006. In 2017, I completed a trial involving 1,500 patients in the rural village of Gitwe Rwanda that characterized the impact of sepsis (including the cardiovascular impact) in resource limited environments.

27. Grant Support:

a. Previous Support:

i. Federally-Funded:

a. National Institutes of Health (NIH)

- National Heart Lung & Blood Institute (NHLBI)
- Mentored Clinical Scientist Development (K08) Award
- Sponsor: Dr. Brian Kobilka
- February 1, 2004 – January 21, 2009
- Total dollars: \$640,440
- Principal Investigator: Andrew J. Patterson, MD, PhD

ii. Private Foundation Funded:

a. Foundation for Anesthesia Education and Research

- Research Fellowship Grant
- Mentor: Dr. Brian Kobilka
- January 1, 1998 - December 31, 2000
- Total dollars: \$60,000
- Principal Investigator: Andrew J. Patterson, MD, PhD

b. Stanford University

- Innovation in Teaching and Researching Online Courses Grant
- July 2012 - July 2014
- Total dollars: \$25,000
- Principal Investigator: Andrew J. Patterson, MD, PhD

c. Society of Critical Care Medicine & European Society of Intensive Care Medicine

- Surviving Sepsis in Resource Limited Environments Grant
- July 2015 – July 2018
- Total dollars: \$61,000
- Principal Investigator and Co-Investigators: Andrew J. Patterson, MD, PhD; Urayeneza Olivier, MD, Martin Dunser, MD

28. Bibliography:

a. Published and Accepted Research Articles:

- i. **Patterson AJ**, Leong MS, Brodsky JB, Mark JBD. Airway Obstruction Caused by an Oleothorax. *Journal of Cardiothoracic and Vascular Anesthesia*. 1998; 12(2): 189-191.
- ii. Guo TZ, Davies MF, Kingery WS, **Patterson AJ**, Limbird LE, Maze M. Nitrous Oxide Produces Antinociceptive Response via Alpha2B and Alpha2C Adrenoceptor Subtypes in Mice. *Anesthesiology*. 1999; 90(2):470-476.
- iii. Brenner R, Perez GJ, Bonev AD, Eckman DM, Kosek JC, Wiler SW, **Patterson AJ**, Nelson MT, Aldrich RW. Regulation of Arterial Tone And Blood Pressure by the beta1 Subunit of the Calcium-activated Potassium (BK) Channel. *Nature*. 2000; 407:870-876.

- iv. Brum PC, Kosek J, **Patterson AJ**, Bernstein D, Kobilka BK. Abnormal Cardiac Function Associated with Sympathetic Nervous System Hyperactivity in Mice. *Am J Phys – Heart Circ Physiol*. 2002: 283(5):H1838-1845.
- v. Dayoub H, Achan V, Adimoolam S, Jacobi J, Wang B, Tsao P, Kimoto M, Vallance P, **Patterson AJ**, Cooke JP. Dimethylarginine Dimethylaminohydrolase Regulates Nitric Oxide Synthesis: Genetic and Physiologic Evidence. *Circulation*. 2003;108:3042-3047.
- vi. Myles T, Nishimura T, Yun TH, Nagashima M, Morser J, **Patterson AJ**, Pearl RG, Leung LLK. Thrombin Activatable Fibrinolysis Inhibitor (TAFI): A Potential Regulator of Vascular Inflammation. *J. Biol. Chem*. 2003: 278(51):51059-51067.
- vii. **Patterson AJ**, Zhu W, Chow A, Agrawal R, Kosek J, Xiao RP, Kobilka BK. Protecting the Myocardium: A Role for the beta2 Adrenergic Receptor in the Heart. *Critical Care Medicine*. 2004: 32(4):1041-1048.
- viii. Ashley EA, Powers J, Kundu R, Finsterbach T, Caffarelli A, Deng A, Eichhorn J, Chen M, Mahajan R, Agrawal R, Greve J, Robbins B, **Patterson AJ**, Bernstein B, Quertermous T. Apelin Reduces Cardiac Loading and Improves Contractile Reserve in Vivo. *Cardiovasc Res*. 2005: 65(1):73-82.
- ix. Jacobi J, Sydow K, von Degenfeld G, Zhang Y, Dayoub H, Wang B, **Patterson AJ**, Kimoto M, Blau HM, Cooke JP. Overexpression of Dimethylarginine Dimethylaminohydrolase Reduces Tissue Asymmetric Dimethylarginine Levels and Enhances Angiogenesis. *Circulation*. 2005: 111:1431-1438.
- x. Williams DM, Littwin S, **Patterson AJ**, Brock-Utne JG. Fiberoptic Light Source-induced Surgical Fires – The Contribution of Forced-Air Warming Blankets. *Acta Anaesthesiol Scand*. 2006: 50:505-508.
- xi. Richter W, Day P, Agrawal R, Bruss MD, Granier S, Wang YL, Rasmussen SGF, Horner K, Wang P, Lei T, **Patterson AJ**, Kobilka B, Conti M. Signaling from beta1 and beta2 Adrenergic Receptors is Defined by Differential Interactions With PDE4. *EMBO J*. 2008: 27(2):384-393.
- xii. Chun HJ, Ali ZA, Kojima Y, Kundu RK, Sheikh AY, Agrawal R, Zheng L, Leeper NJ, Pearl NE, **Patterson AJ**, Anderson JP, Tsao PS, Lenardo MJ, Ashley EA, Quertermous T. Apelin Signaling Antagonizes Angiotensin II Actions in Experimental Atherosclerosis. *J Clin Invest*. 2008: 118(10):3343-3354.

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THE AMERICAN BOARD OF ANESTHESIOLOGY
Advancing the Highest Standards of the Practice of Anesthesiology

DID MEDUSA JUST DYE HER HAIR? AN ABA AND MOCA UPDATE

Georgia Society of Anesthesiologists
Winter Meeting 2022

Andrew J. Patterson, M.D., Ph.D.

Disclosures

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Outline

- APPLIED Exam Update
- New Subspecialty Certifications
 - Neurocritical Care
 - Adult Cardiac Anesthesiology
- MOCA[®] Requirements

- Future of Continuing Certification
 - Did Medusa just Dye her hair?
- Research Initiatives
- Diversity, Equity and Inclusion
- NEW: Virtual Consultations

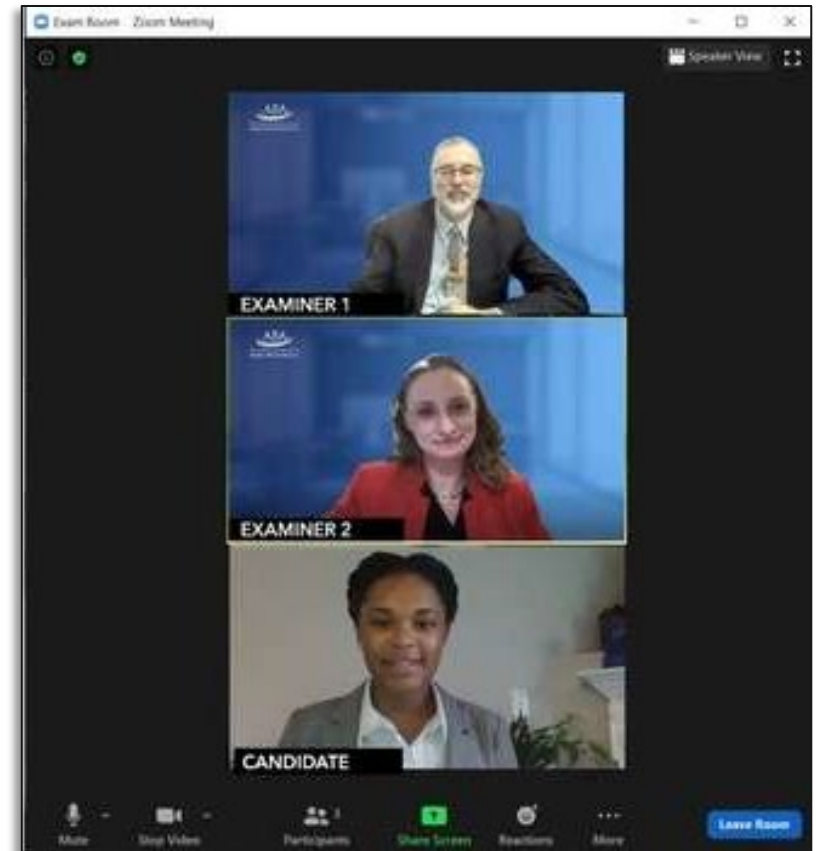


THE AMERICAN BOARD OF ANESTHESIOLOGY
Advancing the Highest Standards of the Practice of Anesthesiology

APPLIED EXAM UPDATE

VIRTUAL APPLIED EXAM UPDATE

- Concluded November 2021
- Over **3,000 candidates** examined over **17 weeks**
- Not perfect, but professional, valid and reliable
- **95 percent of candidates** said we **prepared them well** for the virtual experience
- Allowed for prioritization of the health and safety of candidates and assessment team



2022 APPLIED EXAMS

SIX EXAM WEEKS

RETURN TO RALEIGH

TO BE HELD AT THE AIME CENTER

- Virtual exams were a successful way to get displaced 2020 candidates and the 2021 cohort through the certification process
- Anticipate returning to in-person exams in Raleigh in **February 2022** with risk-mitigating measures in place; better positioned to deliver fair and standardized exams in-person
- 2022 candidates will be first to experience The **AIME Center** – our newly expanded assessment center
- Will be able **accommodate more candidates** each exam week



2022-2023 APPLIED EXAM: OSCE CHANGES

FIRST CHANGE

Application of Ultrasonography (Point-of-care Ultrasound)

- Heart (2022)
- Lung (2023)

SECOND CHANGE

Interpretation of Echocardiograms & Surface Ultrasound of Lung

- Transthoracic echocardiography images (2022)
- Lung and diaphragm ultrasound images (2023)

These changes were set to take effect in 2021 but were postponed until 2022 or 2023 because of disruptions to training

NEUROCRITICAL CARE (NCC) EXAM

- NCC specialty is devoted to the comprehensive, multisystem care of critically ill patients with **neurological diseases** and **conditions**
- First exam was administered **Oct. 4-8 2021** by the **American Board of Psychiatry and Neurology** to eligible diplomates of the **American Boards of Anesthesiology, Emergency Medicine and Surgery**
- Another NCC Exam will be given in **2022**, and then **even-numbered years** after that

ADULT CARDIAC ANESTHESIOLOGY (ACA) EXAM

Diplomates in this specialty will pursue ACA certification to demonstrate their expertise in the **imaging, diagnosis, physiology, pharmacology** and **management** of adults whose cardiac disease requires specific techniques, interventions and technology

- New subspecialty certification
- First exam in 2023
- ACA Examination Committee appointed
- Two-year exam development process now underway

MOCA[®] PROGRAM REQUIREMENTS



Medical License

Unrestricted medical licensure



CME

250 Category 1 CME Credits
(including 20 Patient Safety)



MOCA Minute[®]

Answer 120 questions each year
and meet the standard



Quality Improvement

Attest to completing 25 points (25
hours) every five years; Variety of
options

CME FOR MOCA MINUTE®

- We received frequent **requests** to offer **CME** for **MOCA Minute** and collaborated with the **ASA** to deliver this feature to our diplomates
- Diplomates participating in MOCA Minute for continuing certification can earn up to **10 CME credits per year** for answering all **30 questions each calendar quarter**
- **98 percent** of MOCA participants have **opted-in** to CME for MOCA Minute (during annual registration)

CONTINUING CERTIFICATION

AMERICAN BOARD OF MEDICAL SPECIALTIES

STANDARDS FOR CONTINUING CERTIFICATION

Effective January 1, 2024

*Approved by the Board of Directors of the
American Board of Medical Specialties (ABMS)
on October 29, 2021*

DID MEDUSA JUST DYE HER HAIR?



(medium.com, 2021)

CONTINUING CERTIFICATION

BUILDING THE NEXT ITERATION

1 DIPLOMATE
EXPERIENCE

- Promote lifelong learning, improve public health and enhance outcomes

2 INCORPORATE NEXT
GENERATION LEARNING

- Multi-phased initiative to develop an interactive, diplomate-centered program that incorporates AI and other technologies to promote learning

3 DEVELOP NEW ASSESSMENT
PLATFORMS

4 ENHANCE QI/REGISTRY INTERFACE

- Offer credit for participating in on-the-job learning

PHASE 1: ABA GO

- New user experience - **redesigned physician portal** and **integrated mobile app**
- Features and tools designed to deliver data and elevate the board certification experience
- Builds on the former MOCA Minute app, providing the **full suite of ABA services**, including access to certification records, diplomates' Knowledge Assessment Report and the CME Explorer
- Physicians are engaging an average of three times more in 2021 than in 2020 and are accessing more web pages each session
- 17,000 mobile app downloads



ABA GO DASHBOARD

The dashboard features a dark blue sidebar on the left with the ABA logo and navigation links: DASHBOARD, MOCA, EXAM INFORMATION, ACCOUNT SETTINGS, CONTACT US, PUBLIC WEBSITE, POLICY BOOK, and FAQ. The main content area is divided into sections: MY PROGRESS, REGISTRATION, CERTIFICATIONS, and MEDICAL LICENSE.

MY PROGRESS

MOCA MINUTE®

Tell us how you're improving your practice

Learn more about the requirements that need to be completed by Years 5 and 10 as part of MOCA 2.0®.

[Review Your Progress Report](#)

CME

QUALITY IMPROVEMENT

QI-1
1/2/2015 - 12/31/2019
25 points completed out of 25

QI-2
1/1/2020 - 12/31/2024
25 points completed out of 25

QI-3 ⚠️
Attestation due between 1/1/2023 and 12/31/2023

[My QI Activities](#)

REGISTRATION

Name	Progress	Action
MOCA 2.0 Program	100%	View

CERTIFICATIONS

▼ Anesthesiology

MEDICAL LICENSE

State	Status
Connecticut	Expired ❌
Washington	Expires Soon ⚠️

[My Medical Licenses](#)

KNOWLEDGE ASSESSMENT REPORT

ABA

Dr. Ann Example
ABA ID: 1234-5678 | CERT#: 999999
ann.example@theaba.org

Knowledge Assessment Report

This report provides details about the questions you answered incorrectly and CMEs related to the question topics.

View Performance for: 2021

^ Fundamental Topics In Anesthesiology

Incorrect: 3

QUESTION	QUESTION
<p>During general anesthesia for a laparoscopic appendectomy, fresh gas flows are decreased from 6</p>	<p>In a patient with COVID-19 requiring general anesthesia</p>
<p>KEY POINT</p> <p>Causes of anesthesia machine low pressure alarm include circuit leaks</p>	<p>KEY POINT</p> <p>A heat and moisture exchange filter with a gas sampling port should be placed between the tracheal tube and the</p>
<p>PEER PERFORMANCE</p> <p>64%</p>	<p>PEER PERFORMANCE</p> <p>49%</p>
<p>RESOURCES</p> <p>View Question Details Related CME Activities</p>	<p>RESOURCES</p> <p>View Question Details Related CME Activities</p>

CME EXPLORER

The screenshot shows the CME Explorer web application interface. On the left is a dark blue sidebar with the ABA logo and a list of navigation links: DASHBOARD, MOCA, EXAM INFORMATION, ACCOUNT SETTINGS, CONTACT US, PUBLIC WEBSITE, POLICY BOOK, FAQ, and LOG OUT. The top header is blue and displays the user's profile: Dr. Ann Example, ABA ID: 1234-5678 | CERT#: 999999, and email: ann.example@theaba.org. A notification bell icon is in the top right. The main content area is titled 'CME Explorer' and features a search bar with the text 'airway' and a 'Search' button. Below the search bar, there is a disclaimer: 'The ABA does not produce or endorse any CME. We also do not financially benefit from diplomate participation in CME.' The search results show '111 Search Results' with 'Filter By' and 'Sort By' options. Three search results are visible, all titled 'AIRWAY EMERGENCIES/TREATMENT OF PAIN'. Each result includes the following details: Activity Format: Enduring Material, Provider Name: Audio-Digest Foundation, Expiration Date: 10/07/2021, Typical Learning Time: 2 hrs 0 min, CME Credits: 2.00, and Fee: Yes.

ABA

DASHBOARD
MOCA >
EXAM INFORMATION >
ACCOUNT SETTINGS >
CONTACT US
PUBLIC WEBSITE
POLICY BOOK
FAQ
LOG OUT

Dr. Ann Example
ABA ID: 1234-5678 | CERT#: 999999
ann.example@theaba.org

CME Explorer

Search for CMEs

Keyword Search Topic Search

airway Search

The ABA does not produce or endorse any CME. We also do not financially benefit from diplomate participation in CME.

111 Search Results Filter By Sort By

AIRWAY EMERGENCIES/TREATMENT OF PAIN
Activity Format: Enduring Material Provider Name: Audio-Digest Foundation
Expiration Date: 10/07/2021 Typical Learning Time: 2 hrs 0 min CME Credits: 2.00 Fee: Yes

AIRWAY EMERGENCIES/TREATMENT OF PAIN
Activity Format: Enduring Material Provider Name: Audio-Digest Foundation
Expiration Date: 10/07/2021 Typical Learning Time: 2 hrs 0 min CME Credits: 2.00 Fee: Yes

AIRWAY EMERGENCIES/TREATMENT OF PAIN
Activity Format: Enduring Material Provider Name: Lippincott Continuing Medical Education Institute, Inc.
Expiration Date: 10/07/2021 Typical Learning Time: 2 hrs 0 min CME Credits: 2.00 Fee: Yes

RESEARCH INITIATIVES

EVALUATION OF INITIAL CERTIFICATION

- Analysis of **OSCE** and **SOE** measurement constructs
- Impact of OSCEs on training programs
- Development of **virtual APPLIED Exams**

CONTINUING CERTIFICATION EVALUATION

- **Participation in MOCA**, including MOCA Minute, is associated with **fewer license actions** taken by state medical licensing boards against physicians

PHYSICIAN WELL-BEING & WORKFORCE ANALYSIS

- Resident Family and Medical Leave during the first year of the revised Absence from Training Policy
- Residents' experiences and perspectives on training
- Anesthesiologist demographic trends

INNOVATION UPDATE- ARTIFICIAL INTELLIGENCE- DRIVEN CHATBOX



DEVELOPMENT UNDERWAY

NEW ASSESSMENT MODEL FOR CONTINUING CERTIFICATION

- Using Additional Topics (AT) questions from the ABA's oral exams to replicate the case-based discussion of a clinical scenario in a choose-your-own-adventure, formative assessment. Designed to be an optional assessment for learning, not as a replacement of MOCA Minute
- Designed with assistance from diplomate volunteers to help guide features and content that is most meaningful for physicians.
- **Currently in prototyping phase and plans to pilot the functionality when available before implementing.**

DIVERSITY, EQUITY & INCLUSION (DEI)

- We are committed to addressing **DEI issues**, particularly those relating to our organization and assessments
- Objective is to ensure that ABA **governance** and **assessment policies** and **practices** contribute to a **diverse** and **inclusive specialty** that can meaningfully address **healthcare disparities**
- Began **collecting physician race/ethnicity data** July 1 as part of a broader QI analysis of our certification programs and to ensure our volunteer corps are representative of the specialty
- Working with a **DEI consultant** to guide this work
- We conducted a **diplomate survey** and will do **focus groups** and **interviews** to incorporate diplomate feedback into our future

Thank You!

COMMUNICATIONS CENTER

Phone: (866) 999-7501

Fax: (866) 999-7503

Email: coms@theABA.org

MAIL CORRESPONDENCE

ABA Secretary

4208 Six Forks Rd, Suite 1500

Raleigh, NC 27609-5765

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