AUGUSTA UNIVERSITY
MEDICAL COLLEGE OF GEORGIA

Anesthesiology PGY1 Ultrasound Core Rotation
Syllabus, 2021 - 2022

Course Description: The Anesthesiology PGY1 Ultrasound Core Rotation is a 4-week rotation during the PGY1 year of the Anesthesiology Residency Program. This rotation introduces the residents to a variety of POCUS scanning techniques through lectures and hands-on scanning sessions. Learning evaluations will include didactic learning assessments, image interpretation assessments, and ultrasound scanning assessments.

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Scope: Point-of-care ultrasound (POCUS) refers to the use of ultrasound (US) examinations at the patient's bedside performed by a healthcare provider to answer specific diagnostic questions, guide treatment, and aid in invasive procedures. The role of this technology during the perioperative period started a decade ago and has gained momentum to the present day. Initially under the purview of cardiology and radiology, pressure has shifted to include POCUS as part of the training program of other specialties. The practice of Anesthesiology now has started to rely on this technology in the perioperative period. From the placement of peripheral

intravenous lines all the way to the more complex cardiac valvular disease processes evaluation, ultrasound offers a non-invasive view into the patient's body with the use of sound. The Department of Anesthesiology at AU and the Center for Ultrasound Education have partnered to provide the Anesthesiology Resident with tools as he or she progresses through the learning continuum. The aim of this curriculum is thus to introduce the ever expanding role of ultrasound technology to the perioperative setting without overburdening the learning experience. To keep the curriculum manageable the two main areas of the course include cardiac and lung ultrasound. These main topics form the foundation for your training as required by the American Board of Anesthesiology and will be part an integral part of your examination.

Components:

The POCUS curriculum includes a wide range of ultrasound applications. The components of which should follow a structured didactic guide which are contained within the Anesthesia Toolbox website offered by the Department of Anesthesiology; the areas of focus include Ultrasound Basics, Evaluation of the Lung and Pleural Space as well as Point of Care Ultrasound Echocardiography. An additional area of interest for the avid reader should include Focused Assessment with Sonography for trauma module (FAST) exam. (https://www.anesthesiatoolbox.com/tools/rotation-study-guides/pocus-core-curriculum).

The knowledge component should be followed by a practice component with an attending who is part of the program. The Center for Ultrasound Education offers a full list of attendings and area of expertise, see the list below. A registry of examinations performed is available so that residents and attendings can formalize practical training sessions.

Residents are expected to be able to progress through the basic didactic material provided below. In conjunction, they are expected to complete a minimum of 40 complete POCUS examinations during the US core rotation. These POCUS examinations include: Transthoracic ECHO (TTE), Thoracic Ultrasound and FAST Exams. Dedicated time to complete these is available during Preop rotation and Chronic pain rotation regardless of PGY level.

General Learning Objectives:

At the conclusion of the rotation, the learner will:
1. Recall key information concerning introductory ultrasound topics including basic ultrasound physics principles, screen orientation, scan techniques, and ultrasound machine and simulation equipment knobology.
2. Recognize common ultrasound applications and appropriate indications, pre-exam activities, patient preparations, and common scanning protocols.
3. Demonstrate Point-of-Care ultrasound introductory scanning skills through hands-on scanning labs.
4. Understand the basic principles of the following applications: Transthoracic ECHO (TTE), Thoracic Ultrasound, and FAST and RUSHed examinations.

Rotation Content Outline:

A. Ultrasound Basics

These modules will help the clinician have a better understanding of probe selection, image acquisition, and optimization efforts to maximize the use of POCUS:

- Ultrasound machine controls
- Ultrasound physics
- Introduction to ultrasound artifacts

B. Ultrasound evaluation of the Lung and Pleural Space

The clinician will gain insight into the interpretation of lung ultrasonography to aid in lung pathology in the following areas:

- Introduction of lung ultrasonography
- Ultrasound evaluation for pneumothorax
- Lung ultrasonography of pleural effusion
- FATE exam

C. Point of Care Transthoracic Echocardiography

Transthoracic echocardiography (TTE) is a powerful tool in the evaluation of the critically ill. Basic TTE is not meant to supplant a comprehensive exam but can be used to guide management. Aspects that are focused during training include image acquisition through limited TTE views and the interpretation of the views. Imaging modalities include 2D and color flow Doppler. Pulsed wave and continuous wave Doppler are technologies of ultrasound that are not part of the curriculum but are encouraged to the eager learner. The following areas of TTE will be addressed:

- Introduction to TTE views
- Basic TTE image Views and Acquisition
- TTE assessment of LV function
- TTE assessment of regional wall motion
- Assessment of volume responsiveness with TTE
- Assessment of RV systolic function with TTE
- FATE exam

D. FAST and RUSHed Examinations

Weekly Rotation Schedule:

Week 1 - TTE

- *Monday and Tuesday*
  - Complete US Pretest
  - View the following videos:

Lecture Title	Web Link (YouTube)	Length
1. Introduction to Clinician Based Ultrasound	http://youtu.be/zm2ek7qiUTQ	12:19
2. Physics and Fundamentals I	http://youtu.be/QQEii6qzOtk	17:29
3. Physics and Fundamentals II	http://youtu.be/kvZs5q8SxKs	13:50
4. Physics and Fundamentals III	http://youtu.be/nq3HI4hMBgc	13:15
5. Physics and Fundamentals IV	http://youtu.be/ELRODwQ9iWA	19:20
6. Cardiac Orientation	http://youtu.be/rkI_FzLL5jQ	13:41
7. Bedside Cardiac Ultrasound	http://youtu.be/OchbLT0EaQM	50:30

  - Ultrasound Imaging – Obtain 5 sets of images (PSLA, Subcostal 4 Chamber, Subcostal IVC, Apical – label chambers)

- *Wednesday*
  - Scan with CUSE Staff 2 hours – Chela Wednesday afternoon – 2:00 – 4:00
  - SIMULATION: TTE Cardiac Simulation – 4:00 – 5:00

- *Thursday and Friday*
  - IMAGES: 10 TTE Cardiac Images in ED/ICU (must demonstrate normal EF, diminished EF, low CVP, elevated CVP)
    - Must utilize POCUS Teaching Order
  - QUIZ: Complete Cardiac Quiz

Week 2 – FAST

- *Monday – Tuesday*
  - View the following videos:

1. FAST Exam	http://youtu.be/JLlLl03QpWo	24:54
2. Knobology	http://youtu.be/wDNcQonG9IM	8:19
3. Care and Maintenance of the US Machine	http://youtu.be/iuWHE7KrUYM	10:31

  - Ultrasound Imaging – Obtain 5 sets of TTE/ FAST images (4 windows – label organs)

- *Wednesday*
  - Scan with CUSE Staff 2 hours – Chela Wednesday afternoon – 2:00 – 4:00
  - SIMULATION: TTE / FAST Simulation – 4:00 – 5:00

- *Thursday and Friday*
  - IMAGES: 10 TTE / FAST Images in ED/ICU (must demonstrate ascites, renal failure)

    - Must utilize POCUS Teaching Order
  - QUIZ: Complete FAST Quiz

Week 3 - Thoracic Ultrasound

- *Monday – Tuesday*
  - View the following videos:

1. Thoracic Ultrasound Part 1	http://youtu.be/u6yNZnQPjxI	23:49
2. Thoracic Ultrasound Part 2	http://youtu.be/_t8LFs7_SL8	20:19
3. Thoracic Ultrasound Part 3	http://youtu.be/IqPz7f9GOxw	18:15
4. Thoracic Ultrasound Part 4	http://youtu.be/mnXkcjURZOw	14:18

  - Ultrasound Imaging – Obtain 5 sets of images (TTE/FAST with Lung windows labeled)

- *Wednesday*
  - Scan with CUSE Staff 2 hours – Chela Wednesday afternoon – 2:00 – 4:00
  - SIMULATION: TTE/ Thoracic Simulation – 4:00 – 5:00

- *Thursday and Friday*
  - IMAGES: 10 TTE / FAST Cardiac Images in ED/ICU – must demonstrate Pleural effusion, Sliding lung sign, B-lines, a Lines)
    - Must utilize POCUS Teaching Order
  - QUIZ: Complete Thoracic Quiz

Week4 USG Procedures and RUSHed

- *Monday – Tuesday*
  - View the following videos:

Lecture Title	Web Link (YouTube)	Length
1. Undifferentiated Hypotension	http://youtu.be/wq5MrNmA0UA	59:12
2. Why we still fail at USGVA		
3. Modified Procedure for USGVA	https://youtu.be/NVhvkD5h5QE	1:37
4. US Guided Thoracentesis	https://youtu.be/fvqO_V1_bgM	8:06

  - Ultrasound Imaging – Practice with USGVA with Blue phantom, Obtain 5 RUSHed sets of images in ICU of patients with hypotension
    - Must utilize POCUS Teaching Order

- *Wednesday*
  - Scan with CUSE Staff 2 hours – Chela Wednesday afternoon – 2:00 – 4:00
  - SIMULATION: TTE/ RUSHed Simulation – 4:00 – 5:00

- *Thursday and Friday*
  - IMAGES: 10 TTE / RUSHed exams in ED/ICU (must demonstrate Hypovolemia, Cardiogenic shock or pre-shock, Pulmonary hypertension)
    - Must utilize POCUS Teaching Order

- QUIZ: Complete US Post Test

Measured Outcomes:

- Module Quiz Scores
- Graded US Images
- Clinical US Images and Quality
- US Post Test Results

References & Suggested Readings:

Center for Ultrasound Education website: mcgultrasoundeducation.com

Lyon, M., Menckhoff, C., & Shiver, S.A. (2008). *Emergency Ultrasound Pocket Reference*. Augusta, GA: Medical College of Georgia, Department of Emergency Medicine. Available at: http://tiny.cc/ecus_ebook

Anesthesia toolbox Point of Care Ultrasound Curriculum and other recommended study guides:

Anesthesia toolbox study guide.https://www.anesthesiatoolbox.com/tools/rotation-study-guides/pocus-core-curriculum

Foresight ultrasound is a webpage designed by perioperative and acute care physicians as an open source platform for ultrasound education. https://www.foresightultrasound.com/

The Society of Point of Care Ultrasound offers great educational resources on POCUS https://spocus.org/resources-programs/foamed/

Standard and focused TTE views through the University of Toronto: Best resource for a more comprehensive view. http://pie.med.utoronto.ca/TTE/index.htm

Focus Cardiac Ultrasound: Also from the University of Toronto. Great resource to compare normal against important pathologic variations. https://pie.med.utoronto.ca/TTE/TTE_content/focus.html

FATE/ FAST exam : Easy to remember protocols that assist the clinician in emergency situations. https://www.heart.org/idc/groups/heart-public/@wcm/@fda/documents/downloadable/ucm_4936 91.pdf http://usabcd.org/node/22

Stanford University ICU echocardiography with pathology. https://web.stanford.edu/group/ccm_echocardio/cgi-bin/mediawiki/index.php/Main_Page Basic echocardiographic views with pathology http://www.echocardiographer.org/TTE.html

Rush Exam. Rapid ultrasound for shock and hypotension protocol. https://emcrit.org/rush-exam/

TEE of the month by U Washington: Transesophageal echocardiography resources for those who want to exand their knowledge.
http://depts.washington.edu/anesth/education/community/tee/index.shtml

ASA Supplemental Guide. These are the Point of Care Ultrasound milestones Anesthesiology residents are expected to know in order to prepare for the Board examinations prepared for by the Board of Anesthesiology.
https://www.acgme.org/Portals/0/PDFs/Milestones/AnesthesiologySupplementalGuide.pdf?ver=2020-12-02-142625-453

References:

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2. Canty DJ, Royse CF. Audit of anaesthetist-performed echocar diography on perioperative management decisions for non-cardiac surgery. Br J Anaesth 2009;103:352–8

3. Neelankavil J and all. Transthoracic echocardiography simulation is an efficient method to train anesthesiologists in basic transthoracic echocardiography skills. Anesth Analg. 2012 Nov;115(5):1042-51. doi: 10.1213/ANE.0b013e318265408f. Epub 2012 Jul 19.

4. Cahalan M, Abel M, Goldman M, Pearlman A, Sears-Rogan P, Russell I, Shanewise J, Stewart W, Troianos C. American Society of Echocardiography and Society of Cardiovascular Anesthe siologists Task Force guidelines for training in perioperative echocardiography. Anesth Analg 2002;94:1384–8.

5. Jensen MB, Sloth E, Larsen KM, Schmidt MB. Transthoracic echocardiography for cardiopulmonary monitoring in inten sive care unit. Eur J Anesthesiol 2004;21:9:700–7

6. Breitkreutz R, Uddin S, Steiger H, Ilper H, Steche M, Wal cher F, Via G, Price S. Focused echocardiography entry level: new concept of a 1-day training course. Minerva Anesthesiol 2009;75:285–92.

7. Lang RM and all. Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging. Journal of the American Society of Echocardiography. 2015 Jan; 28(1);1-39.

8. Jensen MB and all. Transthoracic echocardiography for cardiopulmonary monitoring in intensive care. Eur J Anaesthesiol 2004; 21:700-7

9. Tanzola RC and all. Brief report: Focused transthoracic echocardiography training in a Cohort of Canadian anesthesiology residents: a pilot study. Can J Anesth (2013) 60:32-37.

10. Cowie B: Three years' experience of focused cardiovascular ultrasound in the peri-operative period. Anaesthesia 66:268-273, 2011

11. Canty DJ and all. The Impact of Pre-Operative Focused Transthoracic Echocardiography In Emergency Non-cardiac Surgery Patients With Known or Risk of Cardiac Disease. Anesthesia 2012; 67: 714-720.

12. Fagley RE and all. Critical Care Basic Ultrasound Learning Goals for American Anesthesiology Critical Care Trainees: Recommendations from an Expert Group. Anesthesia & Analgesia. 120(5):1041–1053, MAY 2015