



Intern Ultrasound Rotation Guide

Rotation Administration Details

Rotation Directors: Laura Wallace, Erica Blustein, Allison Zanaboni

Rotation Support Contact: Dora Miller, doram@wustl.edu

Site: Barnes-Jewish Hospital Emergency Department

Duration: 1 full block (26 days)

Emergency Absences

Please notify your admin chief and Rotation Director if you have an emergency. Otherwise, any absence during regular hours for non-ultrasound related activities (i.e. doctor's appointments, meetings) must be pre-approved with the rotation director **before** the beginning of your rotation and will likely need to be made up in your off hours. Absences will only be approved for extenuating circumstances and emergencies.

Rotation Goals

The goal of this rotation is for residents to develop competence with the performance of core Emergency Medicine Point of Care Ultrasound Examinations and the communication skills and administrative tasks that go along with performing POCUS.

Rotation Objectives

- Demonstrate professionalism in activities and presence in ED during scan shifts and interactions with peers, staff, and students.
- Log at least 150 examinations during the rotation, including a variety of the 12 exam types needed for graduation.
- Perform ultrasound examinations capturing the standard views and meeting the objectives for each scan type. See page 5. Use the flashcards on pocushub.com as a reference for each exam type.
- Demonstrate professionalism with organization and documentation of examinations on a daily basis.
- Prepare and participate in Image Review Days and integrate feedback into examinations.

Description of Activities

- Arrive on time to scan shifts and be available for diagnostic and education scans during the scheduled clinical scan days.

- Remain in the ER and available by phone during the scan days (other than lunch breaks). Place phone number on EPIC or on whiteboards and add yourself to the trauma pager each day.
- When asked to perform an examination, ensure that the attending caring for the patient or an attending in the pod is aware beforehand so they can attest to your examination and help with image acquisition/interpretation.
- Input patient information accurately for every exam and follow the exam standards as best as possible for each exam.
- You must save an image and document for every scan you perform, including unsuccessful scans and procedures. All uploaded exams should be signed by the end of the day.
- Complete the assigned independent curriculum (AEUS videos, page 10) by the end of each week (see below)
- Review scans and follow up testing so you are prepared to discuss exam on Image Review Days. Keep your Review Day Worksheets handy so you can reassess personal goals and exam numbers each week.

Schedule

The QA/Scan Day schedules are subject to change-US Faculty will email beforehand to confirm times.

Day/Time	Activity	Participants
10 am, First Day of Rotation (unless otherwise specified)	Rotation Orientation	Intern, US Faculty
Monday-Friday 10am-7pm (exceptions for Conference, Journal Club)	Scan shifts Intern is expected to be in the ER available for scans.	Intern, Med student on rotation
Mondays 10am (unless otherwise scheduled)	Image Review/Scan Day Review Scans from prior week and be prepared to discuss findings Scan in ED w/ US Faculty	Intern, student, US Faculty
Thursdays 10am (unless otherwise scheduled)	Scan Day Scan in ED w/ US Faculty	Intern, student, US Faculty

Third Thursday of month, 9am	US Journal Club Over Zoom	Intern, Student, US Faculty
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Resident Assessment:

Formative: Image Review/Scan Day Worksheets (1-2 x weekly when working with US Faculty)

Summative: Will include your scans numbers logged in qPath, assessment of documentation Completion, Scan Day worksheet feedback and any other feedback we receive during the rotation.

Important Tips:

Prioritizing Tasks during Scan Shifts

Please prioritize US examinations and US guided procedures first. You can take advantage of opportunities for other non-ultrasound procedures (paracentesis, intubation, etc.) if you are not missing out on ultrasound opportunities.

Assume each exam takes at least 30 minutes so you can give a time estimate if you are asked to do multiple exams in a row. Please let the Rotation Faculty know if you have any difficulties.

IV placement

IV placement is one of the more common call you will receive. When you are called, it can be helpful to ask:

- Where has the nurse attempted the IV placement?
- Has the attending caring for the patient been notified the IV attempts have failed?
- Has the nurse discussed with the attending what type of IV they will need? (22 in the hand, 18 above the elbow for CTA etc)

OB Ultrasound

An attending must be present for all transvaginal ultrasounds.

Emergency Medicine Resident Ultrasound Competencies (with goal exam numbers)

The extended version of the EM resident competencies can be found on POCUSHUB.com. A shortened version of competencies and exam expectations is below.

- I. General Ultrasound Competencies
 - A. Image Acquisition-see specific exam details below
 - B. Patient Positioning-describes standard patient position and environment setup for optimization of image acquisition as well as draping for patient comfort
 - C. QPath Documentation
 1. QPath Documentation Requirements
 - a) Pull patient information from worklist if possible
 - b) Update information in QPath E immediately after finishing exam if worklist malfunctions
 - c) Add operators
 - d) Edit Exam Type
 - e) Write and Sign Note by the end of shift or workday
- II. Core Competency: Basic Physics, Important Artifacts
 - A. Physics terms: Piezoelectric effect, Frequency, Resolution, Attenuation, Echogenicity, Doppler (color and spectral), Aliasing
 - B. US System terms: Knobology, Image made, gain, Time gain compensation, Focus, Transducer types
 - C. Common Artifacts: Reverberation, Side lobe, Mirror, Shadowing, Enhancement, Ring-Down
- III. Core Competency: Basic Echocardiography 25
 - A. Describe the indications and limitations of cardiac POCUS.
 - B. Perform standard POCUS windows (subcostal, parasternal, and apical) and planes (four chamber, long and short axis).
 - C. Identify relevant US anatomy including pericardium, cardiac chambers, valves, descending aorta and IVC.
 - D. Estimate qualitative left ventricular function and central venous pressure to guide hemodynamic assessment of patient (EPSS, IVC)
 - E. Recognize cardiac arrest, pericardial effusion with or without tamponade, and dilation of the aortic root or the descending aorta.
 - F. Advanced evaluation
 1. Acquire view of the aortic arch and recognize aortic arch dissection and/or aneurysm.
 2. Identification of right ventricular dysfunction.
 3. Assessment of cardiac output and fluid responsiveness.
 - G. Procedural Guidance: pericardiocentesis, transvenous pacer, and cvc placement.
 - H. Integrate Emergency echocardiography findings into individual patient and department management.
- IV. Core Competency: Trauma- EFAST 25
 - A. Describe the indications, clinical algorithm, and limitations of POCUS in blunt and penetrating thoracoabdominal trauma.
 - B. Perform the POCUS protocol for Trauma in both primary and secondary surveys.

- C. Identify relevant US anatomy including pleura, diaphragm, IVC, pericardium, liver, spleen, kidneys, bladder, prostate, and uterus.
 - D. Recognize pathologic findings and pitfalls in the evaluation of pneumothorax, hemothorax, pulmonary contusion, hemopericardium, cardiac activity, volume status, and hemoperitoneum.
 - E. Integrate Trauma POCUS findings into individual patient, departmental and disaster management.
- V. Core Competency: Renal/Bladder 25
- A. Describe the indications and limitations of POCUS of the kidneys and bladder.
 - B. Perform POCUS protocols to evaluate the urinary tract.
 - C. Identify relevant US anatomy including the renal cortex, renal pelvis, ureter, bladder, liver, spleen and uterus or prostate.
 - D. Recognize the relevant findings and pitfalls when evaluating for hydronephrosis, renal calculi, renal masses, bladder volume, pregnancy and Foley catheter evaluation.
 - E. Integrate POCUS of the urinary tract into individual patient and departmental management.
- VI. Core Competency: First Trimester Pregnancy 25 (at least 10 TVUS)
- A. Describe the indications, clinical algorithm, and limitations of POCUS in first-trimester pregnancy pain and bleeding.
 - B. Understand the utility of quantitative b-hcg in the evaluation of first-trimester pregnancy pain and bleeding.
 - C. Perform POCUS protocols for transabdominal and transvaginal views as appropriate, including fetal heart rate and gestation age measurement techniques.
 - D. Identify relevant US anatomy including the cervix, uterus, adnexa, bladder and cul-de-sac.
 - E. Recognize the relevant findings and pitfalls when evaluating for intrauterine and ectopic pregnancy:
 1. Early embryonic structures: gestational sac, yolk sac, fetal pole and heart.
 2. Location of embryonic structures in pelvis
 3. Embryonic demise (fetal pole without heartbeat)
 4. Molar pregnancy
 5. Findings of ectopic pregnancy including pseudogestational sac, free fluid and adnexal masses.
 - F. Advanced Evaluation: Basic gyn US, ovarian cysts, fibroids, tubo-ovarian abscesses, ovarian torsion, ectopic pregnancy, 2nd and 3rd trimester OB.
 - G. Integrate pregnancy POCUS findings into individual patient and departmental management.
- VII. Core Competency: Aorta 25
- A. Describe indications, clinical algorithms, and limitations of POCUS in the evaluation of abdominal and thoracic aortic pathology.
 - B. Perform POCUS protocols to evaluate the abdominal and thoracic aorta including measurement techniques.

- C. Identify relevant US anatomy including the aorta with major branches, inferior vena cava, and vertebral bodies.
 - D. Recognize pathologic findings and pitfalls when evaluating for abdominal and thoracic aortic aneurysms and dissection.
 - E. Integrate Aorta POCUS findings into individual patient and departmental management.
- VIII. Core Competency: Thoracic 25
- A. Describe the indications and limitations of thoracic POCUS
 - B. Perform POCUS protocols for the detection of:
 - 1. Pneumothorax, pleural effusion and interstitial lung fluid (CHF, ARDS, pneumonia, pulmonary contusion).
 - C. Identify relevant US anatomy of thoracic structures.
 - D. Recognize the relevant findings and pitfalls when evaluating for thoracic pathology.
 - E. Recognize the sonographic findings of tracheal and esophageal anatomy, especially in regard to EM procedures.
 - F. Integrate thoracic POCUS findings into individual patient and departmental management.
- IX. Core Competency: DVT 25
- A. Describe the indications and limitations of POCUS for the detection of DVT.
 - B. Understand the differences between lower extremity venous POCUS and radiology lab-or vascular lab-performed “Duplex evaluation”.
 - C. Perform CUS protocols for the detection of deep venous thrombosis of the upper and lower extremities including:
 - 1. Vessel identification
 - 2. Compression
 - 3. Doppler imaging of respiratory variation and augmentation.
 - D. Identify relevant US anatomy of the upper and lower extremities including the deep venous and arterial systems, major nerves and lymph nodes.
 - E. Recognize the relevant findings and pitfalls when evaluating for DVT.
 - F. Integrate EUS for DVT into individual patient and department management.
- X. Core Competency: Biliary 25
- A. Describe the indications and limitations of POCUS of the biliary tract.
 - B. Perform POCUS protocols to evaluate the biliary tract.
 - C. Identify relevant ultrasound anatomy including the gallbladder, portal triad, inferior vena cava and liver.
 - D. Recognize the relevant findings and pitfalls when evaluating for cholelithiasis and cholecystitis.
 - E. Advanced evaluation
 - 1. Common bile duct pathology (dilation and choledocholithiasis)
 - 2. Liver pathology (masses, pneumobilia, hepatomegaly)
 - 3. Portal vein abnormalities
 - 4. Pancreas pathology
 - F. Integrate EUS of the biliary tract into individual patient and department management.

- XI. Core Competency: Procedural Guidance 25 (5 for each individual procedure)
 - A. Describe the indications and limitations when using US guidance for bedside procedures.
 - B. Perform POCUS protocols for procedural guidance including both transverse and longitudinal approaches when appropriate. Procedures may include:
 - 1. Vascular Access: Central and Peripheral
 - 2. Confirmation of endotracheal intubation
 - 3. Pericardiocentesis
 - 4. Paracentesis
 - 5. Thoracentesis
 - 6. Foreign body detection and removal
 - 7. Evaluation and aspiration/drainage of body fluid
 - 8. Arthrocentesis
 - 9. Pacemaker Placement and capture
 - 10. Abscess identification and drainage
 - 11. Regional Anesthesia
 - C. Identify relevant US anatomy for each procedure.
 - D. Recognize the relevant findings and pitfalls when performing POCUS for procedural guidance.
 - E. Integrate POCUS for procedural guidance into individual patients and department management.
- XII. Core Competency: Ocular 25
 - A. Describe the indications, limitations, and relative contraindications of ocular US.
 - B. Perform POCUS protocols for the detection of vitreous hemorrhage, posterior vitreous detachment, retinal detachment, optic nerve sheath diameter measurement, and optic disc evaluation
 - C. Advanced evaluation:
 - 1. Lens pathology
 - 2. Foreign body
 - 3. Globe rupture
 - 4. Retrobulbar hematoma
 - 5. Central retinal artery/vein occlusion
 - 6. Subretinal hemorrhage
 - 7. Light reflex
 - D. Identify relevant US anatomy of the globe and orbital structures.
 - E. Recognize the relevant findings and pitfalls when evaluating for ocular pathology.
 - F. Integrate ocular US into individual patient and department management.
- XIII. Core Competency: Skin/Soft Tissue 25
 - A. Describe the indications and limitations of skin and soft tissue POCUS.
 - B. Perform POCUS protocols for the evaluation of skin and soft tissue pathology.
 - C. Identify relevant US anatomy including skin, adipose and lymph nodes.
 - D. Recognize the relevant findings and pitfalls when evaluating the following:
 - 1. Soft tissue infections: Abscess vs. Cellulitis
 - 2. Subcutaneous fluid collection identification.
 - 3. Foreign body location and removal.

- E. Integrate skin and soft tissue US findings into individual patient and departmental management.
- XIV. Core Competency: MSK 25
 - A. Describe the indications and limitations of musculoskeletal POCUS.
 - B. Perform POCUS protocols for the evaluation of MSK pathology.
 - C. Identify relevant US anatomy including tendons and ligaments, muscles, bones, and joints.
 - D. Recognize the relevant findings and pitfalls when evaluating the following:
 - 1. Tendon injury (laceration, rupture)
 - 2. Fractures
 - 3. Joint identification
- XV. Core Competency: Abdominal 25
 - A. Describe the indications and limitations of bowel POCUS.
 - B. Perform POCUS protocols for the detection of:
 - 1. Acute appendicitis
 - 2. Small and Large bowel obstruction
 - 3. Pneumoperitoneum
 - 4. Diverticulitis
 - 5. Hernia
 - 6. Intussusception and Pyloric Stenosis
 - 7. Evaluation/placement of orogastric/nasogastric or percutaneous gastrostomy tube.
 - C. Identify relevant US anatomy of bowel structures.
 - D. Recognize the relevant findings and pitfalls when evaluating for bowel pathology.
 - E. Integrate bowel US findings into individual patient and departmental management.
- XVI. Advanced Competency: TEE
 - A. Describe the indications, limitations and contraindications to resuscitative TEE.
 - B. Perform standard TEE views to evaluate for cardiac pathology, guidance of chest compressions in cardiopulmonary resuscitation, and procedures, such as pericardiocentesis, pacemaker placement, and ECMO catheter placement.
 - C. Advanced evaluation:
 - 1. Regional wall motion abnormalities
 - 2. Aortic dissection
 - 3. Aortic aneurysm
- XVII. Quality Assurance, Obtaining Credit for Residency Graduation
 - A. Current Process: Completion of intern rotation and 150 signed exams required for graduation
 - 1. Goal Process '24-'25: 300 signed exams required for graduation, with 25 in each type desired for credentialing. 10 TVUS and Abdominal exams required.
 - 2. Future Goal: Only exams of adequate quality are counted towards the graduation total. This requires re-tooling of QPath and standardization amongst faculty and is not ready for 2024-2025 AY

Asynchronous Curriculum

Week 1: Physics, FAST, Echo, Procedures

Introduction

ACEP POCUS Guidelines - <https://tinyurl.com/y2pzdvau>

Physics and Instrumentation

AEUS Physics lecture- <https://vimeo.com/channels/aeus/94786374>

FAST

AEUS FAST lecture <https://vimeo.com/channels/aeus/34118863>

Cardiac

Echo part I - <https://vimeo.com/channels/aeus/44570642>

Echo part II - <https://vimeo.com/channels/aeus/44575412>

Inferior vena cava

5minsono.com IVC lecture - <http://5minsono.com/ivc/>

Procedures

5minsono.com US-Guided IV lecture - <http://5minsono.com/ugiv/>

5minsono.com CVC placement lecture - <http://5minsono.com/cvc/>

5minsono.com CVC confirmation lecture - http://5minsono.com/cvc_confirm/

5minsono.com Pericardiocentesis lecture - <http://5minsono.com/pericardiocentesis/>

AEUS US-Guided procedures lecture (LP/para/thora) -

<https://vimeo.com/channels/aeus/59095992>

ACEPNow Knee Arthrocentesis article - <https://tinyurl.com/yxkyp559>

Week 2: Early Pregnancy, Aorta, Renal

First trimester pregnancy

AEUS TAOB lecture - <https://vimeo.com/channels/aeus/52830902>

AEUS TVOB lecture - <https://vimeo.com/channels/aeus/41808262>

Abdominal aorta

AEUS Aorta lecture - <https://vimeo.com/channels/aeus/41791516>

Renal

AEUS Renal Lecture - <https://vimeo.com/channels/aeus/69556457>

Week 3: Lung, RUSH

RUSH

<https://vimeo.com/channels/aeus/216695713>

Thoracic

AEUS Thoracic lecture - <https://vimeo.com/channels/aeus/46515236>

Week 4: Biliary, Ocular, DVT, MSK, Bowel

Biliary tract

AEUS Biliary Tract lecture - <https://vimeo.com/channels/aeus/87759897>

Deep vein thrombosis

AEUS DVT lecture - <https://vimeo.com/channels/aeus/52819569>

Ocular

AEUS Ocular lecture - <https://vimeo.com/channels/aeus/41575053>

Bowel

AEUS Appendicitis lecture - <https://vimeo.com/channels/aeus/93051990>;

AEUS Small Bowel Obstruction lecture - <https://vimeo.com/channels/aeus/69551555>

MSK

MSK AEUS lecture - <https://vimeo.com/channels/aeus/41682960>