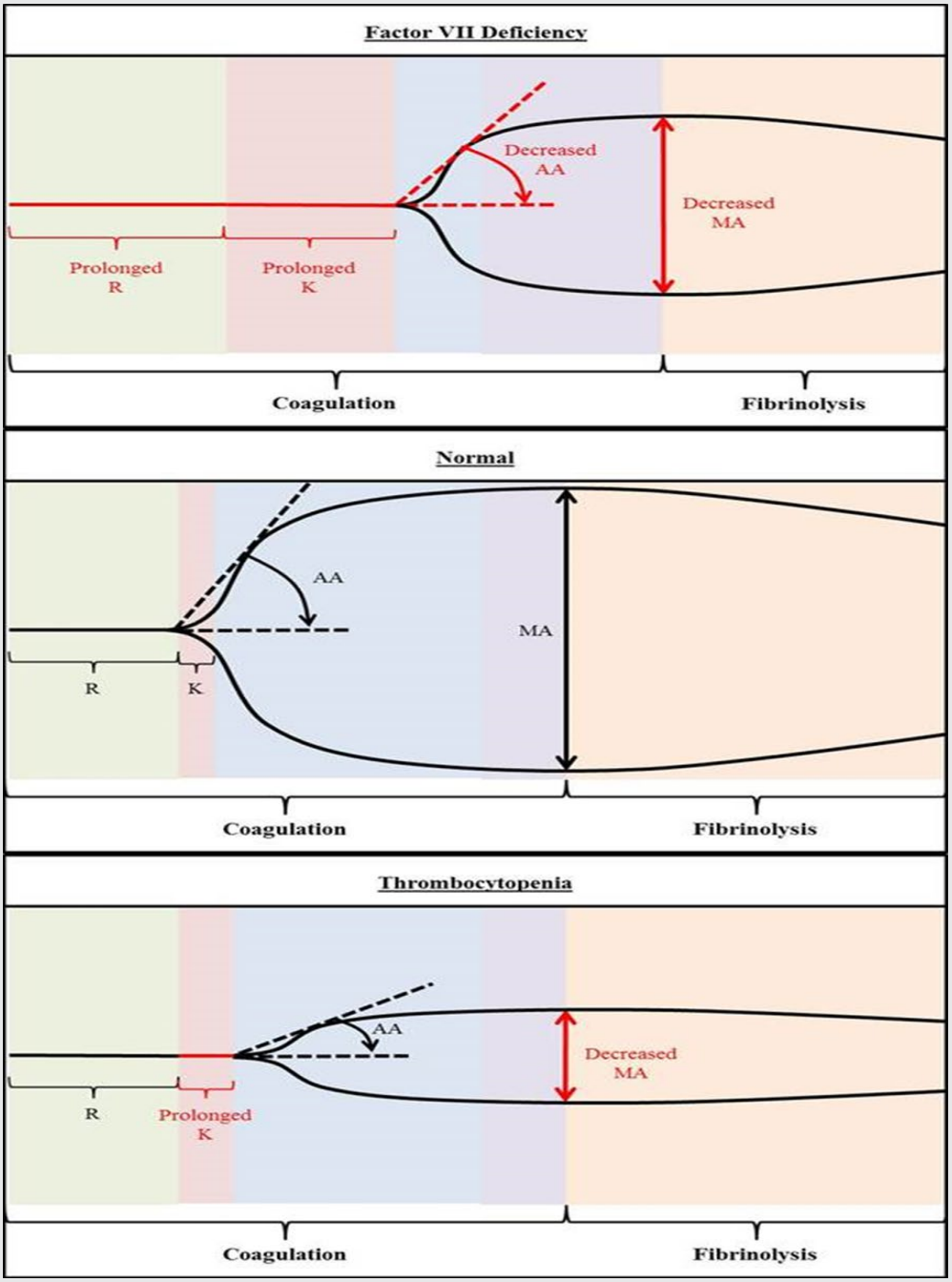
Volume 1 | Issue 4
November 2024

CLINICS IN MEDICAL EDUCATION

Docendo Discimus

[By Teaching We Learn]



INSIDE

Beth Israel Deaconess Medical Center

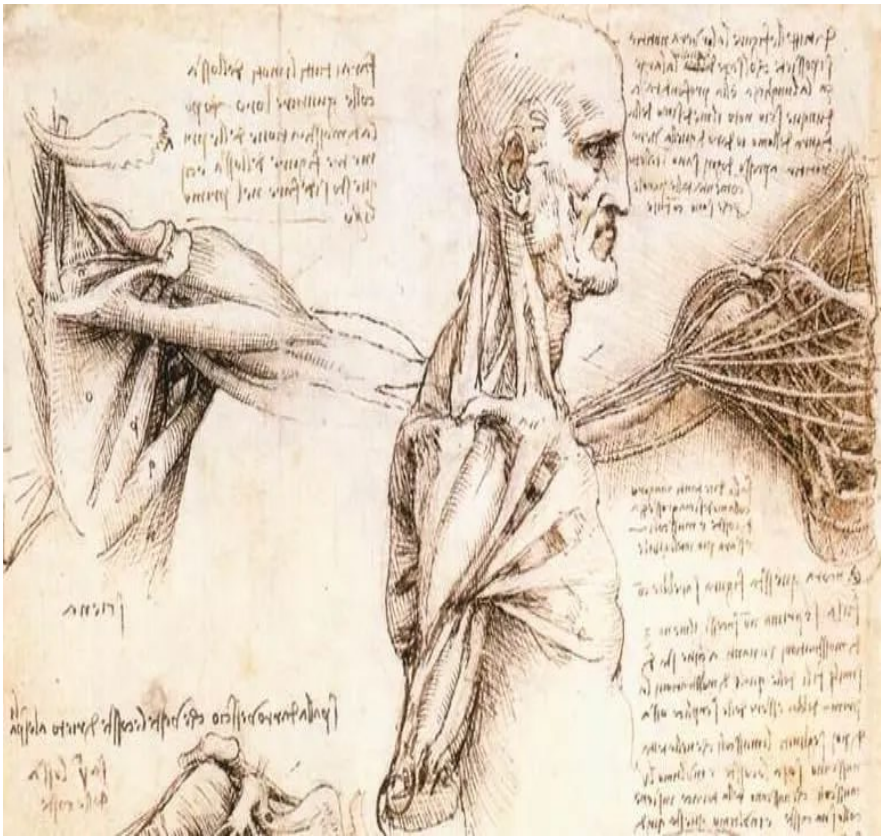
HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

Department of Anesthesia, Critical Care and Pain Medicine

Center for Education Research, Technology and Innovation

New Website

Check us out online!
medicaleducationclinic.com
offers the latest updates in research, academia, and pedagogy from the anesthesia department at BIDMC. The site features extra content, interactive courses, quizzes, and a wide array of engaging resources. Click here to explore and enhance your learning experience!



The artwork "Anatomical studies of the shoulder," created by Leonardo da Vinci around 1510 in Milan, Italy, presents a compelling exploration of human anatomy. Rendered with finesse on paper using chalk and ink, this piece measures 28.9 cm by 19.9 cm and belongs to the High Renaissance movement.
https://www.artchive.com/artwork/anatomical-studies-of-the-shoulder-leonardo-da-vinci-c-1510-milan-italy/

Nyansapo "Wisdom Knot": A symbol of wisdom, ingenuity, intelligence, and patience.
The proverb associated with this Adinkra is "Nyansapo wosane no badwenma," to wit,
"A wisdom knot is untied (only) by the wise."
https://www.adinkrasymbols.org/symbols/nyansapo/

COVER: Thromboelastography reading with analysis parameters. AA indicates α-angle; K, coagulation time; MA, maximal amplitude; R, reaction time; TEG, thromboelastography.

In this issue, we have introduced a '**Coagulation Corner**' to provide in-depth insights into diagnostic tests, their utilization and interpretation. We have kicked off with Thromboelastography (TEG) and moving forward we will share case studies and additional modules to enhance understanding of coagulation diagnostics.

Table of Contents

CLINICS IN MEDICAL EDUCATION
Docendo Discimus
[By Teaching We Learn]

EDITOR'S WELCOME

We are thrilled to share our fourth issue of Clinics in Medical Education! This is an interactive anesthesia education journal that will deliver a summary of clinical and medical education directly to your mobile devices, ipads and computers. We have recently launched our website (https://medicaleducation-clinic.com/) and look forward to hearing your feedback and suggestions for future content. Our aim is to provide unlimited educational resources to our residents and faculty. Each month, we present complex and unique cases to enhance your expertise featuring embedded live lectures, quizzes and rich visual aids including ultrasound images, CT scans, X-rays and interpretation of invasive and non-invasive monitoring.

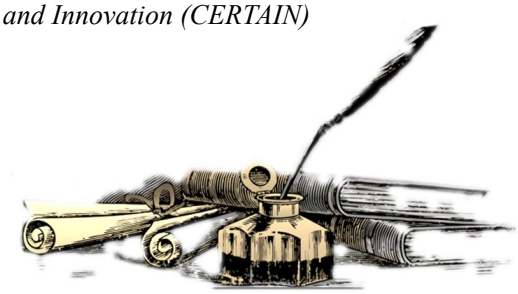
We hope you enjoy our fourth issue!

Robina Matyal

Robina Matyal, MD
Vice Chair, Education
Director of Center for Education Research, Technology and Innovation (CERTAIN)
Director of Vascular Anesthesia
Beth Israel Deaconess Medical Center

Leonard S. Bushnell MD, Chair in Anaesthesia
Beth Israel Deaconess Medical Center

Professor of Anaesthesia, Harvard Medical School



Feroze Mahmood, MD, FASE
Division Director, Cardiac Anesthesia
Beth Israel Deaconess Medical Center

Professor of Anaesthesia, Harvard Medical School

Daniel S. Talmor, MD, MPH
Chairman, Department of Anaesthesia, Critical Care, and Pain Medicine
Beth Israel Deaconess Medical Center

Edward Lowenstein Professor of Anaesthesia, Harvard Medical School

OUR MISSION

- Empowering scholarly dialogue and advancing knowledge through rigorous research and insightful perspectives.
- Advancing medical education through effective teaching practices and ongoing mentorship.
- Fostering excellence in medical teaching through continuous innovation and professional growth.

"Mentorship transforms the Sisyphean task into a journey of growth, where every struggle is met with support and every setback is a setup for a comeback."

PEDAGOGY IN EDUCATION

The Sysiphus Effect: Mentorship and the Power of Resilience

Robina Matyal, MD

The story of Sisyphus, a figure from Greek mythology, serves as a profound exploration of resilience and the human spirit. At its core, the myth of Sisyphus holds essential lessons about resilience. Sisyphus's determination to continue pushing the boulder, despite its inevitable descent, highlights the importance of perseverance in the face of challenges. His plight teaches us that life often involves repetitive tasks and struggles that may seem meaningless, yet it is within these struggles that we can find deeper meaning and strength. This perspective can be particularly insightful for mentors as they guide their mentees through their own journeys.

Resilience in Daily Life: Resilience is not just about enduring hardship; it is about cultivating a mindset that views challenges as opportunities for growth. This perspective enables individuals to learn from failure, develop emotional strength, and maintain a sense of purpose. In a world characterized by rapid change and uncertainty, resilience becomes an essential skill for personal and professional success.

The Role of Mentors in Fostering Resilience: Mentors play a crucial role in teaching resilience to their mentees. They offer guidance, support, and wisdom drawn from their own experiences. Here are several ways mentors can nurture resilience:

1. **Modeling Resilience:** Mentors can share their own stories of overcoming adversity. By demonstrating how they navigated challenges, mentors show mentees that setbacks are a natural part of life and can be overcome with perseverance.

2. **Encouraging a Growth Mindset:** Mentors can help mentees adopt a growth mindset, emphasizing that abilities can be developed through dedication and hard work. This perspective encourages learners to see challenges as opportunities for growth rather than insurmountable barriers.

3. **Promoting Problem-Solving Skills:** A key aspect of resilience is the ability to tackle problems effectively. Mentors can guide mentees in developing critical thinking and problem-solving skills, equipping them to approach challenges with confidence and creativity.

4. **Providing Emotional Support:** Resilience is not just about mental toughness; it also involves emotional intelligence. Mentors can offer a listening ear, validate their mentees' feelings, and help them process their emotions during tough times.

5. **Encouraging Reflection:** By prompting mentees to reflect on their experiences, mentors can help them identify lessons learned from failures and setbacks. This reflection fosters a deeper understanding of resilience and reinforces the idea that struggles can lead to personal growth.

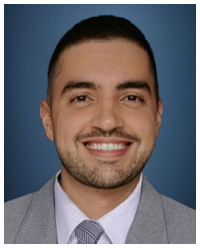
6. **Setting Realistic Goals:** Mentors can assist mentees in setting achievable goals, which can provide a sense of purpose and direction. Celebrating small victories along the way helps build confidence and demonstrates that progress is possible, even in the face of adversity. The story of Sisyphus reminds us that resilience is about more than merely enduring hardship; it is about finding meaning in the struggle.

"Knowledge knows no bounds—transform your life through the power of adult learning."

Make it Stick: Shaping Our Teaching Using Effective Learning Strategies

Federico Puerta Martinez, MD

Matthew Gao, MD



As anesthesiology educators, we hold the key to guiding students toward learning strategies that don't just get them through exams but equip them with the skills for real-world situations. Let's explore some evidence-based approaches that transform the learning experience, deepen understanding, and build lasting retention of complex concepts—making learning truly "stick."

Understanding How We Learn

Broadly speaking, the process of learning can be broken down into three stages. It all starts with encoding—transforming sensory perceptions into meaningful representations in the brain to form short-term memory. This stage requires attention and focus; without these, information is quickly lost. Next is consolidation, where new information is stored in long-term memory. Finally, retrieval allows us to access this information when we need it. So, beyond just paying attention, what can we do to effectively learn—and help our students learn better?

Why Active Learning Matters?

Cramming, highlighting, and rereading notes might feel productive, but research shows that these passive techniques often create an "illusion of mastery," where students feel they're learning without actually retaining much. An example of this could be to start some classes or lectures with low-stakes, quick-fire review questions on key concepts from the previous session, especially practical and relevant points. But remember, this isn't about evaluation (i.e. measuring knowledge) but about using testing as a learning tool. Accompany each quiz with constructive feedback, explaining both the correct answers and the reasoning behind them. This approach, known as Retrieval Practice, is one of the most effective ways to learn. It encourages students to actively recall and consolidate knowledge, strengthening their memory and reinforcing prior learning.

Retrieval, Spaced and Interleaved Practice: Building Stronger Foundations

While many of us have crammed for exams, spaced practice—revisiting material over time—is far more effective. Pair this with interleaved practice, which involves mixing topics in a way that requires students to differentiate and connect them. Consider, for example, a teaching session on neuromonitoring during vascular cases. It might be appropriate to revisit cerebral blood flow and brain protection concepts during endarterectomy surgeries. Or, in an arrhythmia workshop, interleave discussions of cardioversion and pacing procedural steps. The key concept here is that by interleaving principles or rules that differentiate types of problems, students develop "discrimination skills," helping them select the right approach even in unfamiliar scenarios. This approach leads to a deeper, more flexible understanding, making it easier to apply concepts in unpredictable clinical settings.

Beyond Memorization: Foster Effective Reasoning Skills

To deepen understanding and retention, encourage students to engage in cognitive processes that go beyond memorization. These strategies help students develop critical thinking and a more comprehensive grasp of the material. Some principles with suggested examples include:

Elaboration: The process of linking new information to previous knowledge (making connections). Encourage students to explain concepts in their own words and link new information to what they

already know. Case-based learning (CBL) is an excellent strategy for this, as it allows students to justify specific approaches based on prior knowledge of related topics.

Generation: Involves the act of trying to solve a problem before being taught the solution. This is believed to enhance learning, even when the initial answer to the problem is not correct. Generation is the theoretical foundation of the Problem-Based Learning (PBL) approach.

Reflection: Prompt students to reflect on what they've learned and how they applied it. This is evident in debriefing sessions after simulation scenarios but can also be used in many other contexts.

Calibration: Help students align their perceptions with their actual performance by providing regular, constructive feedback. This works hand in hand with self-reflection and objective assessments, improving their ability to accurately judge their own knowledge.

Encourage a Growth Mindset for Development and Resilience

Cultivating a growth mindset means students see their skills as continually developable through effort and learning from mistakes, unlike a fixed mindset, in which they view their abilities as unchangeable—a perspective that can lead to frustration in challenging situations.

Consider for example observing a student failing at an attempt to place an epidural catheter, instead of focusing on the outcome, one could provide feedback that focuses on their technique and progress, rather than just the outcome. For instance, one could say, "You're not quite there yet, but here's how we can improve." This approach helps students see setbacks as part of their learning curve, reducing performance anxiety and encouraging persistence.

Use Concrete Examples and Deliberate Practice

Abstract concepts can feel daunting, but using concrete examples makes them more accessible. Combine this with deliberate practice, where complex skills are broken down into manageable steps, allowing students to master each component before putting everything together.

By embracing these evidence-based strategies, we can foster a dynamic, supportive learning environment where students don't just memorize but understand, apply, and grow—transforming them into more competent and, hopefully, more resilient anesthesiologists.

Adapted from: Brown, Peter C., Henry L. Roediger III, and Mark A. McDaniel. Make It Stick: The Science

Understanding Atrial Fibrillation: A brief educational review

Mona Hedayat, MD

A 65-year-old male with a history of hypertension, diabetes mellitus, coronary artery disease (previous PCI 3 years ago), chronic kidney disease stage 3 and former smoker is undergoing elective laparoscopic cholecystectomy. During the procedure, the patient develops acute atrial fibrillation (AF) with a rapid ventricular response, leading to hemodynamic instability characterized by hypotension and signs of poor perfusion. The anesthesiologist checked ABG to rule out reversible causes (hypo or hyperkalemia, acidosis), administered IV fluids cautiously to optimize preload and blood pressure and IV metoprolol to control rate, but the patient remains hemodynamically unstable.

According to 2023 guidelines from the American College of Cardiology (ACC), American Heart Association (AHA), American College of Chest Physicians (ACCP), and Heart Rhythm Society (HRS), emergency R-wave synchronized direct current (DC) electrical cardioversion is recommended for hemodynamically unstable patients with new-onset AF [1]. Caution is advised for patients with preoperative or unknown sinus node dysfunction or with patients receiving significant doses of rate controlling medications, as significant pauses can occur after DC cardioversion. For those patients, external pacing may be required and should be readily available [2].

The 2023 guidelines also provide specific recommendations regarding the need for echocardiography to find intracardiac thrombus prior to cardioversion in the context of managing AF [1].

- For patients with AF duration of ≥48 hours, a 3-week duration of uninterrupted therapeutic anticoagulation OR imaging evaluation to exclude intracardiac thrombus is recommended before elective cardioversion.
- For patients with AF undergoing cardioversion, therapeutic anticoagulation should be established before cardioversion and continued for at least 4 weeks afterwards without interruption to prevent thromboembolism.
- In patients with AF in whom cardioversion is deferred due to left atrial appendage (LAA) thrombus detected on pre-cardioversion imaging, therapeutic anticoagulation should be instituted for at least 3 to 6 weeks, after which imaging should be repeated before cardioversion.

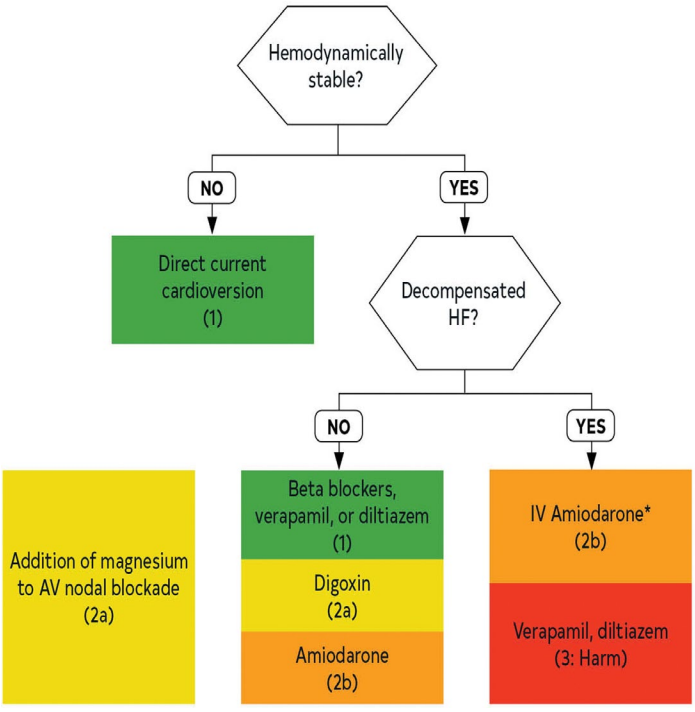


Figure 1. Acute Rate Control in AF With RVR. * Contraindicated in patients with moderate-severe LV dysfunction regardless of decompensated HF.[4] RVR: Rapid Ventricular Rate, HF; Heart Failure

- For patients with reported AF duration of <48 hours (not in the setting of cardiac surgery) and who are not on anticoagulation, pre-cardioversion imaging to exclude intracardiac thrombus may be considered in those who are at elevated thromboembolic risk (CHA2DS2-VASc score ≥2 or equivalent).

  During the first 48 hours after the onset of paroxysmal AF, the need for anticoagulation before and after DC cardioversion may be based on the patient's risk of thromboembolism (CHA2DS2-VASc score) balanced by the risk of postoperative bleeding [3].

  In this case scenario, synchronized DC cardioversion was performed with an initial shock of 200 J, successfully restoring sinus rhythm with HR 78 bpm and BP 120/75. Following successful cardioversion, cardiac enzymes and BNP were sent to assess for myocardial ischemia or heart failure exacerbation. Postoperatively, intravenous heparin was administered to reduce the risk of thromboembolism. A cardiology consultation needs to be arranged for further management and to discuss long-term anticoagulation based on the patient's CHA2DS2-VASc score.

  For hemodynamically stable patients requiring acute rate control, here is the summary of the 2023 guideline recommendations [1]:

- In patients with AF with rapid ventricular response who are hemodynamically stable, beta blockers or non-dihydropyridine calcium channel blockers (verapamil, diltiazem; provided that EF >40%) are recommended for acute rate control.

- In patients with AF with rapid ventricular response in whom beta blockers and non-dihydropyridine calcium channel blockers are ineffective or contraindicated, digoxin can be considered for acute rate control, either alone or in combination with the aforementioned agents.

- In patients with AF with rapid ventricular response, the addition of intravenous magnesium to standard rate-control measures is reasonable to achieve and maintain rate control.

- In patients with AF with rapid ventricular response who are critically ill and/or in decompensated HF in whom beta blockers and non-dihydropyridine calcium channel blockers are ineffective or contraindicated, intravenous amiodarone may be considered for acute rate control. Consider the risk of cardioversion and stroke when using amiodarone as a rate-control agent.

- In patients with AF with rapid ventricular response and known moderate or severe LV systolic dysfunction with or without decompensated HF, intravenous non-dihydropyridine calcium channel blockers should not be administered.

Click here to view the 2023 ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines!

References:

1. Frendl G, Sodickson AC, Chung MK, et al. 2014 AATS Guidelines for the Prevention and Management of Perioperative Atrial Fibrillation and Flutter for Thoracic Surgical Procedures. Executive Summary. The Journal of Thoracic and Cardiovascular Surgery. 2014;148(3):772-91.

2. Fleisher LA, Fleischmann KE, Auerbach AD, et al. 2014 ACC/¬AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery: A Report of the American College of Cardiology/¬American Heart Association Task Force on Practice Guidelines. Circulation. 2014;130(24): e278-333.

3. Lucà F, Giubilato S, Di Fusco SA, et al. Anticoagulation in Atrial Fibrillation Cardioversion: What Is Crucial to Take Into Account. Journal of Clinical Medicine. 2021;10(15):3212.

4. Joglar, José A et al. "2023 ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines." Circulation vol. 149,1 (2024): e1-e156. doi:10.1161/CIR.0000000000001193

Get To The Point! Sharpen Your Message and Make Your Words Matter With Effective Power Point Presentation

Feroze Mahmood, MD

As part of the Education Scholarly Program, Dr. Feroze Mahmood delivered a talk during the Tuesday Faculty Hour to highlight the techniques for creating effective powerpoint presentations.

Click here to view the recording!

Every presentation has four essential parts: (1) Prerequisties, (2) Architecture, (3) Planning and (4) Examples.

Here are some key strategies:

Clear Structure: Start with a strong introduction that outlines your main points. Use a consistent format throughout, including a clear agenda slide, and conclude with a summary that reinforces your key messages.

Concise Content: Aim for brevity and limit the amount of text on each slide to avoid overwhelming your audience. Each slide should be symmetric and convey a single idea or theme.

Engaging Visuals: Use high-quality images, charts, and infographics to illustrate your points. Visuals can often convey complex information more effectively than text alone, helping to maintain audience interest.

Consistent Design: Maintain a uniform color scheme and font style throughout your presentation. This helps the audience focus on the content rather than the format.

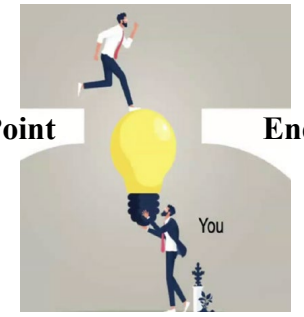
Animation and Transitions: Use animations and transitions sparingly to emphasize key points or to guide your audience through the narrative. Overuse can be distracting, so keep it subtle.

Interactive Elements: Consider integrating polls or questions to encourage audience participation. Tools like Mentimeter or Slido can facilitate real-time feedback and interaction.

Practice Delivery: Familiarity with your content will allow you to engage more naturally with your audience.

By implementing these techniques and utilizing the right tools, you can create PowerPoint presentations that effectively communicate your message while keeping your audience engaged and interested.

CERTAIN and the Education Division invite you to attend our next session on December 3rd at 6:30am!



"Master the art and science of imaging with our ultrasound training course—where every lesson turns complexity into clarity and precision into practice."

Certification in Ultrasound

Michael Li, MD
Robina Matyal, MD
Shirin Saeed, MD
Christina Short, BS




We are launching a comprehensive certification program in ultrasound, designed to enhance both knowledge and practical skills through a hybrid learning approach. This program incorporates online and live teaching. The online curriculum will be available on the learning management system Docebo and C8Health.

Click here to view the first short module on probe motions.

As we move forward, we are excited to launch a new online segment dedicated to ultrasound education, designed to make complex concepts more accessible for practitioners at all levels. Each installment in the journal will feature bite-sized pieces that distill essential information into easily digestible formats, ensuring that busy professionals can quickly grasp key principles without feeling overwhelmed. In our inaugural segment, we will focus on the fundamental probe motions and techniques required for obtaining views in transthoracic echocardiography (TTE).

For hands on practice, we encourage residents to identify local mentors in the department and utilize the QPath E software to enhance their hands on skills. The list of local mentors is available on Docebo.

Our goal is to empower practitioners to apply ultrasound techniques in their clinical practice and achieve competency level 4 as described by the ACGME.

Patient Care 6: Point-of-Care Ultrasound				
Level 1	Level 2	Level 3	Level 4	Level 5
Lists and explains the basic science and terminology of ultrasound	Selects ultrasound equipment for procedures, with supervision	Selects ultrasound equipment for a patient with difficult anatomy, with supervision	Independently selects proper ultrasound equipment and settings for indicated scenarios	Participates in research of emerging ultrasound procedures
Identifies relevant anatomy using ultrasound	Conducts point-of-care ultrasound, with supervision	Interprets point-of-care ultrasound, with supervision	Independently conducts and interprets point-of-care ultrasound	Participates in the development of institutional protocols for point-of-care ultrasound
Uses ultrasound for vascular access in routine situations, with supervision	Uses ultrasound for vascular access in routine situations	Uses ultrasound for vascular access in complex situations, with supervision	Independently uses ultrasound for vascular access in complex situations	

Table 1. Competency levels outlined by the Accreditation Council for Graduate Medical Education (ACGME) for point of care ultrasound.

References: Ambardekar, Aditee P et al. "The Anesthesiology Milestones 2.0: An Improved Competency-Based Assessment for Residency Training." Anesthesia and analgesia vol. 133,2 (2021): 353-361.

How to login to Qpath

Use your BIDMC portal login credentials to log onto Qpath.

How to access Qpath and Docebo

Qpath and Docebo can be accessed from the Anesthesia Portal here.

"Ethics training: Where knowledge meets conscience to guide responsible action."

Ethics Analysis of A Complex Perioperative Case

Shahla Siddiqui, MD

A 74 year old patient with a h/o stroke and MI is listed in the OR for a decortication of a possibly malignant pleural effusion. There is a DNR and DNI order in place and the patient lives in a care facility, is non-verbal and has a medical order for life sustaining treatment (MOLST) form in the chart with her prior wishes, preferences and goals expressed. The anesthesiologist discussed the goals of care and code status prior to the procedure with the family, who agree to rescind the DNR DNI order peri-procedure, but do wish for the team to discuss with them, if any heroic therapy is required to save her life. The patient suffers an intraoperative cardiac arrest after induction of anesthesia and the family urgently called from the OR while resuscitation is started. The family discuss prognosis with the care team (surgeon, anesthesiologist and an intensivist whom the anesthesiologist urgently contacted). The patient has return of spontaneous circulation, but given the circumstances, and discussion between the family, surgeon and anesthesiologist, the procedure is aborted and the patient is moved to the ICU for palliative care and comfort measures. Palliative care staff are involved, along with the ICU team. Spiritual care staff and other family are at the bedside and the patient is moved to comfort measures and expires peacefully. The family appreciate the care and communication.

Questions

1. Is it necessary to rescind DNR code status perioperatively?
2. Who assesses decisional capacity?
3. If the status is 'full code' is it ethical to discuss decompensation in the OR with the family?
4. If the patient lacks capacity, can the sister (HCP) make a decision to revoke her MOLST wishes?
5. What duty of care do perioperative physicians carry towards discussion of code status? Who does it?
6. Is it helpful to have a discussion with the family in real time from the OR?

Ethics Issues to Consider

Surrogate Decisional Capacity vs competency in informed consent.

Surrogate decision making vs shared decision making (relational autonomy)

Principle of proportionality- burden vs benefit of therapy

Empathic communication and empathic actions.

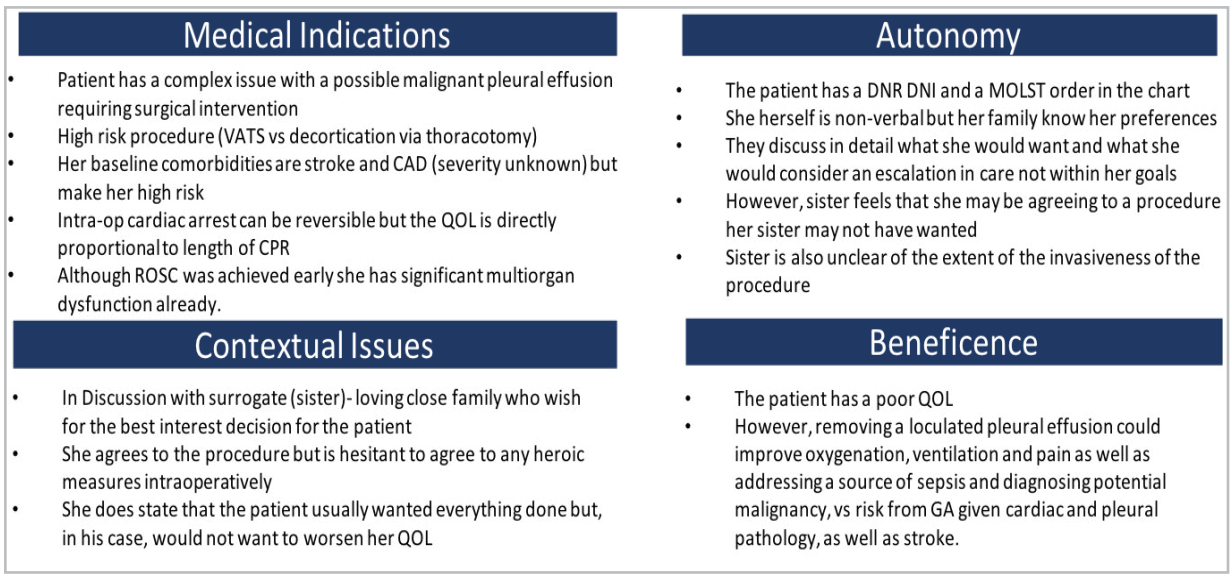


Figure 1. Jonsen's 4 box model of ethical decision making.[3]

Decisional Capacity vs Competency in Informed Consent

- Capacity is defined as "a functional determination that an individual is or is not capable of making a medical decision within a given situation". This is relative to the baseline abilities of the patient, pertains only to the current situation, and takes into consideration the severity of the possible consequences.Determination is made by any clinician for any specific situation.
- Competency is defined as "the ability of an individual to participate in legal proceedings". Legal competence is presumed - to disprove an individual's competence requires a hearing and presentation of evidence. Competence is determined by a judge. This legal determination is never determined by medical providers.
- All adults are presumed to have sufficient capacity to decide on their own medical treatment, unless there's significant evidence to suggest otherwise. Capacity means the ability to use and understand information to make a decision, and communicate any decision made. A person lacks capacity if their mind is impaired or disturbed in some way, which means they're unable to make a decision at that time.Informed consent can be obtained only if the patient can understand, retain and deliberate on their decision specific to the procedure. In the case of our patient this was absent and a surrogate was asked for a decision (healthcare proxy /sister)

Surrogate decision making (SDM) vs shared decision making (relational autonomy)

- A surrogate decision maker shall make decisions for the person conforming as closely as possible to what the person would have done or intended under the circumstances, taking into account evidence that includes, but is not limited to, the person's philosophical, religious, moral and ethical beliefs. However, the SDM decisions are typically made according to a process governed by a hierarchy of 3 distinct decision-making standards: (1) patients' known wishes, (2) substituted judgments, and (3) best interests.
- In this case the sister weighed all 3 standards, and applied 1, 2 but within limits and when the best interest standard was challenged opted to limit care and shift goals to comfort and dignity. Having 'shared' decisions made with the care team in real time and with ALL stakeholders (surgeon, anesthesiologist and intensivist) helped guide her care decision. Assurance that 'care' will not be withdrawn for her sister- human nature is to desire support in making tough decisions, as well as get direction in 'best' medical course to achieve goals.

Principle of proportionality- burden vs benefit of therapy

- The principle of proportionality states that responses should be proportional to the good that can be achieved and the harm that may be caused. As it relates to medical ethics, this means that medical interventions and risks should be proportionate to the possible benefits achieved.
- In this case, proceeding to do the surgery with a questionable outcome from the cardiac arrest as well as the risk of further deterioration and worsened quality of life outweighed the benefit of removing the pleural effusions. At the same time, proceeding towards comfort measures was acceptable by the family in view of the suffering caused by invasive treatment and a worse QOL by the patient. The HCP was guided by the care team in such difficult decision making. This is not always possible but prevents institution of measures that may violate a patient's right to self determination and prior expressions of preference and values.

Empathic Communication and Empathic Actions

- Empathy is understanding in the truest and most authentic form the suffering of another person or their family. Empathy is displayed in not just words expressed and communicated but also in actions and behavior: such as respecting a patient's wishes and choices, also respecting their surrogates' opinions and recognizing the emotional needs of family members (as this is respectful to the patient). In providing real time information, involving all stakeholders and experts in a timely manner to discuss prognosis and risks and benefits with the family in an iterative manner, the most compassionate decisions could be made.

References

1. Allen MB, Bernacki RE, Gewertz BL, Cooper Z, Abrams JL, Peetz AB, Bader AM, Sadovnikoff N. Beyond the Do-not-resuscitate Order: An Expanded Approach to Decision-making Regarding Cardiopulmonary Resuscitation in Older Surgical Patients. Anesthesiology. 2021 Nov 1;135(5):781-787. PMID: 34499085

2. Allen MB, Siddiqui S, Nwokolo O, Kuza CM, Sadovnikoff N, Mann DG, Souter MJ. Reviewing Ethical Guidelines for the Care of Patients with Do-Not-Resuscitate Orders after 30 Years: Rethinking Our Approach at a Time of Transition. Anesthesiology. 2024 Sep 1;141(3):584-597. PMID: 39136474.

3. Toh HJ, Low JA, Lim ZY, Lim Y, Siddiqui S, Tan L. Jonsen's Four Topics Approach as a Framework for Clinical Ethics Consultation. Asian Bioeth Rev. 2018 Mar 23;10(1):37-51. PMID: 33717274; PMCID: PMC7747427.

4. Malenfant S, Jaggi P, Hayden KA, Sinclair S. Compassion in healthcare: an updated scoping review of the literature. BMC Palliat Care. 2022 May 18;21(1):80. PMID: 35585622; PMCID: PMC9116004.

GLOBAL HEALTH

Capnograph Guided Ventilation During Cleft Lip Repair Surgery

Ama Taplah, BSN, MPH,RNA,
JFK Medical Center

Diana Park, MSN,CRNA, BIDMC

Patricia O'Connor,

Huma Hussain, MD

Edward Clune,MD

Robina Matyal, MD

Every month, the Boston Africa Anesthesia Collaborative (BAAC) hosts grand rounds, providing a platform for healthcare professionals to share cases and insights in anesthesia practice across resource-limited settings in Liberia. The October grand rounds session showcased a case, where local nurse anesthetists, supported by BAAC, are advancing anesthesia safety through improved access to capnography monitoring.

Ama Taplah, a nurse anesthetist, presented a case on capnography-guided ventilation during cleft lip repair surgery, highlighting the clinical impact of capnography on surgical outcomes. A three-month-old infant with right unilateral cleft lip underwent surgical repair at JFK Medical Center in Monrovia, Liberia. Throughout the procedure, capnography provided continuous monitoring of end-tidal CO_2 ($ETCO_2$), offering real-time feedback on the ventilation status and alerting the team to hypercapnia early on. These ventilatory modifications resulted in the gradual normalization of CO_2 levels, with stable postoperative respiratory and hemodynamic status observed during recovery. This case highlights the value of capnography as a tool for managing anesthesia, especially in preventing complications arising from ventilation-perfusion mismatches.

Diana Park, CRNA, at Beth Israel Deaconess Medical Center in Boston, shared how BAAC and Liberian nurse anesthetists are closing critical gaps in anesthesia through a collaborative initiative that improves access to capnography monitoring. Capnography remains unavailable in many low-resource settings, compromising patient outcomes. Recognizing this, Liberian nurse anesthetists undertook a national assessment to document the scarcity of capnography, revealing disparities in access. Of the few available units, distribution and routine use were inconsistent across health facilities.

Supported by the Boston Africa Anesthesia Collaborative (BAAC), six capnographs were provided to priority hospitals, each accompanied by hands-on training for local nurse anesthetists. Within weeks, these monitors were integrated into daily patient care, enabling safer anesthesia management and timely interventions. A follow-up assessment conducted five months post-deployment confirmed sustained use.

The impact of this initiative resonates through testimonials from Liberian nurse anesthetists who now use capnography. "With the capnograph machine, our intubations have improved, and tubes are secure, as the CO_2 reading gives us confidence." Such feedback highlights not only the clinical benefits of capnography but also its role in building confidence and skills among local practitioners, contributing to safer anesthesia practices across Liberia.

"Empowering educators through simulation: where teaching meets real-life scenarios for impactful learning"

INNOVATION IN EDUCATION

Routine In Situ Simulation

Nadav Levy, MD

Lior Levy, MD

Dario Winterton, MD

Adil Al-Karim Manji,MD

Peva Gbagornah, MD

Huma Hussain, MD

We are excited to provide an update on our simulation training program, which continues to enhance the educational experience for our residents. Our regular in-situ simulation sessions remain a cornerstone of this initiative, covering major intraoperative emergencies such as cardiac arrest, anaphylaxis, airway crises and non operative room anesthesia (NORA). These immersive experiences allow residents to practice critical decision-making, communication, and teamwork skills in a safe and controlled environment. By simulating high-stakes scenarios, we aim to instill confidence and competence in our residents, preparing them for real-life challenges in the operating room.

Alongside our educational efforts, we are leveraging this initiative to research and refine our teaching methods. We are actively collecting surveys and feedback from residents to assess their self percieved clinical knowledge and competence, confidence, and crisis management skills. In addition, we will assess the effectiveness of our simulation sessions and identify areas for improvement. This data-driven approach will not only enhance our training methodologies but also contribute to the broader field of medical education through research dissemination. **We are deeply grateful to our residents and faculty for their cooperation and commitment to this program, as their insights and participation are vital to our success.** By analyzing the outcomes and experiences from our simulation program, we aim to develop best practices that can be shared with other institutions, fostering a culture of continuous improvement in medical training and ultimately benefiting patient care.

Simulation Case! Click here to view a sample simulation case.

DIVISION CORNER

Case Presentation From Vascular Division

Kaavya Mahajan, MD
Jacopo Colombo, MD

A 59 year old female with weight of 57 kg and BMI 20 with past medical history
Cardiac: HTN, HLD, HFrEF, chronic CAD, valvular disease
Pulmonary: current smoker, active MJ use, COPD, severe pHTN
Endocrine: DM
Kidney: ESRD on HD
Vascular: PAD

August '23	May '24	July '24	Hospital Day #5	Hospital Day #5-11
MVR	LE ULCER	Acute on Chronic Limb Ischemia	Periop Evaluation	Interval Hospital Course

ED PRESENTATION for worsening foot pain

FINDINGS: diminished pulses, toe discoloration showing moderate to severe stenoses of the lower extremity arteries and short segment occlusion the R superficial femoral and L popliteal artery.

TREATMENT: heparin gtt, broad-spectrum Abx, serial HD sessions (on average 2.5-3L removed)
Restarted home dose of metoprolol

Bedside POCUS:
- EF ~15%
- Dilated IVC
- B/l pleural effusions

Procedure postponed for further cardiac optimization

Extensive lower extremity endovascular interventions planned

Cardiology consulted

TTE: EF 16%, biventricular dilation and hypokinesis, moderate-severe TR

RHC: elevated biventricular filling pressures

Aggressive volume removal with HD

HF consultation

Valsartan initiation

Repeat angiogram and endovascular interventions under MAC

Perioperative Evaluation

- Prior cardiac testing and cardiology notes reviewed
- Patient confirmed no interval cardiology visits occurred between May and July 2024
- Per MAR, patient's current GDMT included metoprolol
- Bedside TTE, lung and gastric ultrasound exam performed
- Patient consented for GETA, CVL, PA-Catheter, a-line with high risk for
- perioperative cardiovascular morbidity

Click here to view Transthoracic Echocardiography Imaging and Generate Report

References:

1. Carless PA, Henry DA, Moxey AJ, O'Connell D, Brown T, Fergusson DA. Cell salvage for minimizing perioperative allogeneic blood transfusion. *Cochrane Database Syst Rev.* 2010

2. Tamura T, Waters JH, Nishiwaki K. Heparin concentration in cell salvage during heparinization: a pilot study. Nagoya *J Med Sci.* 2020

After an interdisciplinary discussion with anesthesia and vascular surgery teams regarding our perioperative evaluation, decision made to postpone the case due to evidence of worsening biventricular systolic function and echocardiographic signs of volume overload. Recommended further cardiac assessment and treatment of acute decompensated heart failure.

Cardiology consulted

TTE: EF 16%, severe global LV hypokinesis c/w non-ischemic cardiomyopathy, RV dilation with free wall hypokinesis, moderate-severe TR (increased from 5/24), well-seated MV
RHC: elevated pre and postcapillary filling pressures, mean PAP 32 mmHg, PCWP 18 mmHg
Recommended aggressive volume removal with HD
Restarted on valsartan
Outpatient HF follow-up for advanced therapies, including Sacubitril-Valsartan initiation
Consider endovascular interventions without generalized anesthesia
Angiogram, angioplasty of popliteal and SFA conducted on hospital day #8 and #11 under MAC with precedex infusion

What is Heart Failure?

Heart failure is a complex clinical syndrome with symptoms and signs that result from any structural or functional impairment of ventricular filling or ejection of blood . Most common causes of HF include ischemic heart disease, MI, HTN, valvular heart disease. Advanced stages of HF are associated with overall reduced survival. Therapeutic interventions at each stage aim to mitigate risk factors, treat underlying structural heart disease to prevent HF, reduce symptoms, morbidity and mortality. Patients with acute or chronic HF have worse outcomes as compared to patients without a history of HF. In a 2008 study utilizing Medicare claims data, amongst individuals undergoing AKA, BKA, LE bypass, or open AAA, the 30-day risk of mortality was up to twice as high for patients with history of HF compared to those without HF.

Evaluation, Management, Anesthesia Considerations of Acute Decompensated Systolic Heart Failure

Evaluation[4]	Management[4]	Anesthesia Considerations
Symptoms:	Floor vs ICU admission	**Type of Anesthesia:**
Dyspnea on exertion, orthopnea, paroxysmal nocturnal dyspnea, abdominal fullness, LE swelling, weight gain	Monitor oxygen saturation, vital signs, cardiac rhythm	Mod-sed vs MAC
Physical Exam:	Supplemental oxygen vs non-invasive vs mechanical ventilation	Regional anesthesia
Hypo vs hypertension, tachycardia, hypoxia, peripheral and sacral edema, air hunger, respiratory distress, frothy secretions, rales, wheezing, diminished air entry in lung bases, elevated JVP, hepatomegaly, positive hepatojugular reflux, S3, lateral displaced point of maximal impulse, MR or TR murmur, cool or mottled extremities, altered mental status, oliguria	Adequate IV access, position patient upright	GETA, TEE, PA-C, CVC, CVP-monitoring, a-line
Objective Data:	Early cardiology consultation	High risk of decompensation in the perioperative period
Elevated BNP	IV Diuresis vs aggressive volume removal with HD	**Goals of Anesthesia:**
Elevated troponins	Strict I/Os	Preserve cardiac output and delivery of oxygen
CBC, BMP, UA, UCx, BCx, TSH to r/o reversible causes of HF	Identify etiology of ADHF (i.e. ACS, MI, valvular disease, sepsis)	- Avoidance of tachycardia to optimize diastolic filling time, coronary perfusion pressure, and minimize increases in myocardial O2 demand
EKG with signs of ischemia, arrythmia or LVH	Consider afterload reduction with nitroprusside, preload reduction with nitroglycerin	- Maintain NSR, as failing LV is highly reliant on atrial kick to maintain preload
Ventricular dilation, reduction in EF, valvular disease on TTE	Consider IV inotrope (i.e. dobutamine, milrinone) vs mechanical support (IABP)	- Avoid increases in afterload
Elevated biventricular filling pressures, PCWP on RHC	Cardiac surgery consultation for acute MR, AR or ascending aortic dissection	- Maintain contractility
Pulmonary vascular congestion, cardiomegaly on CXR	Early involvement of vascular anesthesia team for pre-operative management prior to the OR	- Patients with HF rely on increased SNS tone to maintain CO and are vulnerable to circulatory collapse if this is lost with induction of anesthesia
B-lines, pleural effusion on lung US		

CBC: Complete blood count; BMP: Basic Metabolic Panel; UA: Urine Analysis; UCx/BCx: Urine/Blood Culture; TSH: Thyroid Stimulating Hormone.

DIVISION CORNER

Critical Airway Management: Exploring A Complex Case of Awake Tracheotomy

Dario Winterton, MD
Stephen Odom, MD

A 60 year old male presented with sore throat, fever, cough, and dyspnea and left neck swelling. Per chart review, patient had been feeling sick for a week. CT neck at community hospital was positive for abscess from left vallecula to left piriform and the patient received dose of unasyn, decadron, toradol, and racemic epi. The patient was transferred for specialized ENT care to the tertiary hospital. On arrival, the patient was noted to have breathing difficulty and inspiratory stridor.
Vital Signs: Temp: 98.3 °F (36.8 °C) Heart Rate: 85 Resp: 20 BP: 88/65 SpO2: 96 % FiO2 (%):70 %

CT scan

Click here to view the CT imaging.

Abbreviated CT Report: Approximately 4 x 2 x 2 cm lobulated, peripherally enhancing hypodensity extending from the left vallecula caudally/posteriorly into the piriform sinus, with displacement of, mass effect upon, and pronounced narrowing of the supraglottic airway. There are several bilateral, borderline enlarged level 2 and 3 cervical lymph nodes.

In the context of the patient's clinical presentation and the possible need for awake tracheostomy, the decision was made to proceed with an endoscopic exam in the Operating Room.

A flexible fiberoptic endoscopy was performed in the OR to assess the airway and evaluate for potential awake fiberoptic intubation. The anatomy was completely distorted, with difficulty in identifying the airway.

A team decision was made to minimize airway manipulation and proceed to an awake surgical tracheostomy. Patient was consciously sedated with dexmedetomidine and low-dose remifentanil. Anesthesia was provided with abundant, multi-step infiltration with lidocaine.

This patient had difficult anatomy with posteriorly oriented tracheal with minimal space from sternal notch and profound edema throughout the supraglottis and left posterior pharyngeal wall. An urgent awake tracheotomy (Bjork flap and stay sutures) and thyroid isthmusectomy was performed.

After the airway was secured, the patient was induced with midazolam and propofol and a laryngoscopy was performed

Click here to view the imaging.

Laryngoscopy report Oropharynx: No mucosal lesions, masses, or erythema, tongue base without lesions. Thick secretions throughout. Hypopharynx: Edema of vallecula. No masses or lesions in vallecula, piriform sinuses, or post-cricoid area. Thick secretions throughout. Larynx: Epiglottis with watery edema on the left partially obstructing view of the vocal cords. No mass lesions.

Reasoning points: The decision to perform all procedures in the OR was taken so to have the best possible setup in case an emergent surgical intervention would have been required. Moreover, the low threshold to shift from awake fiberoptic endoscopy to awake tracheostomy was based on the patient still having a patent but extremely labile airway in the context of an extreme difficulty in identifying the airway on endoscopy, and thus avoiding any manipulation that might cause loss of ventilation capabilities.

Click here to view a lecture on management of emergent airway!

Click here for self evaluation!

"Echo Corner: Transforming Echo Insights into Clinical Mastery."

ECHO CORNER

Case by Case Insights into Advanced Echocardiographic Diagnostics

Feroze Mahmood, MD

A 41 year old male is s/p post laparoscopic esophagectomy. On evaluation, the patient is tachypneic and desturated to 50% on room air and 80% on 10 L of facemask.

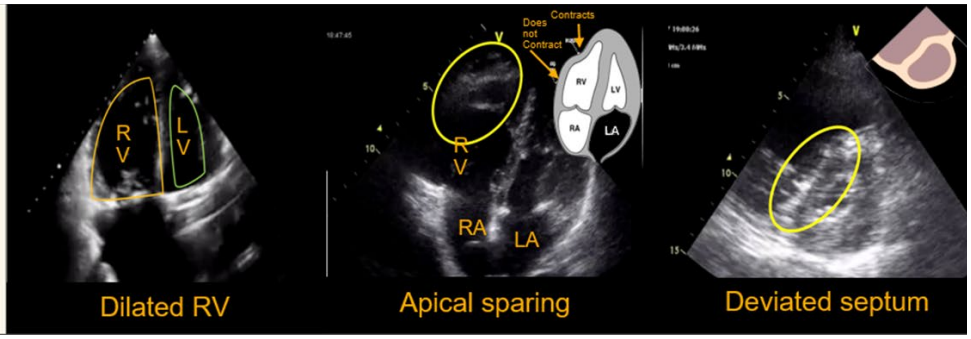
ABG: 7.45/41/58/29/ +3

What is your initial differential diagnosis?

How can you narrow your differential diagnosis?

Click here to view Transthoracic Echocardiography Imaging and Generate Report

Pulmonary Embolism	• Enlarged RV • Apical sparing (McConnell's sign • Deviated septum (D-shaped LV) • TAPSE < 1.6cm • Hyperdynamic LV • Tricuspid regurgitation • Possible hyperechoic shadow of thrombus



Key Points in Pulmonary Embolism

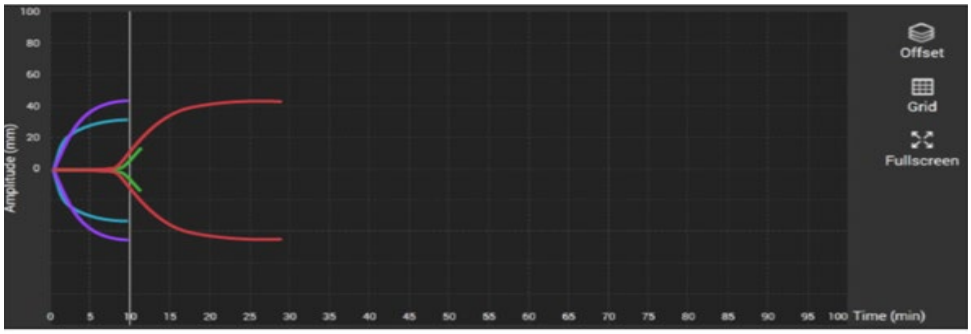
- Acute, hemodynamically significant PE frequently involves both lungs (saddle embolism). Difficult diagnosis and requires integration of all available information and high index of suspicion.
- Typical US findings include RV Dilation with poor contractility. Apical function may be relatively preserved (Mc Connell's sign) but this finding is erratic and of little diagnostic relevance.
- LV hyperdynamic and underfilled.
- Source of clot may not be apparent but finding of DVT in addition to the above signs, strongly supports a diagnosis of PE.
- Large pneumothorax may cause similar TTE findings.
- Thrombolysis can be life saving but will more than triple the risk of intracranial hemorrhage over therapeutic anticoagulation.

COAGULATION CORNER

A Comprehensive Analysis of Coagulation Dynamics and Clinical Applications

John Bellamente, MD

A 72 yo male is undergoing a CABG. At the end of the procedure surgeon is concerned about diffuse bleeding. You decide to send a TEG sample. **What is the most likely deficiency here?**



	R (min)	K (min)	ANGLE (deg)	MA (mm)
CK	8.0 (4.6 - 9.1)	2.1 (0.8 - 2.1)	66.1 (63 - 78)	44.2 (52 - 69)
CRT				45.5 (52 - 70)
CKH	8.0 (4.3 - 8.3)			
CFF				25.2 (15 - 32)

The interpretation of TEG shows platelet deficiency: MA of the Rapid TEG (CRT) test is low. The functional fibrinogen (CFF) MA is normal. These results are suggestive of a platelet deficiency.

What is Thromboelastography (TEG)?

Traditional coagulation tests do not show the mechanical properties of clot over time because PT and PTT both terminate at low thrombin levels and before fibrin is polymerized. TEG provides a comprehensive view of a hemostatic profile, assessing the hemostatic potential of whole blood, as compared to a traditional coagulation monitoring. TEG measures viscoelasticity of whole blood from initiation of fibrin formation to maximal platelet clot strength and through fibrinolysis.

Which parameters are used to measure clot strength?

TEG measures clot strength over time, focusing on:

- Clot rate (R, in mins) - time it takes for first measurable clot to form.
- Clot strength (max. amplitude MA, in mm) - Strength of the clot.
- Clot stability (lysis LY30, in %) - breakdown of the clot.

Graphical tracing and numerical results are reported for each measurement and results are highlighted orange if they fall outside the reference range.

Literature Corner
Click to view

Point-of-Care Thromboelastography for Intrathecal Drain Management in Patients With Coagulopathy and Thoracic Aorta Surgery: A Case Report

In order to assess the hemostatic properties of citrated blood samples,TEG uses 4 different assays/ reagents simultaneously: CK,CKH,CRT and CFF.

Citrated Kaolin (CK): An intrinsic pathway activated assay identifies underlying hemostatic characteristics and risk of bleeding or thrombosis.

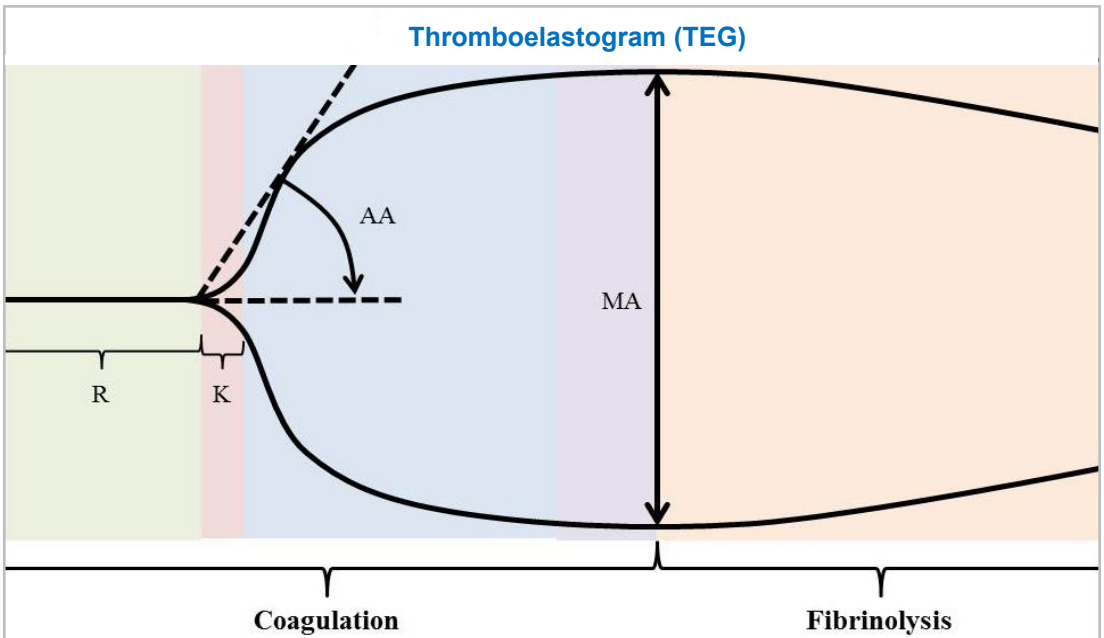
Citrated Kaolin with Heparinase (CKH): Eliminates the effect of heparin in the test sample and used in conjunction with Kaolin assessed the presence of systemic heparin.

Citrated Rapid TEG (CRT): An intrinsic and extrinsis pathway activated assay speeds the coagulation properties.

Citrated Functional Fibrinogen (CFF): Used in conjunction with Kaolin or RapidTEG can assess relative contribution of platelets and fibrin to overall clot strength.

The framework for interpreting TEG results is summarized in the image below.

Click here to view a module on Thromboelastography

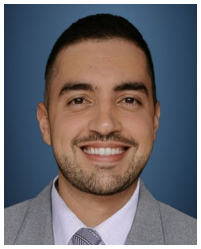


Variable	Definition	Normal Value	Deficiency	Treatment
R Time (R)	Time to start forming clot	1-14 mins	Coagulation Factors	FFP
K Time (K)	Speed of stable clot formation	1-3 mins	Fibrinogen	Cryoprecipitate
Alpha Angle (AA)	Speed of fibrin accumulation	45-55°	Fibrinogen	Cryoprecipitate
Maximum Amplitude (MA)	Maximal strength of clot	50-60 mm	Platelets	Platelets or DDAVP
Fibrinolysis	Reduction of clot strength after 30 minutes	0-8%	Excess Fibrinolysis	Tranexemic Acid or Aminocaproic Acid

"Scientific advancements in regional anesthesia: Pioneering targeted interventions for refined pain management."

REGIONAL CORNER

Optimization of Adductor Canal Block for Lower Extremity Anesthesia: Evidence-Based Approaches



Federico Puerta Martinez, MD
Victor Polshin, MD

John Smith is a 42-year-old male working as a construction worker who presented with severe knee pain following a fall at work. He reported slipping and landing directly on his right knee, experiencing immediate pain, swelling, and an inability to bear weight or extend the knee.

Upon examination in the emergency room, there was noticeable swelling, bruising, and deformity over the knee. The patient had no active extension of the knee, and passive motion was limited due to pain. Strength testing showed that he was unable to perform a straight-leg raise, though distal pulses and sensation were intact on neurovascular examination. Imaging revealed a transverse patellar fracture with 3-4 mm of displacement, along with an associated extensor mechanism disruption. In terms of regional blocks what options do we have?

Figure 1.Imaging shows a transverse patellar fracture.

Anatomy

In this case of a patellar fracture, the focus is on the innervation of the anterior knee, particularly the patella and surrounding structures. Key contributors to the anterior knee's innervation include the following branches of the femoral nerve (FN) (1) Nerve to Vastus Medialis: (supero-medial aspect of the patella), (2)Nerve to Vastus Lateralis: (lateral aspect of the patella)) and for this particular case the (3) sephanous nerve (Infrapatellar Branch). The saphenous nerve is a branch of the posterior division of the femoral nerve and it is purely a sensory nerve. It leaves the femoral triangle and passes through the adductor canal(sub-sartorial canal/Hunter's canal). It accompanies the superficial femoral artery in the thigh, initially lateral to the artery then becomes more medial and superior in the distal thigh. Through out its course in the thigh it stays deep to the sartorius muscle. In the leg saphenous nerve is lateral to the saphenous vein and it can be identified either distally near the medial malleolus or at the midcalf.

Positioning: The patient is placed in the supine position with the leg slightly externally rotated. The medial aspect of the thigh is exposed.

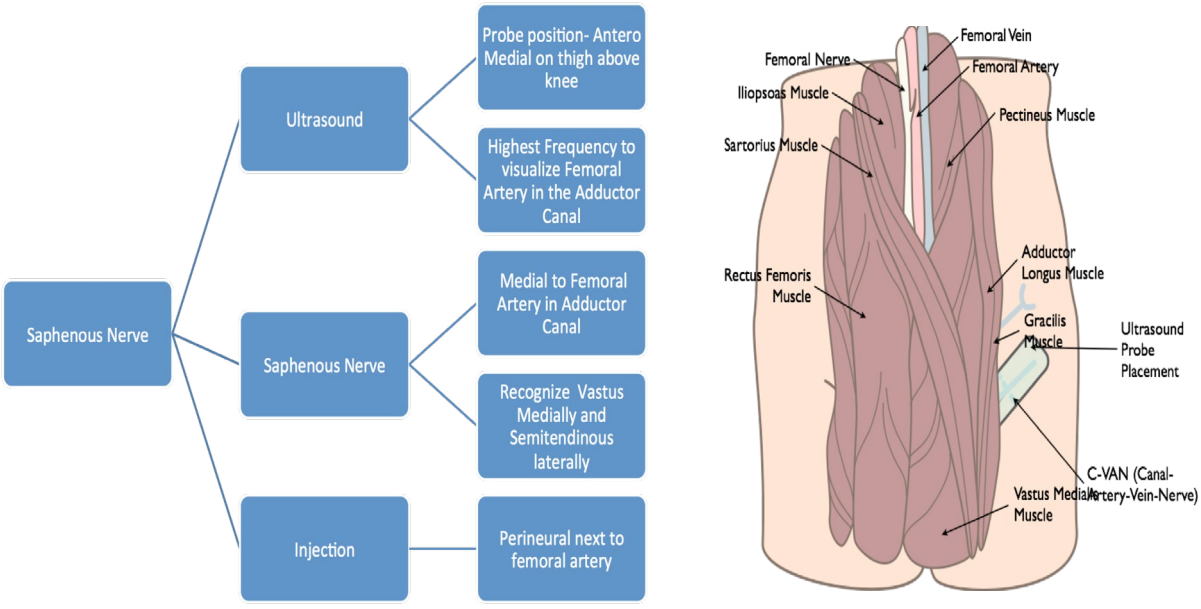


Figure 2. Workflow and anatomy of a sephanous nerve block.

Preparation: Clean the injection site in the mid-thight-atero-medial area with chlorhexidine or iodine solution.

Equipment: A 22g block needle for single shot or 18 g for catheters. Needles 50mm or 80mm based on the depth of structures.A high-frequency linear ultrasound probe is used.

Figure 3. Patient and probe position for sephanous nerve block.

Technique:The nerve can be easily blocked in the mid-thigh. Both in-plane and out-of-plane approaches can be used. The saphenous nerve is superficial to the femoral artery, deep to the sartorius muscle and posterior to the vastus medialis in the distal thigh. Even in muscular/large BMI population, femoral artery pulsation can be identified Injection of local anesthetic solution anterior to the pulsation (subsartorial injection) provides reliable conduction block.

Complications: Risk of intraneural injection, Local anesthetic systemic toxicity and hematoma at the injection site.

Relative Contraindications: Neuropathy, pre-existing nerve injury/neurological disease.

Absolute Contraindications: Patient refusal, allergy to local anesthetics, and infection or cellulitis at the injection site.

Clinical Pearls: For anterior knee surgery, a more cephalad adductor canal block seems to be more effective in terms of postoperative analgesia. Scan the usual adductor canal landmarks; then slide the probe proximally (upper third of the thigh) and look for the intersection of adductor magnum and sartorius muscles. Perform the block in this point. Recommended LA Volume: 10-15 mL.

Final Recommendation: For the purpose of this case, and for postoperative analgesia of the anterior knee in general, we see the Adductor Canal Block as the most suitable alternative. It offers a reasonable balance between postopetative analgesia and muscle weakness.

Click here to view Ultrasound Anatomy and illustrations for Sephanous Nerve Block

Click here to learn more about Knee Innervation and Regional Approaches.

Quiz Yourself

Audio & Visual Lesson

Check out case four here.

We have compiled cases for quick review of ***ECG and rhythm interpretations*** for efficient learning and skill enhancement.

ECG and Rhythms Interpretation

Beth Israel Lahey Health
Beth Israel Deaconess Medical Center

Department of Anesthesia, Critical Care and Pain Medicine

Center for Education Research, Technology and Innovation