General Guidelines for Ultrasound Imaging

PURPOSE:
To review the general guidelines that should be followed for all ultrasound examinations.

SCOPE:
Applies to all diagnostic ultrasound (US) exams performed in Imaging Services / Radiology

INDICATIONS:
- Relevant indications should be provided by the ordering provider.
  - "rule out", "concern for" etc cannot be used alone**. A sign/symptom must be provided**
- Signs, symptoms, or complaints from the patient may also be used, if appropriately documented, such as in Epic Study Notes (tech notes).

CONTRAINDICATIONS:
Most ultrasound examinations do not carry absolute contraindications, unless otherwise specified in the specific protocols. If there are any questions or hesitations, please discuss with the supervising radiologist prior to starting the examination.

EQUIPMENT:
Most ultrasound machines include a variety of transducers (eg. Curvilinear; linear array). The probe that offers the best image resolution (highest frequency range) while maintaining adequate depth of penetration (low frequency range) should be used. **This may mean changing transducers multiple times during a single examination.**
Most ultrasound machines also include a variety of factory and site-specific presets. Preference should be given to the **site-specific presets**, if available. The preset that most closely matches the region of interest or study indication should be used (example: US Neck for thyroid imaging, as opposed to US Soft Tissues).

PATIENT PREPARATION:
- Refer to the specific protocol for details regarding patient preparation.
- For many examinations the patient is required to be NPO for 4-6 hours prior to the study. This allows for adequate distention of gallbladder, for instance, and limits the volume of bowel gas.

EXAMINATION:

EXAM INITIATION:
- **Always review any prior imaging**, making note of focal findings or other associated abnormalities requiring evaluation.
- Always introduce yourself to the patient
- Verify patient identity using two patient identifiers, include name and DOB, checking the arm band
- Load patient/exam from scanner worklist, and verify patient and exam type
- Explain the ultrasound examination to the patient
- Obtain patient history including symptoms. Enter information into history page

TECHNIQUE CONSIDERATIONS:

- Liberal use of cine sweeps allows for better evaluation of focal or indeterminate findings.
- Deep inspiration facilitates imaging of upper abdominal structures using the preferred subcostal approach.
- In LLD position, the liver, gallbladder, and right kidney shift towards the midline, improving accessibility for scanning and facilitating intercostal scanning for the posterior liver.
- Graded compression in the abdomen or pelvis may allow for displacement of bowel gas, increasing visibility of deep and obscured structures.
- Measurements of **arteries** should be made outer wall-to-outer wall. The most accurate measurement for the abdominal aorta is anterior-posterior (AP) in the LONG orientation.
- Measurements of **bile ducts** should be made inner wall-to-inner wall.
- Measurements of masses should be made in 3 dimensions, either using consecutive images in long and transverse –or– **using dual/split screen**.
- Abnormal structures should always be imaged without and with color Doppler, either using consecutive images –or– **using dual/split screen**.
- For structures larger than the probe sector width, widescreen or panorama views should be obtained.
- For studies obtained for focal pain or palpable abnormality, images should be obtained of the specific area with images labeled "Region of pain/mass/concern". **Comparison images of the contralateral side** are also helpful for abdominal/chest wall and extremity soft tissue findings.
- There should be a low threshold for obtaining cine sweeps through a structure or finding of interest (example: suspected kidney masses; thyroid nodules; abnormal lymph nodes; uterus; liver masses; ovarian masses). These cine sweeps should be annotated with direction of sweep (example, S->I; L->R; M->L).

DOCUMENTATION:

- All images should be annotated with:
    - Anatomy or region
    - Orientation of transducer
        - Longitudinal/Sagittal; Transverse/Axial
        - For breast imaging, radial and anti-radial
    - Positioning of patient, if not conventional supine (examples: LLD; upright)
    - Dynamic maneuvers (examples: Valsalva; Augmentation)
- Exam Study Notes (tech notes) should include exam findings (examples: "tenderness in RUQ"; "swelling and rash"; etc).

PROCESSING:

- Review examination images and data in scanner
- Export all data to PACS and confirm images sent/arrived
- Confirm Imorgon measurement data was transmitted appropriately; Complete Imorgon digital worksheet, if applicable.
- Document relevant history, if the patient was altered or received pain medication prior to the examination, and any study limitations

REFERENCES:

ACR-AIUM Practice Guideline