Volume 1 | Issue 5
January 2025

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

Marcus Aurelius: Stoic philosopher and Roman Emperor, epitomizing resilience and inner strength.
https://en.wikipedia.org/wiki/File:Marcus_Aurelius_Glyptothek_M%C3%BCnchen.jpg

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/

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!

Table of Contents

CLINICS IN MEDICAL EDUCATION

Docendo Discimus

[By Teaching We Learn]

EDITOR'S WELCOME

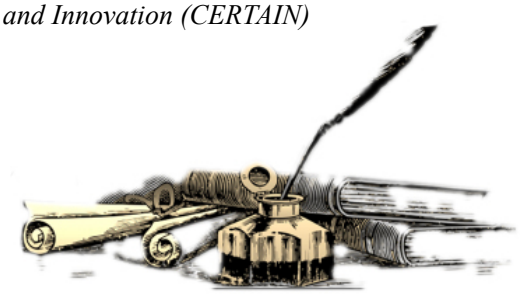
We are thrilled to share our fifth issue of *Clinics in Medical Education*! This is an interactive anesthesia education journal that will deliver a summary of clinical and medical education directly to your mobile devices, ipads and computers. We have recently launched our website (https://medicaleducation-clinic.com/) 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 fifth issue!

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.

PEDAGOGY IN EDUCATION

The Role of Mentors in Fostering a Growth Mindset

Robina Matyal, MD

In the medical field, a growth mindset is particularly crucial due to the complex, high-stakes nature of the work. Introduced by psychologist Carol Dweck, a growth mindset is the belief that intelligence and abilities are not fixed, but can be developed through effort, learning, and perseverance. Research has demonstrated that individuals with a growth mindset are more likely to embrace challenges, persist through setbacks, and continuously improve; qualities that are essential for success in the highly technical and fast-paced environment of anesthesia. Mentors play a vital role in cultivating this mindset among residents, and faculty, supporting their cognitive development, emotional resilience, and overall professional growth.

Challenges as Opportunities

Mentors contribute to the development of a growth mindset by offering constructive feedback that emphasizes the learning process rather than solely focusing on outcomes. Research shows that individuals with a growth mindset tend to view challenges and errors as opportunities for improvement rather than evidence of incompetence. In the context of our field, where the margin for error is small and the consequences of mistakes can be severe, mentors can guide mentees to reflect on clinical mistakes in a way that fosters learning. For example, when a resident encounters an adverse event or technical difficulty during a procedure, a mentor can frame the experience as a valuable lesson in critical thinking, technical skill development, and patient safety, rather than allowing it to negatively impact self-efficacy.

Persistence and Self Reflection

In addition to fostering cognitive skills, mentors also provide emotional support, which is essential in the high-pressure environment of the operating room. Studies in medical education have shown that mentorship can significantly enhance emotional resilience by promoting self-efficacy—an individual's belief in their ability to succeed through effort. Mentors who emphasize the importance of persistence, self-reflection, and progress can help trainees overcome self-doubt and build confidence in their clinical judgment and technical abilities. Given the intensity of the work environment, where critical decisions are often made rapidly, reinforcing these aspects of a growth mindset can mitigate the stress and anxiety that commonly accompanies these complex cases.

Cognitive Flexibility

Mentors also promote cognitive flexibility—an essential component of a growth mindset—by encouraging residents to think critically about complex anesthesia cases. In anesthesia, where each patient presents unique challenges, the ability to adapt one's approach based on new information is crucial. Research on metacognition, or the awareness and control of one's cognitive processes, shows that mentoring which encourages self-reflection and the exploration of different problem-solving strategies helps develop this flexibility. Mentors can encourage residents to consider various anesthetic techniques, reevaluate their decision-making in the context of each patient's changing physiology, and learn from their previous cases. This approach not only enhances clinical competence but also strengthens the confidence to handle future challenges.

The impact of mentorship on the development of a growth mindset extends beyond the individual level to positively shape organizational culture, promoting collaboration, knowledge-sharing, and innovation. In the field of anesthesia, where teamwork is essential for patient safety and optimal outcomes, cultivating a growth-oriented culture ensures that every team member is focused on learning, resilience, and improvement.

References:

1. Raksamani, K., Stalmeijer, R.E. How postgraduate trainees from different health professions experience the learning climate within an operating theater: a mixed-methods study. BMC Med Educ. 2019;19:1–11

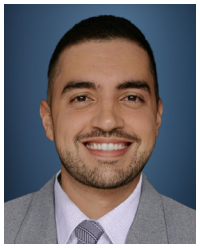
2. Gruppen L, Irby D, Durning S, Maggio L. Interventions designed to improve the learning environment in the health professions: a scoping review. MedEdPublish. 2018;7:1–32

Curriculum Development in Medical Education – Part I

Laying the Foundation with Kern's Framework

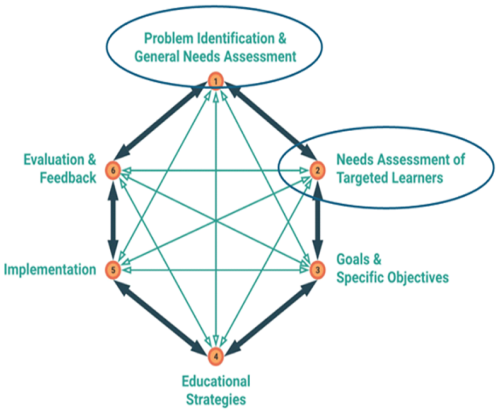
Federico Puerta Martinez, MD

Dario Winterton, MD



In Medical Education, the development of a robust curriculum—a pathway or roadmap—is essential to ensure that learners achieve the competency to provide skilled patient care. A systematic approach, such as Kern's Curriculum Development Framework, is paramount when designing medical education programs.

This article will explore the first two crucial steps of this framework: (1) **Problem identification and general needs assessment** and (2) **Targeted needs assessment,** providing insights and practical examples to guide educators in the field, particularly those in anesthesiology.



Step 1: Problem Identification and General Needs Assessment

The initial step in curriculum development involves identifying a problem and conducting a general needs assessment. This is a critical stage because it is easier to design appropriate curricula to address a problem that is well defined and understood. This step sets the direction for the entire curriculum development process by addressing real-world issues.

The **problem identification** phase requires a critical analysis of the educational gap or problem that the curriculum intends to address. This includes understanding the epidemiology of the problem and its impact on patients, health professionals, medical educators, and society since the ultimate purpose of health professions education is to improve public health.

Once a problem is identified, a **General Needs Assessment (GNA)** is performed to thoroughly understand the gaps between current practices and the desired outcomes. This process is crucial because it not only clarifies the scope of the problem but also provides the foundation for designing an effective and targeted curriculum. The GNA involves a structured, three-part process:

1. **Analyze the Current Approach to the Problem:** This step requires a detailed examination of how the problem is currently addressed within the existing educational framework (i.e. What methods, strategies, or tools are currently in place? What works well in the current system, and where are the shortcomings?

2. **Define the Ideal Approach:** This involves envisioning the optimal way to address the identified problem, guided by best practices, evidence-based recommendations, and theoretical frameworks (Competency-based approaches, diverse learning modalities, standards and guidelines)

3. **Identify the General Need:** The difference between the ideal and current approach represents the general need. This is often expressed as actionable objectives that the curriculum aims to address.

General Needs Assessment Formula:

General Need = Ideal Approach - Current Approach

The GNA should be informed by evidence-based sources such as literature reviews, accreditation requirements, and competency frameworks (e.g., ACGME competencies and milestones). Additionally, previously published

curriculum models, expert opinions, and best practices from thought leaders can provide valuable insights.

Step 2: Targeted Needs Assessment

While the general needs assessment provides a broad overview, the second step focuses on the needs of a targeted group of learners and their specific learning environment. This step tailors the curriculum to address environment-specific challenges, creating an effective learning experience. The targeted needs assessment involves assessing the differences between the ideal and actual characteristics of both the learners and the learning environment. It encourages curriculum developers to shift their focus from the health problem to the specific learners.

This assessment includes gathering information from various sources:

- **Surveys** help gather broad insights and identify common barriers in training.
- **Interviews and focus groups** provide an in-depth understanding and group dynamics.
- **Direct observation**—if feasible—is valuable to understanding real perioperative interactions.

Stakeholder input is also crucial:

- **Residents, faculty, and specific team members** should all have input.
- Performance data from existing rotations is essential.
- Feedback from clinical supervisors provides valuable insights.

Furthermore, an assessment of the institution itself is necessary:

- **Institutional resources, opportunities, and constraints** must be identified. In our example, institution-specific clinical exposure to various regional anesthesia procedures should be considered.
- Faculty expertise and availability also play a role.

Analyzing the data collected helps identify recurring themes, like case mix, and prioritize areas for improvement. This step leads to clear priorities for the curriculum's content.

Challenges and Conclusion

Both Step 1 and Step 2 may present challenges:

- **Stakeholder engagement** is critical to ensure that all voices are heard and considered. It can be challenging to involve a diverse range of stakeholders early in the process.
- **Overcoming institutional inertia and resistance** to change is also important; therefore, clearly communicating the purpose and benefits of the curriculum development is essential.
- It is crucial to clearly define the healthcare or educational issue, determining the current approach and the ideal approach.
- Using robust data collection methods informs a more complete understanding.

In conclusion, the initial steps of curriculum development using Kern's Framework are essential for creating effective medical education programs. The process begins with identifying and assessing the problem in a general sense, and then looking at the specific needs of the learners and their environment. This ensures educators can create a curriculum that is both relevant and impactful, ultimately leading to better-prepared physicians.
One last tip: be mindful of the challenges and try to overcome them from the very beginning—early involvement of stakeholders can make the process much easier.

In the next issue, we will be covering the next 2 steps (Steps 3 & 4) of Kern's Curriculum Development Framework.

Feedback Matters: Transforming Systems for Meaningful Resident Evaluations

Mona Hedayat, MD

Feedback is a cornerstone of effective medical education, allowing learners to identify their strengths, address areas for improvement, and progress toward their full potential. We are aiming to implement a comprehensive feedback structure designed to foster continuous learning and development. This system includes daily feedback, summative feedback at the end of rotations, and formal evaluations aligned with ACGME milestones. Each component serves a distinct yet complementary purpose in supporting our residents' professional growth.

Daily Feedback: Real-Time Insights

Daily feedback provides residents with immediate, actionable insights into their clinical performance. This type of feedback is typically delivered by attending anesthesiologists at the end of a case or a clinical shift. It focuses on specific aspects of the resident's performance, such as technical skills, decision-making, communication, or situational awareness.

Summative Feedback: End-of-Rotation Evaluations

While daily feedback focuses on specific moments, summative feedback provides a broader evaluation of a resident's performance over an entire rotation. End-of-rotation feedback is structured to offer a more holistic view of the resident's progress in the context of the rotation's goals and objectives.

This feedback is typically delivered by the rotation director, who synthesizes input from multiple attendings and team members who worked with the resident. It encompasses clinical performance, professionalism, teamwork, and adaptability, among other key competencies. The summative nature of this feedback allows residents to understand how they have developed over several weeks and how their performance aligns with expectations for their level of training. In addition, end-of-rotation feedback serves as an opportunity to set specific goals for the next stage of training.

ACGME Milestone Evaluations: Tracking Longitudinal Development

The ACGME milestone evaluations represent the most formalized component of the feedback system at BIDMC. These evaluations occur semiannually and are conducted by the Clinical Competency Committee (CCC). Milestones are structured to assess residents' progression in key competency areas, such as patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and system-based practice.

Unlike daily or summative feedback, milestone evaluations track residents' development over time, providing a longitudinal perspective on their training. Each resident is evaluated against predefined benchmarks that reflect their level of training, from beginner to advanced. This structured approach ensures that residents are on track to meet the competencies required for independent practice by the end of their residency.

At BIDMC, milestone evaluations are informed by multiple data points, including daily and summative feedback, procedure logs, and self-assessments. This comprehensive approach ensures that milestone assessments are both accurate and reflective of the resident's overall performance. Additionally, these evaluations provide a framework for meaningful discussions during semiannual meetings with faculty mentors, where residents can reflect on their progress and set long-term goals.

Feedback Platforms: Challenges of the Old Systems

Previously, our feedback system relied on multiple platforms, including daily feedback emails, MyTIPreport, and Medhub. While each platform aimed to address specific aspects of resident evaluation, the use of multiple tools resulted in fragmented information. Feedback was scattered across various systems, making it challenging to consolidate and create comprehensive summaries of resident performance. This fragmentation not only created inefficiencies in tracking progress but also hindered our ability to identify trends or provide actionable, longitudinal feedback.

Furthermore, the presence of multiple platforms caused confusion among attendings regarding which tool to use. Without clear guidelines or a streamlined process, many attendings were unsure where or how to submit their feedback, leading to inconsistent participation. As a result, the feedback response rate was significantly low, limiting the effectiveness of our evaluation process. This inconsistency ultimately affected the residents' ability to receive timely and meaningful feedback, an essential component of their learning and professional development.

The need for a more unified and efficient system became evident, prompting efforts to restructure and simplify the feedback process to better serve both faculty and residents.

Feedback Platforms: Streamlining the New System

We recently launched a new feedback platform integrated into the anesthesia portal, aiming to simplify and streamline the feedback process for both residents and attendings. This platform consolidates daily feedback and end-of-rotation feedback into one centralized location, addressing previous challenges of fragmented systems and scattered information. The goal is to provide a more efficient, user-friendly tool that enhances the overall quality and accessibility of feedback.

The system is designed to streamline the assignment of feedback evaluations across all rotations. While this is a work in progress, we have already launched the OR daily feedback and ad hoc evaluations. Plans are underway to expand daily feedback capabilities to other key areas such as OB, APS/regional, PACU, and PAT soon. Once the daily feedback structure is fully implemented, our next focus will be on rolling out end-of-rotation feedback for various rotations and subspecialties. These phased efforts reflect our commitment to creating a comprehensive, centralized feedback system that meets the needs of both faculty and residents.

Through this new platform, attendings can easily access all feedback evaluations assigned to them, create ad hoc evaluations for specific cases or situations, and review feedback completed by residents for attendings. This integrated design ensures a seamless experience, empowering attendings to actively participate in the feedback process while fostering transparency and collaboration within the department.

We are confident that this centralized approach will not only improve compliance but also foster enthusiasm among attendings to engage more actively in providing feedback. By addressing inefficiencies and simplifying the process, we believe this platform will significantly enhance the educational experience for our residents and strengthen our department's commitment to continuous learning and improvement.

Certification in Ultrasound

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

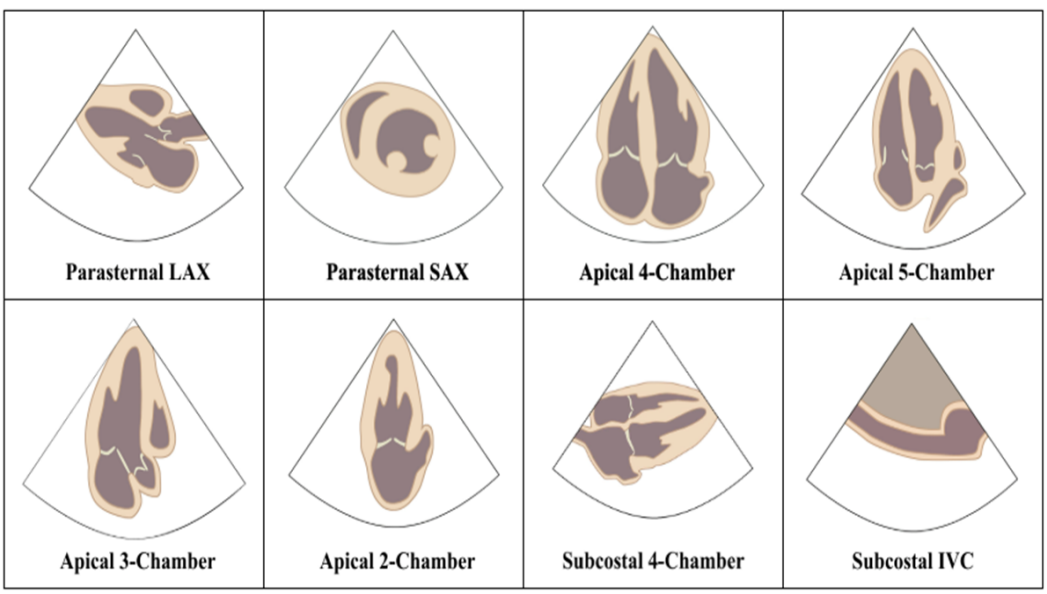
In this second segment of our ultrasound education series, we turn our focus to one of the most crucial aspects of transthoracic echocardiography (TTE): the basic views. Following our inaugural discussion on probe motions and techniques, this installment will guide practitioners through the essential views for assessing cardiac structure and function. Mastering these is key to becoming proficient in echocardiography.

In this segment, we will cover core views commonly used in TTE. In this segment, we will also discuss essential techniques for optimizing these views, such as proper probe orientation, adjusting the depth and gain settings on the ultrasound machine.

This bite-sized approach to ultrasound education is designed to fit into the busy schedules of medical professionals, providing focused, practical content that can be easily understood and immediately applied in clinical practice. We believe that by breaking down complex concepts into manageable pieces, we can help practitioners improve their skills in transthoracic echocardiography without feeling overwhelmed. Whether you are new to TTE or seeking to refine your technique, mastering these basic views will serve as the foundation for more advanced echocardiographic evaluations. As you gain confidence in obtaining high-quality images from these views, you will be better equipped to interpret results and contribute to the optimal care of your patients.

Stay tuned for future segments, where we will continue to explore more advanced techniques and provide practical tips for enhancing your ultrasound proficiency.

Click on the line drawing of each view to see a video exemplar of the view accompanied by a video clip discussing how to obtain the view.



Design, Implementation and Evaluation of Just-in-Time Training Simulated Videos for Central Venous Catheter Insertion and Epidural Placement

Project Leaders:
Megan Clancy, DNP, CRNA
Sarah Hayden, DNP, CRNA
Jennifer Phelan, DNP, CRNA

Faculty Mentors:
Susan Emery, PhD, CRNA
Caitlin Vitale, PhD, CRNA
Patricia Reid Ponte, DNSc, CRNA

The time that elapses between didactic and simulation training experiences of SRNAs and actual clinical interventions in the patient care setting often contributes to the erosion of knowledge and confidence in completing a technical intervention. This is known as skill decay. To mitigate this phenomenon, Just-in-Time (JIT) simulated training videos were designed based on Cognitive Load Theory (CLT) which, emphasizes the importance of minimizing extraneous cognitive load and enhancing knowledge retention.

The project team designed, administered, and evaluated JIT training videos for two procedural competencies. Participants were second- and third-year Boston College student registered nurse anesthetists (SRNAs).

Participants viewed the simulation video and completed pre- and post-knowledge assessment surveys that also included items to assess perceived confidence levels related to performing the technical procedure; demographic information and participants' opinion about the video quality, learning experience and likelihood of using JIT simulation videos in the future.

Participants' knowledge of verbalization of procedural steps, awareness of patient anatomy, proper use of equipment, skillset and confidence level improved after the JIT videos were watched. Additionally, participants' likelihood of using JIT training videos in the future increased.

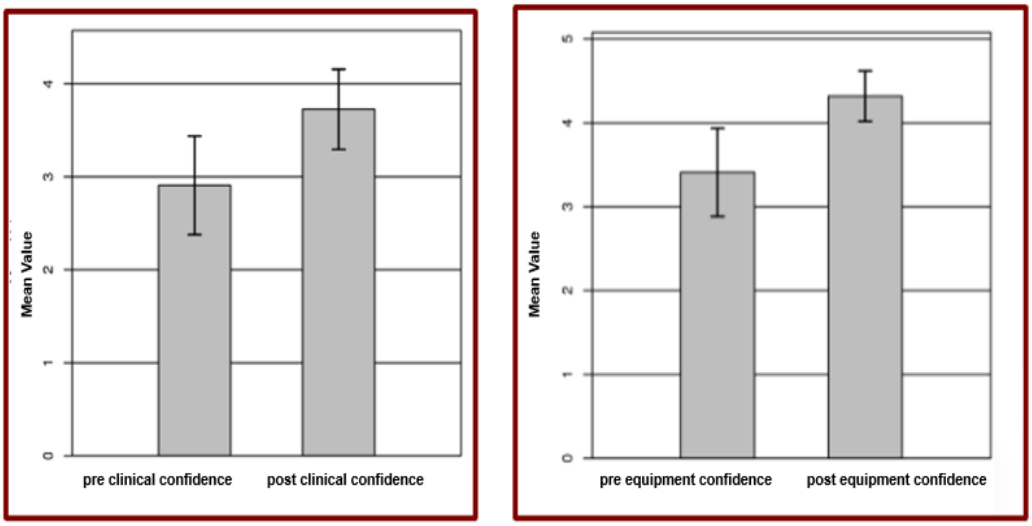
Limitations

Several limitations of this project included the small participant sample size, the amateur quality of the video production and limited simulation equipment. However, the JIT simulated videos will continue to be used, evaluated and improved based on feedback by students and faculty.

Key Points

- Skill decay in student registered nurse anesthetists (SRNA) is predictable and can be reduced with knowledge refreshers.
- Video aids and cognitive load theory (CLT) in educational design have proven effective in enhancing learning outcomes
- Developing just in time (JIT) training videos with CLT methodology for procedural comptencies enhances confidence in SRNAs.

Scan here to view detailed description of the project.



Results and Findings

- Confidence levels increased for the responding SRNAs in all areas examined: clinical skills performance, verbalization of steps, anatomy, equipment and likelihood to use similar videos in the future.
- Confidence increased most significantly related to anatomy and equipment associated with the procedure
- 91% of responding SRNAs would be likely to use JIT training videos in the future to enhance learning.

Conclusions

- Viewing JIT training videos developed with CLT may enhance confidence in the SRNA when performing procedural competencies. This project provides the first known example of JIT training videos developed specifically for SRNAs with the incorporation of CLT.

Impacts and Dissemination

- Findings support the design and production of additional JIT training videos developed with CLT for SRNAs while enhancingcoordination with clinical and didactic curriculum.
- With 68% of the sample preferring hands on simulation review formats , future training videos will be used in parallel with hands-on workshops and simulated procedural review.

INNOVATION IN EDUCATION

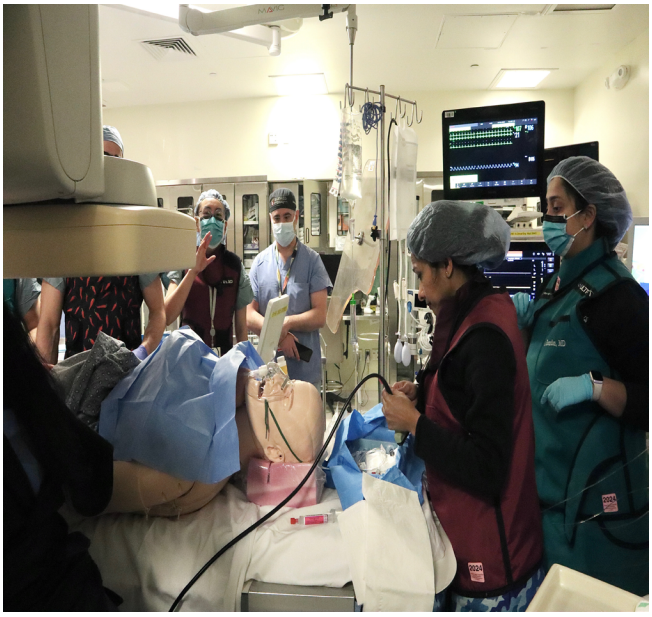
CME Course: In Situ Simulation as a Tool to Optimize Emergency Response for Ruptured Abdominal Aoritc Aneurysm

Nadav Levy, MD
Lior Levy, MD
Dario Winterton, MD
Matthew Gao, DO
Christopher Mallard, MD, MS
Federico Puerta Martinez, MD

We are excited to provide an update on our simulation training program, which continues to enhance the educational experience for our residents and faculty. A one and half hour long CME workshop was conducted where two parallel simulations were run simultaneously, each involving a multidisciplinary team, including anesthesiologists, surgeons, and CRNAs.

We conducted an in situ simulation in the operating room to manage a ruptured abdominal aortic aneurysm (AAA). The in situ setup provided an immersive experience, emphasizing the importance of precise communication, rapid decision-making, and effective coordination between anesthesia and surgical teams. By using high-fidelity equipment, the simulation closely mirrored the challenges faced during actual AAA emergencies, helping to refine technical skills and improve overall team performance under pressure. Both simulations followed the same protocolized approach, where the anesthesia team worked on stabilizing the patient, ensuring fluid resuscitation, monitoring hemodynamics, and managing anesthesia, while the surgical team focused on the rapid repair of the ruptured aneurysm. The goal was to replicate a real-life emergency scenario, emphasizing the importance of seamless communication and coordination between anesthesia and surgery. By condcuting in situ simulations, we aimed to improve team performance, enhance decision-making under pressure, and ensure a synchronized response to the management of a ruptured AAA, ultimately improving patient outcomes.

Click here to view the simulations



GLOBAL HEALTH

Perioperative Cardiovascular Management for Noncardiac Surgery

Ama Taplah, BSN, MPH, RNA
JFK Medical Center
Diana Park, MSN,CRNA, BIDMC
Patricia O'Connor, MSN, CRNA
Huma Hussain, 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 November grand rounds of the BAAC focused on the 2024 AHA/ACC/ACS/ASNC/HRS/SCA/SCCT/SCMR/SVM Guideline for Perioperative Cardiovascular Management for Noncardiac Surgery.
Although the focus of these guidelines has been adult (>18 years of age) patient population in the US, the discussion drew comparisons and applicability in resource-limited settings such as in Liberia. The guideline is an epitome of interdisciplinary collaboration among specialties, including surgery, nuclear cardiology, and anesthesia, to improve perioperative outcomes.The discussion revolved around preoperative cardiovascular risk assessments used in the United States (U.S.) and Libera to help estimate the likelihood of perioperative adverse outcomes. Key topics included:

1. Cardiovascular Risk Indices: In the U.S., commonly used tools for assessing cardiovascular risk include the Revised Cardiac Risk Index (RCRI), the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) perioperative MI and cardiac arrest (MICA) risk calculator, and the universal American College of Surgeons NSQIP surgical risk calculator. These calculators complement or replace evaluations of surgery-related factors (type of anesthesia or surgery) and patient-related factors (physical activity or physical exam findings).

2. Functional Capacity Assessment: In the U.S., functional capacity is evaluated by asking patients if they can climb two flights of stairs or by using tools like the Duke Activity Status Index (DASI), a semiquantitative questionnaire that measures functional capacity based on a patient's ability to perform 12 common daily activities. In Liberia, there are no specific tools available for assessing functional capacity. Instead, evaluations rely on reviewing the patient's medical history and verbally inquiring about their ability to exercise or walk.

3. Frailty Metrics: In the U.S., patients over 65 and those under 64 with suspected frailty undergo frailty assessments using validated tools. In Liberia, however, non-evidence-based methods like the ASA classification, which rely on subjective opinions and experience, are commonly used. There are no standardized tools available for evaluating cardiovascular risk in resource-limited settings.

4. ECG Utility: While preoperative ECGs are routine in the U.S., their use in asymptomatic non-cardiac patients offers limited benefits and may lead to overtreatment and unnecessary surgery delays. In Liberia, the absence of routine cardiac history and limited intraoperative ECG availability pose challenges. Moreover, proper training for ECG lead placement remains a significant gap for local anesthetists.

The session concluded with a discussion on the relevance of Western guidelines in low-resource contexts, emphasizing the need for adaptability to local realities. Participants highlighted the importance of tailored training and resource allocation to address disparities, ensuring that evidence-based practices benefit global perioperative care.

Healthcare Education Across Borders: Curriculum for Distance Education in Point of Care Ultrasound for Anesthesiologists in India

Shweta Yemul Golhar, MD
Robina Matyal, MD

As part of the Global Health Program, Dr. Shweta Yemul Golhar conducted a live virtual "Train the Trainers" workshop on perioperative ultrasound.

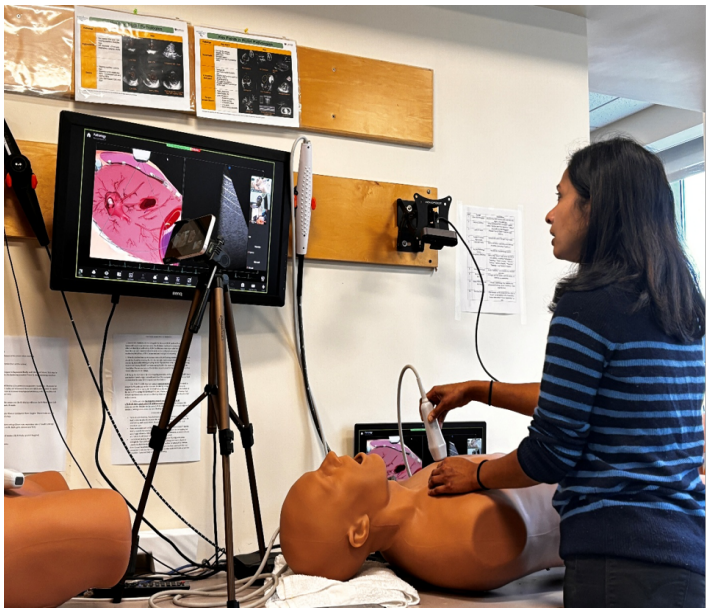
Click here to view the first session of "Train the Trainers' workshop

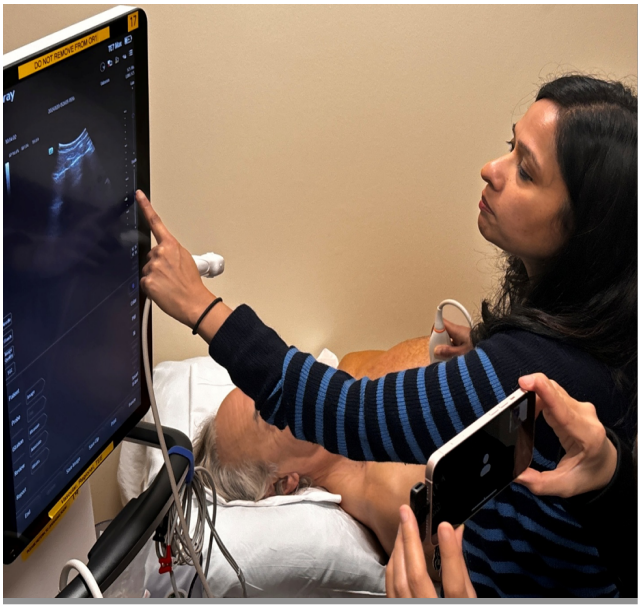
On November 22, 2024, the Global Health team for India, led by Shweta Yemul Golhar, conducted a virtual training session on Lung Point-of-Care Ultrasound (POCUS) at Byramjee-Jeejeebhoy Government Medical College (BJGMC) in Pune, India. The BIDMC Anesthesia team included Huma Hussain, Chau Tran, Adil Manji, and Shirin Saeed. Over ten practicing physicians from BJGMC participated in the session.

Dr. Golhar, an alumnus of BJGMC, introduced the POCUS training program at her alma mater to enhance ultrasound skills among practitioners. The program, launched in October 2024, features comprehensive modules covering ultrasound physics and knobology, RUSH/FAST protocols, and organ-specific POCUS applications for the lungs, heart, and gastric system.

The Lung POCUS session included a demonstration of ultrasound probe techniques using the Vimedix ultrasound simulator, followed by a live demonstration on a model to showcase real-time image acquisition. Participants also engaged in image interpretation exercises, where they received feedback on lung ultrasound images they had submitted. Additionally, de-identified cases from BIDMC were used to illustrate diagnostic approaches and interpretation techniques.

The session received positive feedback, with participants appreciating the practical insights and interactive learning format. The training marked another successful milestone in fostering global collaboration and advancing ultrasound education at BJGMC.

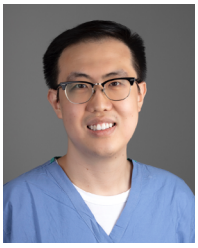
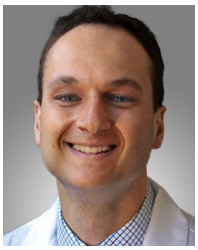




DIVISION CORNER

Role of Intraoperative Transesophageal Echocardiography in Guiding Thoracic Endovascular Aortic Aneurysm Repair

Sumeeta Kapoor, MD
Yifan Bu, MD
Benjamin Aronow, MD
Matthew Gao, DO


Case 1

A 75-year-old male, 157cm, 51kg underwent thoracic endovascular aortic repair (TEVAR).
Allergy: penicillins (reaction: shaking, has tolerated keflex)

Past Medical History: CABG x4 (2008), HFrEF, LVEF 30% with ICD, PAD (bilateral iliac stents), secondary adrenal insufficiency on prednisone, CKD3, HLD, T2DM, presented with chest/epigastric pain now has penetrating atheromatous ulcer in descending aorta w concern for aortitis

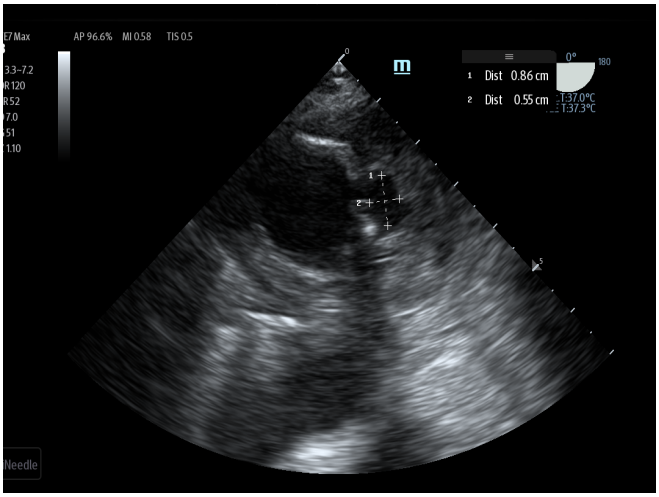
Sugircal History: iliac stent placement bilaterally, penectomy, CABG, bilaterally inguinal lymphadenectomy (2/2 groin infection)

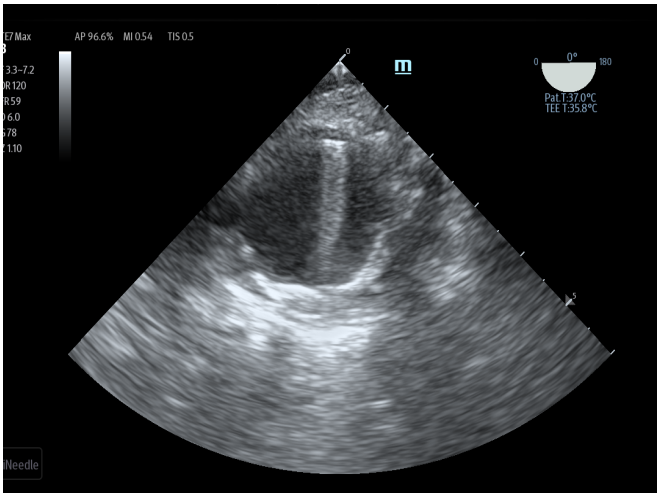
Anesthesia Plans: General Anesthesia with arterial line, central venous line and intraoperative transeesophageal echocardiography (TEE).

Case 2

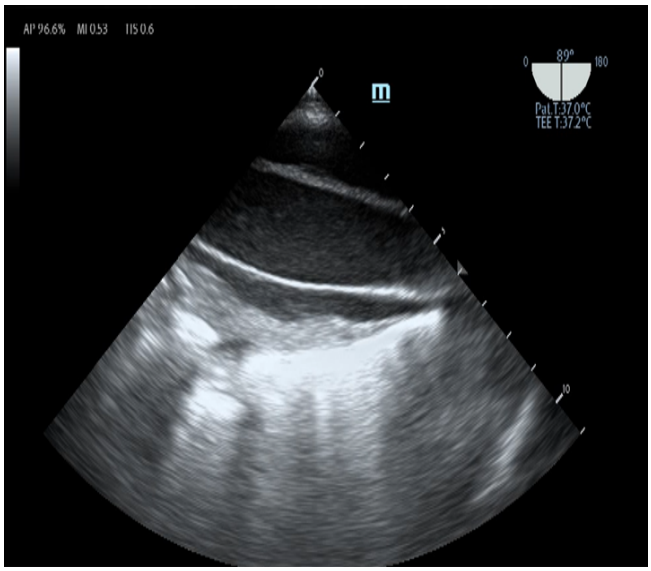
A 83-year-old male with history of atrial fibrillation (no longer on a/c), thoracic aortic aneurysm (TAA) and Aortic stenosis i/s/o biscupid aortic valve s/p aortic valve repair and TAA repair (2014).

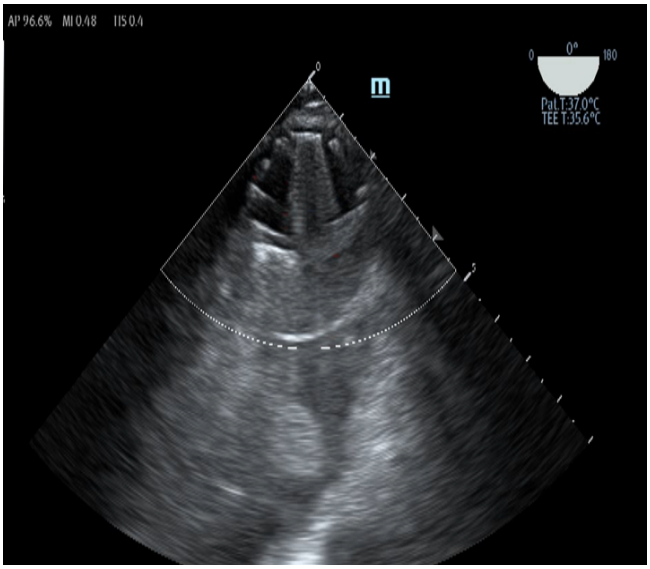
The patient was admitted to the BIDMC Vascular Surgery Service via transfer from Cape Cod Hospital with type B aortic dissection w/ proximal descending thoracic aorta diameter 5cm and suspected renal artery malperfusion. The patient underwent left carotid subclavian bypass without complication as stage 1 of surgical treatment plan. Cardiology was consulted for management of atrial fibrillation and blood pressure control. Discharged with carvedilol, amlodipine, and lisinopril in addition to aspirin. Ten days later, the patient was scheduled for thoracic endovascular aortic repair (TEVAR).
Anesthesia Plans: general anesthesia with arterial line, TEE and CVP monitoring for TEVAR.





Role of TEE in TEVAR Case Review





TEVAR

The use of thoracic endovascular aortic repair (TEVAR) has significantly decreased both morbidity and mortality when compared to traditional open surgical repair. A study utilizing the National Trauma Data Bank revealed a decline in the incidence of open repair, from 7.4% in 2007 to just 1.9% in 2015, while the percentage of TEVAR procedures rose from 12.1% to 25.7% over the same period. TEVAR is also increasingly applied to treat aortic aneurysms, penetrating atheromatous ulcers of the aorta,aortic dissections (type B) and traumatic aortic injuries. As research, clinical interest, and expertise in endovascular techniques have expanded, more advanced and varied procedures have been developed, including chimney TEVAR, and fenestrated and branched TEVAR approaches.

Transesophageal Echocardiography (TEE)

In patients undergoing TEVAR with general anesthesia, TEE provides real-time monitoring of cardiac function, identification of aortic pathologies, guidance for endograft placement, and evaluation of endoleaks after graft deployment. It is also essential for assessing ventricular function and the structure and function of the aortic valve, as thoracic aortic aneurysms (TAAs) and dissections can quickly progress to involve the valve. A comprehensive evaluation of the thoracic aorta is vital to diagnose the primary pathology and detect other conditions such as atheromas. Furthermore, TEE aids in guiding vascular access by visualizing wire placement in the descending aorta. During endograft insertion, it ensures that the aortic pathology is adequately covered. After the graft is deployed, TEE is crucial for confirming that the pathology has been excluded and verifying that no retrograde dissection has occurred. Color Doppler imaging can detect endoleaks but, it may be necessary to reduce the color Doppler aliasing velocity to between 20 and 30 cm per second.

In the first case, pre-procedure TEE identified the descending aorta penetrating ulcer with a size of 0.86x0.55cm and the surrounding intramural hematoma. CFD within the ulcer also appreciated active blood flow, as shown in the TEE image. After the deployment of the stent graft, TEE confirmed the correct apposition of the stent to the ulcer site with no blood flow detected within.

Click here to view TEE imaging of Case 1

In the second case, pre-procedure TEE was able to further evaluate the complexity of the dissection and the true and false lumen, as shown in the TEE images. After the procedure, TEE showed a full stent deployment without endoleaks and successful exclusion of false lumen with the beginning of thrombosis.

Click here to view TEE imaging of Case 2

ECHO CORNER

Case by Case Insights into Advanced Echocardiographic Diagnostics

Feroze Mahmood, MD

A 50-year-old male with type 1 diabetes mellitus presented to emergency department with 3 days history of dyspnea, productive cough, fever, chills and nausea.

On evaluation:
Vitals: BP 80/50, HR 120, SaO_2 96% (NP 4L), RR 20
The patient has diffuse crackles on bilateral bases.Chest xray shows right lower lung consolidation with air bronchograms.

What is your initial differential diagnosis?

Pump Dysfunction: Tamponade, Pulmonary embolism, Heart Failure

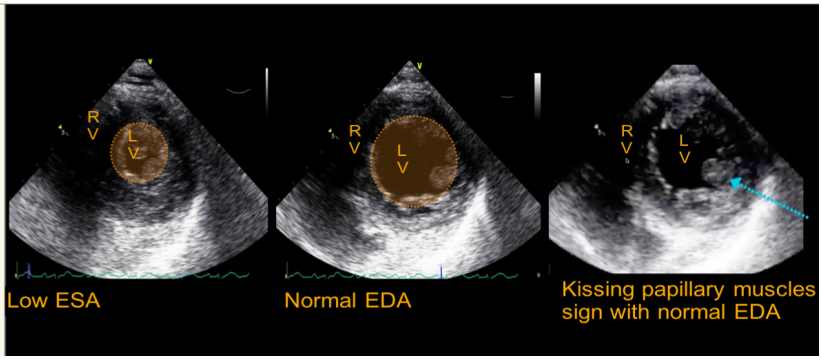
Tank (empty or compromised): Hemorrhage and hypovolemia, Pneumothorax

Pipes: Aortic Dissection, Deep vein thrombosis.

How can you narrow your differential diagnosis?

Click here to view imaging

Sepsis	• Kissing papillary muscles sign • Hyperdynamic ventricles • Early: Decreased ESA and normal EDA • Late: Decreased EDA and ESA



Key Points

The primary differentiating feature of absolute hypovolemia vs. vasodilatory shock on bed-side ultrasound is end-diastolic volume.

End systolic volume (“kissing papillaries”) are common to both, but in isolated vasodilatory shock end-diastolic volume is usually preserved.

Septic shock is a complex process and includes both absolute loss of intravascular volume from capillary leak and vasodilation.

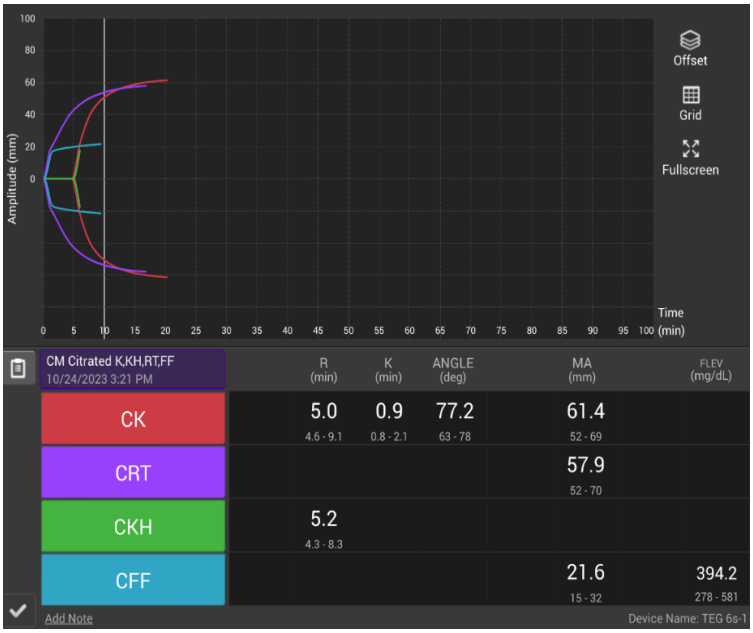
Acute management of vasodilatory shock can still include volume administration, but volume is rarely sufficient in the absence of other therapy (e.g. addressing source of infection, antibiotics, vasoconstrictors).

COAGULATION CORNER

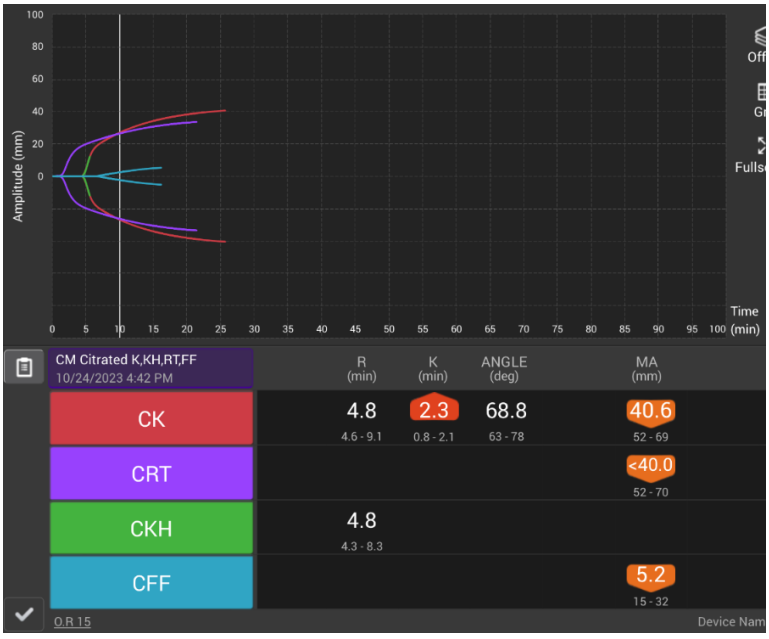
A Comprehensive Analysis of Coagulation Dynamics and Clinical Applications

John Bellemante, MD, MS

A 51-year-old man with non alcoholic steatohepatitis (NASH) cirrhosis with history of right axillary/subclavian/ internal jugular vein thrombus. A TEG was run preoperatively and is shown below.
Based on the TEG results, should this patient recieve any products?

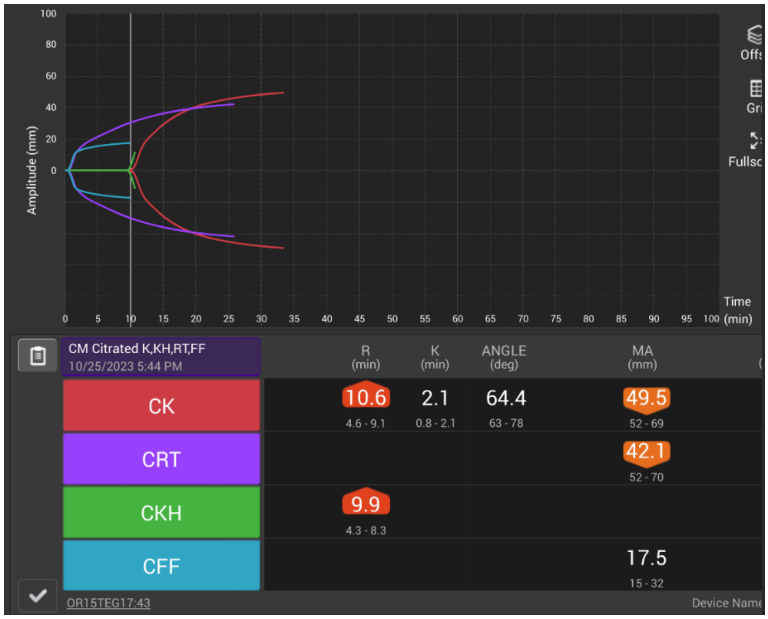


As the case continues, the patient has received multiple pRBC and plasma transfusions. A TEG is repeated and shown below. **Now what products should be given?**



Later on - after reperfusion, the patient is having ongoing coagulopathic oozing.

Is there any other tests we could run?



Click here to view the lecture on thromboelastography.

The patient continues to experience oozing despite the TEG values being near normal. This is indicative of thrombolysis. In this scenario, it is recommended to perform a TEG with lysis.

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.

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

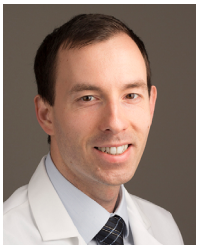
Graphical tracing and numerical results are reported for each measurement and results are highlighted orange if they fall outside the reference range.

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.



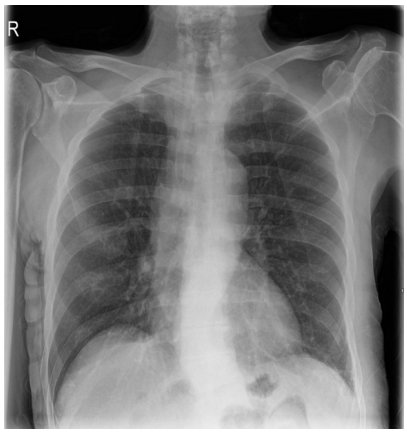
REGIONAL CORNER

Optimization of Analgesia for Rib Fractures: Evidence-Based Approaches

Laura Cook, NP
Andrey Rakalin, MD

Case 1: Thoracic Epidural

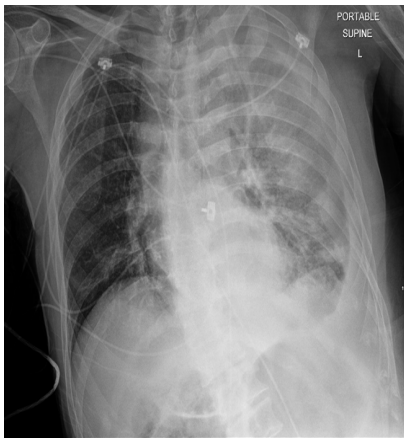
A 78-year-old. male with a past medical history of hyperlipidemia, asthma, multiple cerebral cavernous malformations s/p R cerebellar cavernous malformation resection (2014), chronic kidney disease presented with mechanical fall from bed four days ago. He was found to have displaced left 9-11th rib fractures and right 11th rib fracture.



Chest x ray Day 1: Minor basilar atelectasis is seen without focal consolidation. No pleural effusion or pneumothorax is seen. The cardiac and mediastinal silhouettes are stable; mediastinal contours are similar compared to previous xray. The aorta may be tortuous.

Day 2

He became tachypneic and hyoxic with RR 24 and the chest xray showed left chest wall hematoma c/b intercostal artery pseudoaneurysm. A left chest tube was placed. An epidural catheter was placed at T8/T9 for post-traumatic analgesia management.



Chest x ray New filamentous tubing projects over the lower midline chest, possibly for administering spinal anesthesia. The large bore left thoracostomy tube is in position ascending along the midline. Very small left apical pneumothorax and the small, residual left hemothorax is stable. Large scale consolidation at the base of the left lung, probably atelectasis, and substantial subsegmental atelectasis worsened at the base of the right lung, could both be contributing to hypoxia. Mild interstitial edema persists, left greater than right. Displaced bilateral lower rib fractures are shown.

The following multimodal approach was recommended for this patient:

1. Post-operative analgesia recommendations: Epidural Analgesia: (1) Bupivacaine 0.1%-Hydromorphone 10mcg/mL @ 4-12 mL/hour; rate 10 cc/hr, (2) Naloxone 100-200 mcg/hr (5-10 mL/hr) IV continuous PRN -if needed for pruritus only. (3) Acetaminophen 1gm IV q6H Systemic Anticoagulation was contraindicated while epidural in place due to heightened risk of epidural hematoma

2. VTE Prophylaxis: SC heparin must be limited to <15,000 units/day with coagulation monitoring on day of removal or placement. 10,000 units per day is preferential or Enoxaparin 40mg SC daily (<1mg/kg daily) Delay anticoagulation the morning of planned catheter removal. Following neuraxial catheter removal, delay administration of SC heparin 1 hour or enoxaparin 4 hours. Venodyne boots while sedentary

3. Urinary retention: Urinary catheter is required based off neuraxial catheter location in the lumbar or low thoracic spine (T9,T10,T11) due to an increased risk of urinary retention. Remove immediately following epidural removal. No IUC is required based off epidural placement.

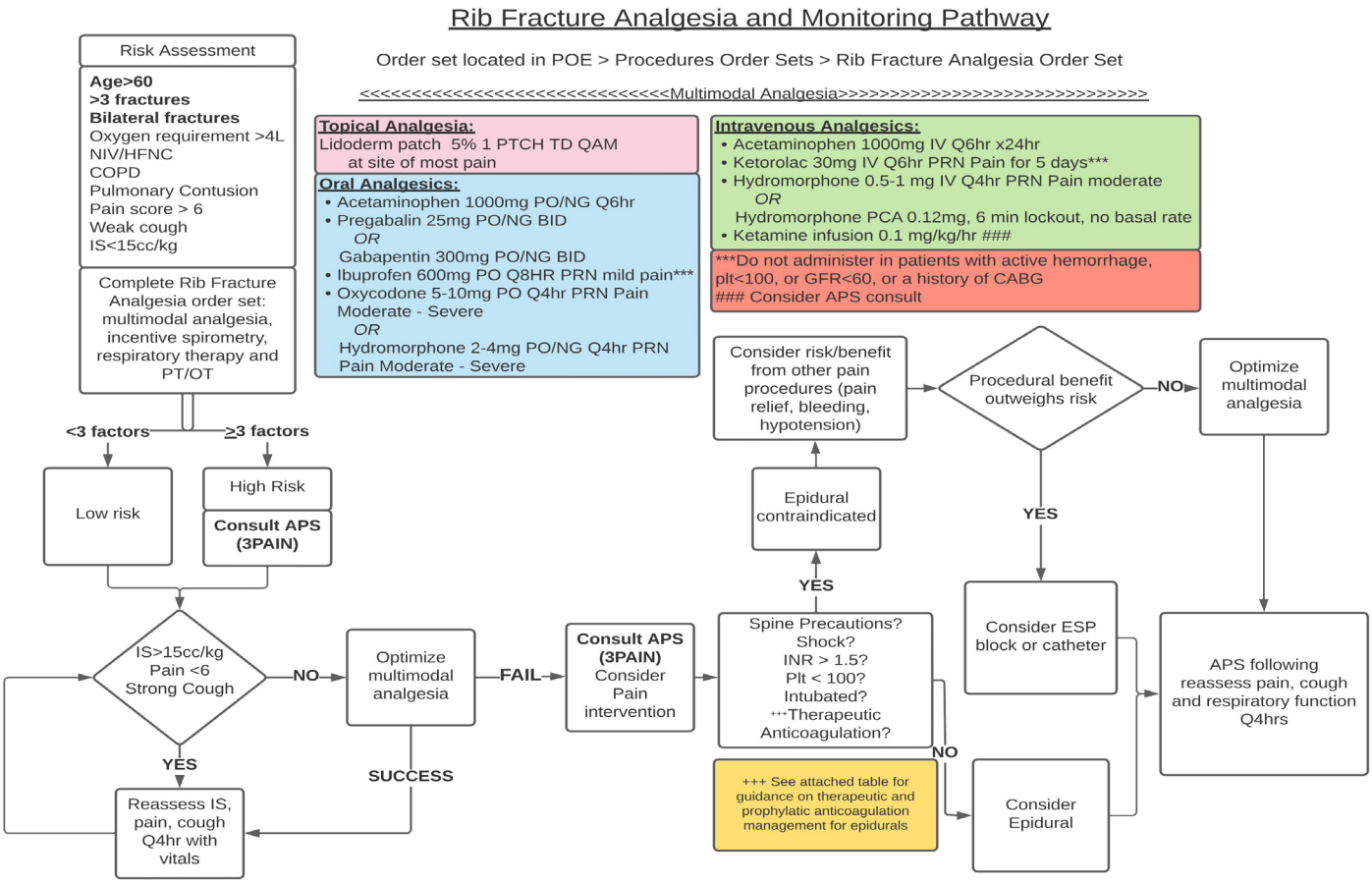
On day 5, the patient stabilized and the catheter was removed.

Case 2 : Ultrasound guided parasternal block and Pectoralis 2 Block

A 71-year-old man with type 1 diabetes mellitus with retinopathy, neuropathy and CKD, HTN. HFrEF (EF 40%, most likely ischemic) who presented initially with dyspnea and cough, volume overload (decompensated HF), course c/b torsades and cardiac arrest s/p ROSC, was transferred to CCU for management. He has had good recovery from his arrest but has chest discomfort related to rib fractures and was managed on oxycodone.

CT report: Nondisplaced fractures in the right anterolateral 2-6 ribs and left anterolateral 2-4 ribs.
Moderate bilateral nonhemorrhagic pleural effusions, right greater than left, accompanied by substantial relaxation atelectasis in the lower lobes. Superimposed pneumonia can not be excluded, especially in light of subtle peribronchial infiltration in both lower lobes and posterior segment of the left upper lobe.
Acute pain service was consulted and performed an ultrasound guided parasternal and PEC 2 block on the right.

The protocol for rib fracture analgesia is shown below.



Quiz Yourself

Audio & Visual Lesson

[Check out case five 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