

PEM FELLOW POCUS PROGRAM & POLICIES

1. INTRODUCTION

A. Your fellowship-trained **PEM POCUS Program Director is Danielle Paulin, DO, MA, FAAP**. You may contact me anytime at:

- i. Cell: 216-513-5431
- ii. Email: dpaulin06@gmail.com, dpaulin@akronchildrens.org (if you email me something important, please text me that you did)
- iii. Website: <http://www.achpempocus.com/>
- iv. What'sApp CHMCA PEM POCUS Group → Scan QR code to join.



B. Vision

- i. Ultrasound First: An environment where highly trained pediatric faculty and staff use Point of Care Ultrasound as the initial diagnostic tool for patient care.

C. Goals

- i. To produce highly trained PEM emergency ultrasound and PEM fellows, credentialed and certified in a wide variety of pediatric applications that utilize a high level of understanding of emergency bedside ultrasound as it applies to the critically ill child.
- ii. Through an innovative curriculum that incorporates a multi-level approach to teaching bedside ultrasound, pediatric emergency medicine fellowship trainees and pediatric faculty will acquire a specific skill set that will seamlessly translate into their everyday work-flow and ultimately give them an added diagnostic advantage to make a positive impact in a high volume, high acuity pediatric clinical environment.

2. GOALS AND OBJECTIVES

A. Image acquisition & Image Interpretation

- i. The pediatric emergency fellow will complete a minimum of 150 independently performed ultrasound examinations covering most aspects of pediatric emergency ultrasound by the end of their PEM Fellowship training.
- ii. Each study will be reviewed for quality of image acquisition and accuracy of interpretation. The Director of Pediatric Emergency Ultrasound will review all scans.
- iii. The fellow will compile all technically appropriate studies into a repository (QPATH) for future review and referral.
- iv. Possible abnormal (or normal) findings are **not to be discussed** with the patient or family unless reviewed with myself or a "follow-up" exam first (refer to section on Documentation below).

B. Documentation

- i. **All clinical POCUS studies should be documented in the patient chart** (either under Procedure tab in your Provider note or as a separate Procedure note)
 1. Complete and sign the report in QPATH
 2. Open snipping tool from the Windows menu
 3. Take a snapshot of the report
 4. Open the patient's chart in EPIC
 5. Assign it as an ED Note and click the Cosigner box and choose Dr. Paulin as the cosigner (if you haven't completed your intro month yet)
 6. Paste the snapshot in the blank note
 7. In Qpath, click on Get Link and then OK to copy the link
 8. Paste the link under the report pasted in EPIC
 9. Sign your note
- ii. As this is a ridiculously time-consuming process, if documentation is critical, but time does not allow for this lengthy process, the following dot phrases are still available in EPIC to document your findings:
 1. ***.pemus*** (for all exams except cardiac)
 2. ***.pemcardiacus*** (for cardiac exams)
 3. ***.usgpiv*** (for PIVs)
 4. ***.usgvenipuncture*** (for venipuncture or art sticks)
- iii. If the exam is not supervised directly by me, then **an appropriate "follow-up" study MUST be performed and documented**. Refer to Appendix A for details.
- iv. If a CT scan or MRI is done as part of the work-up, you may perform POCUS on anything that is included in that study (i.e., CT A/P allows you to scan heart, lung, RUQ, renal, appx, pelvis, FAST, etc.) and the CT or MRI will be your "follow-up" study.
- v. In order to obtain credit for your study, **you must complete the required views**. These are also detailed in Appendix A.
- vi. **You must input patient info into the machine and save the study in order to obtain credit for the study**. If I cannot find it by patient name, MRN, or your name, then I cannot QA it and it will not count towards your total number.

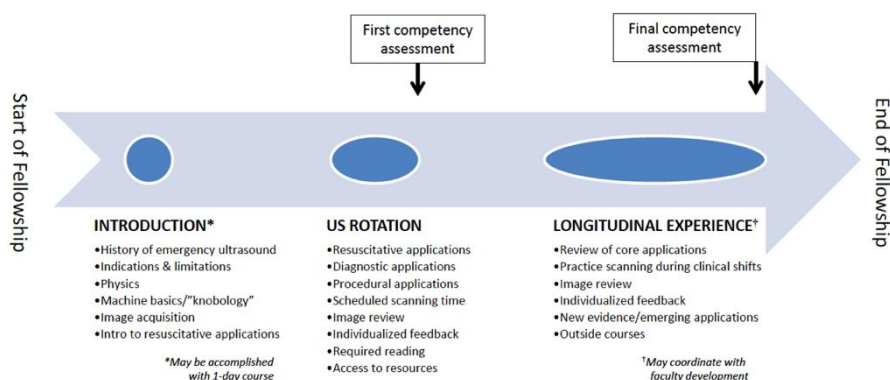
3. INTRODUCTORY ROTATION

- A. During your first year, you will have a 1-month Ultrasound rotation scheduled.
 - i. This rotation consists of 11 scanning shifts a month (4-8 hrs each, pending my availability) plus attendance at Tuesday didactics, as well as one shift with the sonographers in radiology.
 - ii. You may sign up for these shifts using MyLearning from either MyKidsnet or my website.
 - iii. Dedicated shifts may include evenings or weekends to maximize exposure to pathology and interesting emergency US cases.
 - iv. You may take vacation during this month as long as you meet the requirements below.
- B. Requirements:
 - i. Exams
 1. *FAST (5)*

2. *Lung (5)*
 3. *Cardiac (5)*
 4. *Bladder (5)*
 5. *Soft Tissue/MSK (5)*
 6. *25 additional exams of any type for a **total of 50 exams** completed during this month.*
- ii. **Choose one case** from this month to **present during DES** the following month.
 - iii. All fellow-performed scans should be directly supervised by a POCUS credentialed faculty (myself or James Lee, MD) or recorded for subsequent quality assurance review with the POCUS Program Director.
 - iv. You will spend one day with the ultrasound techs during this month learning “non-POCUS” exams. **You must email Marshelle Vales, RDMS** to schedule this date (mvalues@akronchildrens.org).
 - v. All exams must be **logged in New Innovations**. Fellows are encouraged to generate a personal log of POCUS exams on which to build during their postgraduate education (see Appendix B).

4. LONGITUDINAL EXPERIENCE

- A. You should strive to perform at least ONE POCUS EXAM PER SHIFT. This means bringing the ultrasound machine to the bedside when you assess your patients, even if you don’t end up using it. You only get what you put into this learning experience.
- B. During your scholarly months, you will be expected to sign up for one POCUS shift, using MyLearning.
- C. Additional ultrasound elective rotations may be scheduled throughout the year pending approval from your Program Director.
 - i. Please **email me the month prior** to work out your specific schedule or sign up for shifts as detailed above (dpaulin@akronchildrens.org).
 - ii. You will be expected to complete **at least 50 scans** during this month.
 - iii. The purpose of this rotation is to expand your knowledge to more advanced exams and to increase your numbers to achieve competency for future privileging.
 1. *Keep in mind, at Akron Children’s, for basic applications (FAST, Bladder, IVC, Soft-Tissue, Lung for PTx, ONSD, etc.) 5 supervised exams are required. For advanced applications (everything else), 25 supervised exams are required. For US-guided procedures, 5 supervised exams are required. These include simulation exams and procedures.*
 2. *If you plan on practicing elsewhere after fellowship and are interested in obtaining POCUS privileges, check in advance what their requirements are, and I can help you meet them.*



D. Peds Sono Fest

- i. The P2Network annually holds the Peds Sono Fest at one of the regional conferences (AAP, ACEP, SAEM, PAS, etc).
- ii. 2 Fellows are needed to make up a team to compete. This is on a volunteer basis.
- iii. Awards are given for best team name and best costumes.
- iv. The first portion includes multiple choice questions to qualify for the second part, which is various scanning activities.
- v. I will try to get costs covered for the fellows that volunteer (but not guaranteed).
- vi. Refer to detailed curriculum for dates.

5. MONTHLY DICACTIONS

- A. Monthly 2.5-hour session from 9a-11:30a, the third Tuesday of the month, in the KJP ED Conference Room.
- B. First hour and a half includes tape review followed by lecture, last hour includes hands-on practice.
- C. **Detailed curriculum schedule** available on PEM POCUS Website: <http://www.achpempocus.com/> under Documents > Rotation Information.
- D. Please notify me in advance if you feel uncomfortable having any particular exams practiced on you (besides GU exams).

6. ANNUAL PEM POCUS BOOTCAMP

- A. Held yearly on the second Tuesday in August at Austen Simulation Center, 8a – 5p.
- B. **Yearly requirement for all PEM Fellows.**
- C. PEM Fellows in their final year will be **expected to help proctor** morning diagnostic exam stations.
- D. Diagnostic Exams
 - i. Physics & Knobology/?PADGO
 - ii. eFAST
 - iii. Lung
 - iv. Cardiac
- E. Procedural Exams
 - i. Soft Tissue & Foreign Body
 - ii. PIV & CVLs
 - iii. Chest Tubes/Thoracentesis
 - iv. Pericardiocentesis
 - v. Lumbar Puncture

7. APPLICATIONS & PEM BOARD SPECS

Potential Pediatric Emergency Medicine Ultrasound Applications

Resuscitative Applications	Diagnostic Applications	Procedural Applications
eFAST - Identify free peritoneal fluid - Identify pericardial effusion - Identify hemothorax - Identify pneumothorax	Soft tissue - Identify infection - Identify fluid collection - Identify foreign body	CVC placement
Focused cardiovascular - Identify pericardial effusion - Identify cardiac standstill - Evaluate function - Assess IVC for volume status	Thoracic - Identify pleural fluid - Identify pneumothorax - Identify parenchymal pathology	Peripheral intravenous access
Early pregnancy Identify intrauterine pregnancy and/or free peritoneal fluid in evaluation for ectopic pregnancy	Bladder Assess for urine	Abscess incision and drainage
	Focused abdominal - Identify appendicitis - Identify pyloric stenosis - Identify intussusception - Identify free peritoneal fluid	Suprapubic bladder aspiration
	Musculoskeletal - Identify fractures - Identify joint effusions	Lumbar puncture
	Renal Assess for hydronephrosis	ETT position confirmation
	Biliary - Assess for cholelithiasis - Assess for cholecystitis	Nerve block
	Deep venous Identify DVT	Arthrocentesis
	Ocular - Identify retinal detachment - Identify vitreous hemorrhage - Evaluate optic nerve sheath diameter	Thoracentesis
Paracentesis		
CVC = central venous catheter; DVT = deep venous thrombosis; ETT = endotracheal tube; eFAST = extended focused assessment with sonography in trauma; IVC = inferior vena cava.		

A. Basic

i. Physics & Knobology

- Fellows are expected to familiarize themselves with all ultrasound units made available to them in the department of emergency medicine. They should learn to work with the available technology to optimize their scanning and image quality. This applies to basic machine functions such as powering on and off, using color, spectral, and power doppler, and interpreting doppler waveforms. Fellows are expected to learn the basic skills required to perform complete ultrasound examinations in the aforementioned areas.*
- Objectives*
 - Define ultrasound*
 - Describe the properties of sound waves*
 - Discuss image production*
 - Define the piezoelectric effect*
 - Compare and contrast transducer types*
 - Demonstrate ability to adjust knobs to produce a quality image*
 - Discuss common artifacts*
 - Describe techniques utilized for proper transducer hand control*

ii. FAST

1. *The FAST exam changed the algorithmic approach to trauma. The American College of Surgeons (sponsors of the Advanced Trauma Life Support educational model) incorporates the FAST in their education to all certified physicians. There is widespread use of FAST in many ED's across the country.*
2. *For the purposes of the rotation, fellows should gain the basic skills necessary to perform a complete FAST examination. They should be able to generate the four necessary windows (hepatorenal, paracolic gutters, splenorenal, pelvic, and subcostal/parasternal long) while performing the exam. They will learn the difference between a normal and abnormal exam, learn limitations of the technology and exam, and finally learn to incorporate information obtained at the bedside into their daily practice and clinical decision making.*
3. *Objectives*
 - a. *Discuss interpretation of the FAST exam*
 - b. *Compare negative vs. positive FAST exam*
 - c. *Describe the sonographic windows that make up the FAST exam*
 - d. *Describe and demonstrate the proper technique for each sonographic window*
 - e. *Discuss the clinical application of the FAST exam*
 - f. *Identify key structures visualized during the FAST exam*
 - g. *Identify limitations of FAST exam*

B. Advanced

i. Cardiac

1. *Fellows must aim at consistently performing two of the following four sonographic views of the heart: parasternal long and short, subcostal, and apical four chamber. They should familiarize themselves with all sonographic views and should readily identify cardiac structures in all views.*
2. *They must learn to identify the following pathologic conditions: pericardial fluid, pericardial tamponade, decreased ejection fraction or global wall motion abnormalities, and cardiac standstill.*

ii. Pelvic

1. *In the emergency department focused pelvic sonography consists of identifying a gravid versus a non-gravid uterus. Fellows are expected to learn basic sonographic anatomical structures of the pelvis including the vagina, cervix, uterus, ovaries and adnexa. They are expected to identify the gravid uterus, learn basic embryologic structures (gestational sac, yolk sac, fetal pole, fetal heart rate) and correlate sonographic findings with laboratory findings.*
2. *They should learn sonographic anatomy in both the transabdominal and transvaginal (at adult facilities) approaches. In addition, basic bio-safety issues should be appreciated.*
3. *Objectives*
 - a. *Describe and demonstrate proper techniques utilized in the performance of a bedside 1st trimester study*
 - b. *Identify key structures visualized during the exam*
 - c. *Describe sonographic findings of a normal intrauterine pregnancy*
 - d. *Define pregnancy failure and discuss the possible sonographic findings associated with it*
 - e. *Describe sonographic findings of an ectopic pregnancy*

- f. Identify limitations of ultrasound in the evaluation of the patient with an early pregnancy*
- g. Discuss the appropriate use of beta-hCG testing in the first-trimester patient*
- h. Identify the limitations of pelvic ultrasound*

iii. Renal

- 1. Fellows are expected to learn renal sonographic anatomy. They should learn to differentiate hydronephrosis from a normal kidney, identify renal calcifications, and learn to perform accurate measurements of both kidneys.*
- 2. Fellows should also learn to identify the bladder, learn to identify successful catheterization of the bladder, bladder calcifications, and calculate bladder volume.*
- 3. Objectives*
 - a. Describe and demonstrate proper techniques utilized in the performance of a bedside renal study*
 - b. Identify key structures visualized during the exam*
 - c. Describe the sonographic findings of hydronephrosis*
 - d. Discuss limitations of an ultrasound exam in the patient with suspected obstructive uropathy*
 - e. Discuss clinical application(s) of the bedside study in the patient with suspected obstructive uropathy*

iv. RUQ

- 1. Fellows should first review basic biliary anatomy. Next, they are expected to learn basic sonographic anatomy to identify the gallbladder fundus, body, neck, as well as the common bile duct. They should be able to identify hepatic anatomy such as the liver itself, portal vein, and hepatic veins.*
- 2. Fellows should be able to perform a complete examination of the biliary system including the gallbladder and measurement of the common bile duct. Fellows should gain appreciation of common pathology such as gallstones, cholecystitis, and bile duct dilatation.*
- 3. Objectives*
 - a. Describe and demonstrate proper techniques utilized in the performance of a bedside GB study*
 - b. Identify key structures visualized during the exam*
 - c. Describe sonographic findings of cholelithiasis*
 - d. List sonographic criteria for diagnosing cholecystitis*
 - e. Identify limitations of focused RUQ ultrasound*

C. Adult Applications

i. Aorta

- 1. Fellows must learn to identify the basic vascular abdominal structures. They should be able to identify the aorta and inferior vena cava sonographically and learn to visualize the aorta in the proximal, mid, and distal views.*
- 2. The primary aim is to identify aneurysms of the aorta.*
- 3. Fellows should review the upper limits of normal anatomy and be able to incorporate sonographic findings of aortic dilatation into their daily practice.*
- 4. Objectives*

- a. *Describe and demonstrate proper technique for performance of emergent ultrasound exam of the aorta*
- b. *Discuss clinical application of bedside ultrasonography in patients with suspected AAA*
- c. *Identify key structures visualized during the emergent ultrasound exam*
- d. *Discuss pearls/pitfalls associated with the exam*
- e. *List sonographic criteria for diagnosing AAA.*

ii. DVT

1. *Objectives*
2. *Describe and demonstrate proper techniques utilized in the performance of a focused lower extremity compression ultrasound*
3. *Identify key structures visualized during the exam*
4. *List sonographic findings of a DVT*
5. *Contrast the sonographic findings of an acute vs. chronic DVT*
6. *Identify other common incidental pathologic findings*
7. *Identify limitations of the compression ultrasound exam in patients with suspected DVT*

D. Procedural applications

i. Vascular Access

1. *Ultrasound guidance can increase the success rates and decrease complications for a wide array of emergency procedures. Fellows should gain the experience of inserting central venous lines under ultrasound guidance and begin to develop the hand eye coordination necessary for ultrasound guided catheter insertion. Educational models and phantoms can be used as an adjunct in this process. Fellows should be able to identify basic vascular structures in the neck including the carotid artery and jugular vein.*
2. *Objectives*
 - a. *Describe and demonstrate proper techniques utilized in the performance of an ultrasound-guided vascular access procedure (peripheral venous, subclavian, femoral, and internal jugular)*
 - b. *Identify key structures visualized during the exam*
 - c. *Compare and contrast long-axis, short-axis, and oblique vessel approaches*
 - d. *Discuss the advantages/disadvantages of using a biopsy guide*
 - e. *Discuss needle visualization with ultrasound*

8. APPENDIX A

Required Views & Appropriate Follow-up Studies When Performing Ultrasounds for Credit

(Each may have additional appropriate follow-up studies. If there is any question, ask me)

FAST:

Right (Morrison's Pouch, inferior renal pole/paracolic gutter, lung base)

Left (Spleno-renal recess, inferior renal pole/ paracolic gutter, lung base)

Pelvis (Transverse and sagittal views)

Cardiac (At least 1 view subxiphoid or parasternal long)

Follow-up: NA (RDMS not trained in this procedure)

Cardiac:

Subxiphoid, Parasternal long (visualize the descending aorta), parasternal short, apical 4 chamber, IVC long view

Follow-up: Cards US/ Echo, CT, MRI, CXR, EKG (if any concerning findings or unsure, notify the attending to consider further imaging)

Aorta

Proximal (celiac axis "seagull sign")

Mid (SMA)

Distal (Measure proximal to the bifurcation)

Long view

Follow-up: Rads US, CT, MRI, TEE, OR

Renal:

Right and left kidney in long and transverse

Bladder (transverse and sagittal)

Follow-up: Rads US, CT, OR, (for bladder volume- foley catheterization)

RUQ:

Gallbladder (transverse and long)

Gallbladder neck

CBD

Follow-up: Rads US, CT, MRI, HIDA, OR

DVT:

Each view with and without compression

Common Femoral vein (proximal to the greater saphenous)

Common femoral/ greater saphenous junction

Deep/ Superficial femoral vein bifurcation

Popliteal vein (2 vessel- pop vein and artery)

Popliteal trifurcation

Follow-up: Rads US/ Duplex, CT, MRI, Venogram

Pelvic:

RUQ (Morrison's Pouch)

Transabdominal (sagittal and transverse)

Transvaginal (sagittal and coronal of uterus and ovaries/ adnexa)-NOT APPLICABLE AT ACH

Follow-up: Rads US, CT, MRI, OR, (for FHR handheld Doppler)

Vascular/Procedure:

Vessel (preferably clip during the procedure)

Procedure (show fluid and clip during the procedure)

Follow-up: Successful procedure (Need to be done with an attending credentialed in procedural ultrasound)

Appendix:

Appendix (if not visualized at minimum note iliac vessels/ psoas)

When appendix identified, measurements in the longitudinal/transverse orientation, non-peristalsis, diameter > 7mm, blind-end, non-compressibility.

TLC-GO views will be reviewed.

Follow-up: Rads US, CT, MRI, OR

Ocular:

Eye (2 planes of imaging, visualize optic sheath, anterior/posterior chamber)

Follow-up: CT, MRI, Ophthalmology evaluation (RDMS not trained in this procedure)

Testicular:

Each testicle in 2 planes

Epididymis

Power Doppler flow (DPI) (Spectral Doppler arterial/ venous waveforms)

Follow-up: Rads US, nuclear medicine, OR

Musculoskeletal:

Image and label the structure in 2 planes.

Follow-up: Xray, CT, MRI (RDMS not trained in this procedure)

Lung:

4 views MINIMUM (right/left anteriorly at the midclavicular line, right and left lung bases)

Follow up: CXR (if any concern on ultrasound, notify the attending to consider further studies), CT, MRI (RDMS not trained in this procedure)

Pyloric Stenosis

Minimum views: transverse/or longitudinal views with length/width/Muscular thickness measurements

Follow up: Rads US or Upper GI

Intussusception

Minimal views of colon, as seen throughout RLQ, RUQ and LUQ locations.
Intussusceptions to be documented when identified.

Follow up: Abd Xray, Rads US, CT, MRI

9. APPENDIX B

A. Suggested Educational Resources

i. Clinical Guidelines

- [American College of Emergency Physicians \(ACEP\) Emergency Ultrasound Section](#)
- [American Institute of Ultrasound in Medicine \(AIUM\) Practice Parameters](#)
- [American Board of Pediatrics \(ABP\) PEM Content Outline](#) (*Review the current content outline applicable to Pediatric Emergency Medicine board preparation.*)

ii. Ultrasound Education (more available on my website)

- [Society of Clinical Ultrasound Fellowships \(SCUF\)](#)
- [POCUS Atlas](#)
- [5 Minute Sono](#)
- [Core Ultrasound](#)
- [POCUS 101](#)

iii. Suggested Textbooks

- *Ma and Mateer's Emergency Ultrasound*
- *Manual of Emergency and Critical Care Ultrasound* (Noble & Nelson)
- *Diagnostic Ultrasound* (Rumack et al.) for detailed pediatric sonography
- *Fleischer & Ludwig's Textbook of Pediatric Emergency Medicine* (POCUS sections)

iv. Podcasts

- [Ultrasound GEL Podcast](#)
- [Core EM Podcast](#) (*Ultrasound episodes*)
- [EM:RAP](#) (*subscription required*)

10. APPENDIX C

Ultrasound-Specific ACGME Milestone Matrix

Competency Domain	Level 1 (Novice)	Level 2 (Advanced Beginner)	Level 3 (Competent)	Level 4 (Graduation Target)	Level 5 (Aspirational)
Medical Knowledge	Understands ultrasound physics, machine controls, and indications with supervision.	Explains core applications and common artifacts.	Demonstrates comprehensive knowledge of core POCUS applications and limitations.	Applies advanced knowledge to complex clinical scenarios and teaches core concepts.	Contributes to curriculum development or scholarly work in POCUS education.
Image Acquisition	Obtains images only with continuous coaching.	Acquires complete examinations with occasional prompting.	Independently acquires diagnostic-quality examinations.	Efficiently acquires high-quality examinations in routine and critically ill patients	Coaches others and optimizes difficult examinations.
Image Interpretation	Recognizes normal anatomy.	Identifies common pathology with assistance.	Independently interprets common pathology and recognizes limitations.	Correctly interprets subtle pathology and integrates findings appropriately.	Serves as a departmental consultant for image interpretation.
Clinical Integration	Uses ultrasound after prompting.	Integrates findings into straightforward cases.	Uses ultrasound routinely to guide patient management.	Appropriately changes management in complex patients and recognizes when additional imaging is needed.	Leads institutional POCUS pathways and protocol development.
Procedural Ultrasound	Observes procedures.	Performs procedures with direct supervision.	Independently performs routine ultrasound-guided procedures.	Efficiently performs complex procedures while teaching junior learners.	Develops procedural curricula and quality initiatives.
Documentation & QA	Documents studies with significant guidance.	Completes documentation with occasional omissions.	Independently documents and archives examinations; participates in QA.	Consistently produces exemplary documentation and actively contributes to QA conferences.	Leads QA initiatives and departmental process improvement.
Teaching & Scholarship	Participates in educational sessions.	Assists with bedside teaching.	Independently teaches residents and students.	Designs educational sessions and mentors junior learners.	Presents nationally, publishes, or develops institutional curriculum.

