ULTRASOUND ROTATION GOALS AND OBJECTIVES

The goal of the Ultrasound rotation is to provide the education a diagnostic radiology resident will need to interpret, protocol, and perform ultrasound exams via "hands-on" ultrasound scanning, formal didactic teaching conferences, clinical interpretation sessions, and independent review of teaching files, reading resources, and on-line educational tools

After completion of residency training, competence in Ultrasound should be obtained in the following: medical knowledge, patient care, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice. The resident should be proficient in the following:

1. Interpret all ultrasound exams
2. Protocol the correct exam to answer the clinical question
3. Determine if study acquired is complete per AIUM practice standards
4. Assess US technique, transducer selection, image quality/optimization, and artifacts that affect diagnostic performance of the exam
5. Determine if the study answers the clinical question
6. Perform basic ultrasound exam in core competency areas outlined below

4 YEAR CURRICULUM

There are two parts to the medical knowledge portion of the curriculum. The first section lists hands-on scanning objectives to be mastered by the end of each clinical rotation. The second, section is a more comprehensive list of entities that the resident should understand by the end of 4 years of training.

"HANDS-ON" SCANNING

By the end of each rotation, the resident should be able to scan most of the clinical scenarios listed below in each training category. Core competency categories listed by rotation.

Rotation 1 (R1)
Gallbladder (gallstones/acute cholecystitis)
Biliary (common bile duct, biliary ductal dilatation)
Liver (masses)
Kidney (hydronephrosis, stones)
Kidney (mass/cyst)

Rotation 2 (R1)

Basic Doppler (portal vein, pseudoanerysm, arteriovenous fistula)
Pregnancy first trimester: failed pregnancy, ectopic pregnancy)
Adnexal mass (ovarian and non-ovarian). Torsion, hemorrhagic cyst
Testis (pain, torsion, masses, infection)

Rotation 3
Renal transplant (obstruction, vascularity, peri-transplant collection)
Appendix (appendicitis)

Rotation 4
Advanced abdominal Doppler (visceral organs, organ transplants)
Basics obstetrics (basic fetal biometry, basic second/third trimester fetal anatomy, placental localization, amniotic fluid volume)

ULTRASOUND 4 YEAR CORE LEARNING CURRICULUM LIST

1. Vascular:
    - Abdomen: venous thrombosis (hepatic and renal veins, inferior vena cava); portal hypertension; TIPS; renal stenosis.
    - Aortic diseases (aneurysm)
    - Carotid artery duplex evaluation (vascular surgery rotation)
    - Complications of percutaneous vascular interventions: pseudoaneurysm and AVfistula
    - vascular characterization of a mass
    - DVT

2. Biliary Tree and Gall Bladder
    - Normal anatomy
    - Biliary obstruction : benign and malignant causes
    - Congenital anomalies of the common bile duct—choledochal cysts
    - Gallstones
    - Inflammatory disease of the gall bladder—acute cholecystitis and complications
    - Gall bladder carcinoma
    - Cholecystoses

3. Liver and Spleen
    - Normal anatomy
    - Neoplastic disease—hepatoma, metastases, cysts.
    - Infection—Abscess
    - Cirrhosis and portal hypertension.
    - Other parenchymal disease (steatosis)
    - Trauma---biloma, hematoma

4. Pancreas
    - Normal anatomy
    - Inflammatory disease
        - Complications of acute pancreatitis-- pseudocyst Chronic pancreatitis
        - Ductal calculi
    - Neoplasms: adenocarcinoma, IPMN

5. Gastrointestinal
    - Appendicitis
    - Inflammatory bowel processes—colitis

6. Kidney
    - Normal anatomy
    - Congenital Anomalies: ectopia, horseshoe kidney, duplex collecting system, UPJ obstruction
    - Infection: renal abscess and pyonephrosis
    - Calculous disease
    - Neoplasms: renal cell carcinoma, transitional cell carcinoma, angiomyolipoma, metastasis, cystic neoplasms.
    - Cystic Diseases: cortical cysts, polycystic kidney disease, medullary cysts.
    - Hydronephrosis

6. Retroperitoneum
    - Anatomy: perirenal and pararenal spaces, pelvic extraperitoneal spaces.
    - Adrenal neoplasms and other masses
    - Lymphadenopathy
    - Neoplasms
    - Hematoma
    - Abscess

7. Peritoneal cavity
    - Anatomy
    - Intraperitoneal collections: ascites and abscess

8. Gynecology

- Normal Anatomy
- Uterus
  - Cyclic change in the endometrium
  - Leiomyoma, Leiomysarcoma, Adenomyosis
  - Endometrial pathology: carcinoma, polyp, hyperplasia, changes related to tamoxifen
  - Gestational trophoblastic disease
  - Postpartum—retained products of conception
  - Cervical carcinoma
  - Intrauterine contraceptive device location

- Adnexa
  - Ovarian cysts; follicular, corpus luteum, theca lutein
  - SRU and O-RADS criteria
  - Polycystic ovarian syndrome
  - Acute conditions: hemorrhagic cyst, torsion
  - Endometriosis
  - Neoplasms:
    - Benign (dermoids, thecomas, fibromas)
    - Surface epithelial (cystadenoma/carcinoma)
    - Metastatic
    - (Sex cord/stromal)

  - Pelvic Inflammatory Disease
    - Tubo-ovarian abscess and tubo-ovarian complex
    - Hydro/pyo salpinx

9. Thyroid/Head and Neck
   - Normal Anatomy
   - Nodules: patterns suggestive of benignity
   - Neoplasms
     - TI-RADS
   - Nodular goiter and other conditions such as Thyroiditis
   - Parathyroid mass: adenoma
   - Submandibular and parotid gland masses Benign and malignant lymph nodes

10. Scrotum
    - Normal Anatomy
    - Neoplasms
      - Seminoma and other germ cell tumors
      - Metastastic
    - Benign masses

        - Simple cysts Epidermoid cysts
        - Epididymal cysts and sperm granuloma
    - Infections
        - Epididymitis/orchitis
        - Testicular and scrotal abscess/pyocele Fournier's gangrene
    - Trauma
        - Testicular hematoma/rupture
        - Scrotal wall hematoma
        - Hematocele
    - Varicocele
    - Torsion
    - Hernia
    - Extratesticular masses: spermatocele, adenomatoid tumor

Obstetrics

First Trimester:

- Diagnosis of intrauterine pregnancy and relationship to bHCG levels
- Basic anatomy and normal developmental features of embryo and early fetus
- Dating—CRL
- Complications: Failed pregnancy Criteria
    - Ectopic pregnancy
    - Anembryonic pregnancy
    - Subchorionic hematoma
    - Intrauterine demise

Second and Third Trimester:

- Anomalies
- Basic evaluation
- Anatomy—Guidelines of AIUM, ACR, ACOG
    - kidneys, stomach, urinary bladder, umbilical cord insertion, spine, cerebral ventricles and posterior fossa, 4-chambered heart
- Dating—BPD, HC, FL, AC,
- Growth—EFW
- Placenta, location and morphology
- Amniotic Fluid
- Cervix—status, length, confirmation of IUG
- Diagnosis of chromosomal abnormalities Biochemical screening
    - Genetic sonogram—markers of aneuploidy
- Fetal anomalies
    - CNS
    - Thorax/cardiac Genitourinary Gastrointestinal MSK

TECHNICAL CORE COMPETENCIES

Scrotal	Basic
RUQ	Basic
Pelvis TA and TV	Basic

Renal	Basic
1st trimester viability	Basic
Renal transplant	Intermediate
Appendicitis	Intermediate
Abdomen Vascular	Advanced
Obstetric, limited	Advanced

PHYSICS/INSTRUMENTATION

The resident should understand the basic principles of physics that form the foundation of clinical ultrasound.

Rotation 1 (R1)

- Define ultrasound, including the relationship of sound waves used in imaging Straight narrow sound beams, simple reflection, constant sound speed
- Beam shape: linear, sector, curved array
- Probes: transabdominal, endocavitary
- Endocavitary imaging: transvaginal, transrectal, endoscopic, laparoscopic
- Display: Gray scale, M-mode, pulsed wave Doppler, color and power Doppler
- Image optimization: power output, gain, time gain compensation
- Image recording options: electronic (digital), film, paper
- Acoustic properties of fluid, cyst, calcification, complex fluid and solid structures
- Tissue characteristics: acoustic shadowing and enhancement
- Focal zone

Rotation 2 (R1)

- Transducer choice: curvilinear, linear, sector, vector, hockey puck
- Frequency, sound speed, wavelength, intensity, decibels, beam width, Fresnel zone, Fraunhoffer zone
- Interaction of sound waves with tissues: reflection, attenuation, scattering, refraction, absorption, acoustic impedance pulse-echo principles
- Generation/detection of ultrasound waves

Rotation 3

- Beam width: sidelobe artifact, slice thickness artifact (elevational resolution)
- Resolution: lateral, axial, elevational (slice thickness artifact)
- Multiple reflection artifacts - mirror image/reverberation Refractive artifacts
- Doppler artifacts- pulse wave, color imaging, including aliasing Gray scale versus Doppler (trade-off of penetration and resolution) 3-D volumetric imaging
- Thermal/non-thermal effects on tissue: biological health risks Image optimization
- Harmonic imaging, Spatial Compound Imaging options
- Speckle Reduction imaging (SRI) proprietary post processing—change setting
- Equipment quality assurance: phantoms, spatial/contrast resolution

Rotation 4

- Doppler artifacts- pulse wave, color imaging, including aliasing Gray scale versus Doppler (trade-off of penetration and resolution) 3-D volumetric imaging
- Thermal/non-thermal effects on tissue: biological health risks Image optimization

Goals and Objectives Rotation #1 (R1):

Sonosim

Sonosim is a web-based training simulation program with an US simulation component and educational modules that cover basic physics and sonographic anatomy. Please review the Sonosim modules before your first rotation to orient you to basic physics, anatomy, and image optimization. Prioritize the Core Clinical Modules (with the exception of the vascular access module) for your first rotation. Keep in mind that this program is also designed to educate POCUS users—on occasion you will see the transducer held in a way that is suboptimal for our purposes (i.e. subxyphoid cardiac ultrasound). Be sure to follow instructions from the technologist on optimal hand position. You will receive an email at the beginning of your residency with instructions on how to log in to Sonosim. If you do not have this prior to your first US rotation, please check in with Matt Henry who will provide you with the necessary information.

Starting January/February 2021, there will be a sonographer dedicated to resident education on Tuesdays and Thursdays (**this will vary based on sonographer staffing**), and on those days first year residents will train with the designated teaching sonographer. Check-in with the charge tech before 8 am (7:50 or so) to review which room/tech is best suited to your scanning goals for the day. Please wait in the reading room for the tech to call you when the patient arrives. Later in the rotation you may be asked to "room" the patient. Ensuring that you are able to shadow and scan cases with the technologist may require some gentle reminders as they get very busy and forget to find the resident before rooming the patient. It is probably best for you to stay with one sonographer the entire day if this is agreeable to the sonographer. If, however, your scanning goals are better met by changing rooms, be sure to communicate with the technologist staffing that room as well as the charge Tech. Ultrasound is a bit of a dance requiring attention and flexibility -- your US education will depend in large part on your ability to communicate and adapt to the clinical schedule, and the ongoing changes. We understand that during the first rotation, it may be difficult to balance learning a new skill during a busy service -- we are always hoping to improve the resident ultrasound learning experience, and if you have feedback that would be helpful, please let us know.

Medical Knowledge

Learn basic US physics
Obtain basic knobology training
Identify Renal findings: Normal renal cortical echotexture, size and shape, glomerulointerstitial renal disease, simple renal cyst , renal stones, hydronephrosis, pyonephrosis
Identify hydroureter
Identify Urinary bladder findings: calculi, wall thickening, ureteral jets, bladder volume, including post-void residual
Recognize Liver findings : normal echotexture, size, and shape (including anatomic variants), diffuse disease, (fatty infiltration, acute and chronic hepatitis, cirrhosis, edema), focal masses, metastases, granuloma
Recognize Gallbladder findings: normal appearance, wall thickening, gallstones, including supine, decubitus and erect positions, sludge, acute cholecystitis (calculous/acalculous), sonographic Murphy's sign, other etiologies of wall thickening, polyp
Differentiate normal from dilated intra- and extrahepatic bile duct, identify bile duct diameter.

The resident should understand the importance of clinical ultrasound protocols.
Residents should be familiar with ACR appropriateness criteria of:

1. RUQ pain
2. Renal failure

The resident should gain a general understanding of both the clinical uses and limitations of ultrasound as well as the appropriate integration of other complementary cross-sectional imaging studies, particularly CT and MRI.

Techincal:
Focus on scanning skills and knowledge of scanning protocols for Renal and RUQ US. The student handbook prepared by for the NH Technical Institute technologist training is excellent and reviews scanning techniques and anatomy. American Institute of Ultrasound in Medicine (AIUM) scanning protocols and practice parameters that we use in our department can be found at: https://www.aium.org/resources/guidelines.aspx) Follow up the cases you scan with the attending and consider dictating a few cases at the end of your first rotation.

Assessment:
Faculty Evaluation
Technologist Evaluation
Rad Exam
Patient/Family Feedback, where appropriate
Sign off on the following competencies:

1) RUQ US
2) Renal

Patient Care

Provide care that is compassionate and appropriate.
Be aware of patient needs during ultrasound exams, particularly those of a sensitive nature.
Gather essential and accurate clinical and radiologic information about patients relevant to the interpretation of the ultrasound examination
Communicate effectively and demonstrate caring, respectful behavior when interacting with patients and their families, answering their questions and helping them to understand the ultrasound procedure as well as its clinical significance
Use information technology to support patient care decisions
Become familiar with common indications for ultrasound exams as well as limitation and capabilities of the modality for specific indications.

Assessment
Faculty Evaluation
Technologist Evaluation

Practice Based Learning and Improvement

Use information technology to manage information, to access on-line medical information.
Concentrate on acquiring technical competence in sonography.
Observe the ultrasound technologists and backscan.
Accompany the attending radiologist when he/she is obtaining additional views.
List interesting cases on database

Assessment
Faculty Evaluation
Technologist Evaluation

Professionalism

Demonstrate honor, integrity, respect and compassion to patients, other physicians and other health care professionals.

Demonstrate positive work habits, including punctuality and professional appearance Be discrete in

discussing individual patient histories and findings.
Respect individual ethnic or religious preferences.

Assessment
Faculty Evaluation
Technologist Evaluation

Interpersonal Communication Skills

Dictate prompt, accurate and concise radiologic reports for basic ultrasound studies using available electronic software applications.
Develop effective communication skills with patients, patients' families, physicians and other members of the health care team.
Promptly communicate urgent, critical or unexpected ultrasound findings to residents, referring physicians or clinicians and document the communication in the radiological report.
Provide basic explanations of ultrasound examinations to patients.
Establish and foster a good working relationship with ultrasound technologists.

Assessment
Faculty Evaluation
Technologist Evaluation

System Based Practice

Begin to understand how your professional practice affects other health care professionals, the health care organization, and the larger society.
Assist referring clinicians in providing cost-effective health care.
Begin to learn about practice cost-effective health care and resource allocation.
Requests for US may occasionally seem inappropriate, however it is important to communicate with clinicians to understand the overarching care plan. Begin to evaluate the request for imaging as regards cost, effectiveness, and appropriateness.
Become familiar with the ACR Appropriateness Criteria

Assessment
Faculty Evaluation
Technologist Evaluation
Rad Exam
Patient/Family Feedback, where appropriate

Goals and Objectives Rotation #2 (R1) :

Medical Knowledge:

Uterus: normal size, shape, position, echogenicity, fibroid identification. congenital anomalies, , fibroid localization (submucous, intramural, subserosal), adenomyosis

Endometrium: normal appearance during phases of menstrual cycle and thickness measurement (pre-menopausal, post-menopausal, effects of hormone replacement), intrauterine device, fluid endometrial

polyp, endometrial hyperplasia, endometrial carcinoma, endometritis, pyometrium

Ovaries: normal size, shape, echogenicity, physiologic variation during phases of menstrual cycle (follicles, corpus luteum, hemorrhagic ovarian cyst)
Free pelvic fluid
Ovarian hemorrhagic/ruptured cyst, endometrioma, polycystic ovarian disease, ovarian hyperstimulation syndrome
Ovarian neoplasm: cystic/solid adnexal masses, cystadenoma/carcinoma, dermoid, fibroma, germ cell tumor,
Ovarian torsion, Doppler evaluation
Pelvic inflammatory disease, tubo-ovarian abscess
Cervix: mass, stenosis, endometrial obstruction
Fallopian tube: hydrosalpinx, pyosalpinx
Pelvic First trimester:

Normal findings: gestational sac appearance, size, gestational sac growth, yolk sac, embryo, cardiac activity including normal embryonic heart rate, amnion, chorion, normal early fetal anatomy/growth, crown-rump length measurement, correlation with BHCG levels and menstrual dates
Abnormal Findings: failed early pregnancy, spontaneous complete/incomplete abortion, ectopic pregnancy, anembryonic pregnancy, embryonic demise, subchorionic hematoma, gestational trophoblastic disease, ectopic pregnancy.

Testes: normal echotexture, shape and size
Testicular mass Hydrocele
Epididymitis, orchitis
Testicular torsion
Testicular mass characterization: microlithiasis, germ cell tumor, lymphoma, metastasis Cystic ectasia of rete testis
Extratesticular masses/cysts, spermatocele, adenomatoid tumor, epidydimal head cyst.
Varicocele
Trauma
The resident should understand the importance of clinical ultrasound protocols.
Residents should be familiar with ACR appropriateness criteria of:

1. Abnormal uterine Bleeding
2. Acute pelvic pain
3. Clinically suspected adnexal mass
4. Female infertility
5. First trimester vaginal bleeding
6. Postmenopausal acute pelvic pain
7. Acute onset scrotal pain

Technical Hands on scanning:
Focus on transvaginal and transabdominal pelvic US for first trimester OB studies and general GYN. Also learn how to perform scrotal US.

Assessment
Faculty Evaluation
Technologist Evaluation
Rad Exam
Patient/Family Feedback, where appropriate
Sign off on the following competencies:

1) Pelvic US TA and TV
2) OB First trimester US for viability

3) Scrotal US

Patient Care:

Communicate effectively and demonstrate caring, respectful behavior when interacting with patients and their families, answering their questions and helping them to understand the ultrasound procedure as well as its clinical significance.
Understand the importance of the physician/patient interaction during an ultrasound examination
Expedite more urgent cases referred on an emergency basis
Contact clinicians referring examinations to the ultrasound department if additional information is needed.
Review prior radiologic studies and clinical information.

Assessment
Faculty Evaluation
Technologist Evaluation
Patient/Family Feedback, where appropriate

Practice Based Learning and Improvement

Use information technology to manage information, to access on-line medical information, and for self learning.
Facilitate teaching of medical students, sonographers, other residents and other health care professionals
Apply basic knowledge of study design and statistical methods to the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness.
List interesting cases in US PACS teaching file
Follow up on interesting cases, including post-surgical and post-biopsy

Assessment
Faculty Evaluation
RadExam

Interpersonal Communication Skills

Dictate accurate and concise reports for the most complex ultrasound studies with concise impression including diagnosis and/or differential diagnoses as well as recommendations for further imaging and/or management, when appropriate.
Consult effectively with the clinical team.
Explain the exams and results to medical students and other learners.
Establish and foster a good working relationship with ultrasound technologists.

Assessment
Faculty Evaluation
Technologist Evaluation

Professionalism

Demonstrate a commitment to the ethical principles pertaining to confidentiality of patient information.
Demonstrate responsiveness to the needs of patients.
Demonstrate honor, integrity, respect and compassion to patients, other physicians and other health care professionals

Demonstrate positive work habits, including punctuality and professional appearance.
Demonstrate accountability to patients, society and the profession

Assessment
Faculty Evaluation
Technologist Evaluation

Interpersonal Communication Skills

Dictate prompt, accurate and concise radiologic reports for basic ultrasound studies using available electronic software applications.
Develop effective communication skills with patients, patients' families, physicians and other members of the health care team.
Promptly communicate urgent, critical or unexpected ultrasound findings to residents, referring physicians or clinicians and document the communication in the radiological report.
Provide basic explanations of ultrasound examinations to patients.
Establish and foster a good working relationship with ultrasound technologists.

Assessment
Faculty Evaluation
Technologist Evaluation

System Based Practice

Understand how your professional practice affects other health care professionals, the health care organization, and the larger society.
Learn how these elements affect DHMC
Become familiar with the ACR Appropriateness Criteria for Ultrasound

Assessment
Faculty Evaluation
Technologist Evaluation
Rad Exam
Patient/Family Feedback, where appropriate

Goals and Objectives Rotation #3:

1. Review studies and provide preliminary interpretation.
2. Determine if studies are complete per AIUM guidelines, and request additional images or back scan if you feel more information is needed to complete the exam: https://www.aium.org/resources/guidelines.aspx)
3. Determine if additional images are needed to adequately answer the clinical question.
4. Offer follow up for incidental findings.
5. Focus on scanning cases of intermediate difficulty.

Medical Knowledge:
Hemodynamics of cirrhosis, portal hypertension and varices, portal vein thrombosis
TIPS evaluation and complications
Renal transplant: arterial resistive index (rejection, acute tubular necrosis), transplant vein thrombosis, renal

infarction, post-biopsy complications, renal arterial stenosis

Pancreas: normal anatomy, pancreatic duct, mass
Pancreas: neoplasm, cysts
Pancreatitis complications: abscess, pseudocyst and pseudoaneurysm, chronic pancreatitis Peritoneal cavity: abscess, hemorrhage, omental mass, metastasis, carcinomatosis
Spleen: normal echotexture, size and shape (including anatomic variants), focal masses (cystic versus solid), lymphoma, abscess, infarction, granuloma
Pediatric Brain: intracranial hemorrhage and complications, including periventricular leukomalacia and hydrocephalus, shunt evaluation
Pediatric Hips: Normal, dysplasia, dislocation

Gastrointestinal tract: normal gut ultrasound signature, acute appendicitis

Normal thyroid echotexture, size and shape
Thyroid disease: diffuse and focal disease Multinodular thyroid
Lymph nodes: benign and malignant characterization
Residents should be familiar with ACR appropriateness criteria of:

1. Right Lower quadrant pain/suspected appendicitis
2. Renal Transplant Dysfunction

Assessment
Faculty Evaluation
Technologist Evaluation
-
Rad Exam
Patient/Family Feedback, where appropriate
Sign off on the following competencies:

a) Appendicitis
b) Renal transplant

<u>Patient Care:</u>
Communicate effectively and demonstrate caring, respectful behavior when interacting with patients and their families, answering their questions and helping them to understand the ultrasound procedure as well as its clinical significance

Prioritize exams based on urgency
Be responsive to individual patient needs.
Understand the bioeffects and safety issues in diagnostic ultrasound

Assessment:
Faculty Evaluation
Technologist Evaluation
Patient/Family Feedback, where appropriate

<u>Practice Based Learning and Improvement</u>

Facilitate teaching of medical students, sonographers, other residents and other health care professionals

physicians
Learn about equipment quality assurance programs
Apply basic knowledge of study design and statistical methods to the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness
List interesting cases on database
Follow up on interesting cases, including post-surgical and post-biopsy
Use information technology to access on-line medical information, and for self learning.
Follow up on cases with missed findings cases with surgical follow up, and interesting cases with clinical follow up.

Assessment
Faculty Evaluation
RadExam

Professionalism

Demonstrate a commitment to the ethical principles pertaining to confidentiality of patient information
Demonstrate responsiveness to the needs of patients that supercedes self-interest (altruism) Demonstrate honor, integrity, respect and compassion to patients, other physicians and other health care professionals
Demonstrate positive work habits, including punctuality and professional appearance

Assessment
Faculty Evaluation
Technologist Evaluation

Interpersonal Communication Skills

Dictate accurate and concise reports for the most complex ultrasound studies with concise impression including diagnosis and/or differential diagnoses.
Provide recommendations for further imaging and/or management, when appropriate.
Consult effectively with the clinical team in most aspects of ultrasound.
Explain the exams and results to medical students and other learners

Assessment
Faculty Evaluation
Technologist Evaluation

System Based Practice

Practice cost-effective health care and resource allocation that does not compromise quality of care
Help referring clinicians provide cost-effective health care
Evaluate the US request for cost and effectiveness, and appropriateness
Facilitate performance of an alternative study if indicated.
Understand the ACR Appropriateness Criteria

Assessment
Faculty Evaluation
Technologist Evaluation
Patient/Family Feedback, where appropriate

Goals and Objectives Rotation #4:

Be prepared to run the service independently as a junior faculty. Try to preview as many cases as possible for completeness and render preliminary interpretation before the attending reviews the case.

1. Review studies and provide preliminary interpretation.
2. Determine if studies are complete per AIUM guidelines, and request additional images or back scan if you feel more information is needed to complete the exam per guidelines: https://www.aium.org/resources/guidelines.aspx)
3. Determine if additional images are needed to adequately answer the clinical question.
4. Appropriately recommend follow up for incidental findings

Medical Knowledge:

During this rotation Residents are expected to recognize and describe ultrasound findings for the following conditions:

Peritoneal inclusion cyst
Ovarian neoplasm and cancer staging
Saline hysterosonography
Multiple gestations (chorionicity and amnionicity),
2nd and 3rd trimester OB:

Normal findings: normal fetal anatomy/situs/development, placenta, biometry, amniotic fluid volume,
Oligohydramnios (spontaneous premature rupture of membranes, renal disease, fetal death, intrauterine growth retardation, infection)
Polyhydramnios, placenta previa
Recognition of fetal abnormalities that require high risk obstetrics referral, including intrauterine growth retardation, hydrops, holoprosencephaly, hydrocephalus, hydrancephaly, neural tube defects, multicystic dysplastic kidney, hydronephrosis, congenital anomalies/chromosomal abnormalites and syndromes such as Down's syndrome and Turner's syndrome, hydrops, congenital infections, chest masses, cardiac malformations and arrhythmias, diaphragmatic hernia, abdominal wall defects, abdominal masses, gastrointestinal tract obstruction/abnormalities, ascites, skeletal dysplasias, cleft lip/palate, complications of twin pregnancy,

Placental abruption, placental masses, two-vessel umbilical cord, cord masses, retained products of conception
Placental cord insertion site/vasa previa, velamentous cord insertion, cord prolapse, succenturiate placenta, cervical incompetence
Umbilical cord Doppler, fetal cranial Doppler, biophysical profile
Placenta accreta, percreta, increta
Carotid artery: waveform analysis, stenosis, dissection, pseudoaneurysm, stent; Vertebral artery: subclavian steal syndrome

Liver transplants, including hepatic artery stenosis or thrombosis (resistive index), portal vein thrombosis, post-biopsy complications, inferior vena cava stenosis

Residents should be familiar with ACR appropriateness criteria of:

1. Screening 2nd and 3rd trimester anomlies
2. 2nd and 3rd trimester vaginal bleeding
3. Mulitple Gestations
4. Growth Disturbances risk fetal growth restriciton

Technical Knowledge:
Focus on scanning cases of intermediate difficulty

a) Abdomen vascular exam
b) OB 2nd and 3rd trimester

Assessment
Faculty Evaluation
Technologist Evaluation
Rad Exam
Patient/Family Feedback, where appropriate
Sign off on the following competencies:

a) Abdomen vascular exam
b) OB 2nd and 3rd trimester

Patient Care:
Communicate effectively and demonstrate caring, respectful behavior when interacting with patients and their families, answering their questions and helping them to understand the ultrasound procedure as well as its clinical significance
Screen ultrasound requests for appropriateness.
Review prior radiologic studies and clinical information
Be responsive to individual patient needs.

Assessment:
Faculty Evaluation
Technologist Evaluation
Patient/Family Feedback, where appropriate

Practice Based Learning and Improvement

Use information technology to access on-line medical information, and for self learning.
Facilitate teaching of medical students.
Apply basic knowledge of study design and statistical methods to the appraisal of information on diagnostic and therapeutic effectiveness
List interesting cases in US Teaching File
Follow up missed and interesting cases, including post-surgical and post-biopsy.

Assessment
Faculty Evaluation
RadExam

Professionalism

Demonstrate a commitment to the ethical principles pertaining to confidentiality of patient information
Demonstrate responsiveness to the needs of patients that supercedes self-interest (altruism)
Demonstrate honor, integrity, respect and compassion to patients, other physicians, and other health care professionals
Demonstrate positive work habits, including punctuality and professional appearance

Assessment
Faculty Evaluation
Technologist Evaluation

Interpersonal Communication Skills

Dictate accurate and concise reports for all, including the most complex ultrasound studies
Consult effectively with the clinical team andf with the technologists
Explain the exams and results to medical students and other learners

Assessment
Faculty Evaluation
Technologist Evaluation

System Based Practice

Practice cost-effective health care and resource allocation that does not compromise quality of care
Help referring clinicians provide cost-effective health care

Evaluate the US request for cost and effectiveness, and appropriateness

Facilitate performance of an alternative study if indicated.
Understand the ACR Appropriateness Criteria

Assessment
Faculty Evaluation
Technologist Evaluation
Rad Exam
Patient/Family Feedback, where appropriate