UPPER EXTREMITITES:

****Always include both joints. Show soft tissue on all extremities.**

****Use an arrow or marker to indicate the site of injury/lump.**

****Label digits as defined below:**

Thumb (1st digit)
Index finger (2nd digit)
Long (middle) finger (3rd digit)
Ring Finger (4th digit)
Small finger (5th digit)

Digits 2-5:

- PA Hand
- Oblique of Affected digit
- Lateral of Affected digit

Thumb:

- PA Hand (oblique thumb)
- PA/AP
- Lateral

Hand:

- PA
- Oblique
- Lateral (*Fingers should be fanned into lateral position so as the fingers are not superimposed*).
    - For infants <1 year – PA/Lateral only.

Wrist:

- PA
- Oblique
- Lateral
    - For infants <1 year – PA/Lateral only.

Wrist Navicular/Scaphoid Series:

- PA
- Oblique
- Lateral
- PA w/ ulnar and radial deviation

Forearm:

- AP ****Forearm positioning should be anatomically correct unless**
- Lateral **the injury is so extensive that modified views are required**
- Trauma Lateral (if reg lateral isn't superimposed)

Elbow:

- AP
- Lateral
    - Internal oblique if required. (Dr. Riccio oblique)
    - Monteggia's fracture AP proximal forearm and lateral (joint and proximal radius and ulna)

** For AP views on patients who cannot straighten elbow, use "partial flexion" technique. **

Humerus:

- True AP
- Lateral **(Do Trans-Thoracic for proximal humeral fracture)**
    - **"Stop sign" if patient able to**

Shoulder:

- Internal Rotation
- External Rotation
- Axillary ****Y-Scapula can substituted if axillary is not possible due to injury or age****
  - **Infants under 1 year – Internal/External Rotation Only.**
- OPTIONAL: Grashey if history of shoulder dislocation or ortho preference

Clavicle:

- AP
- Lordotic - 25 degree cephalic angle.
  - Take exposure on inspiration.
  - Since the proximal clavicle is difficult to evaluate on radiograph, please tech note if that is the area of pain.

AC Joints:

- AP standing with and without weights.
  - Bilateral on same film.

SC Joints:

- PA (expiration, centered @ T3. Arms along the sides.)
- RAO or LAO (affected side down)
  - Images done on expiration for uniform density.
  - Affected side should be indicated in tech note or patient's history.

Scapula:

- AP – arm abducted above head. (palm up)
- Y-Scapula

Bone Age 2 years and over:

- Left PA Hand

Bone Age Hemi-skeletal (under 2 Years):

- Left AP upper extremity (shoulder→hand) **(Not a Stop Sign)**
  - **Do separate AP hand if necessary.**
- Left AP lower extremity (hip→ankle)
- Left AP foot

LOWER EXTREMITIES:

****Always include both joints. Show soft tissue on all extremitites.**

****Label digits as defined below:**

1st toe (Great Toe)
2nd toe
3rd toe
4th toe
5th toe (Small toe)

Toes:

- AP Foot
- Oblique of affected digit
- Lateral of affected digit (Lifted to isolate with a non-radioopaque device)

Foot:

- AP
- Oblique
- Lateral

****Optional for Clubfeet – Standing or simulated weight bearing AP/Lateral views. Position the tibia perpendicular to cassette. Angle the tube 5 – 10° towards the ankle on lateral and 15° on AP ****

Calcaneus:

- AP Axial – 45°
- Lateral

Ankle:

- AP
- Oblique (Mortise)
- Lateral

Tibia/Fibula:

- AP
- Lateral

Knee:

- AP
- Lateral
- Sunrise
- Optional: Tunnel (patient in supine position w/ knee bent 30 degrees and tube 15 degrees cephalic)
- Merchant View (Dr. Ellis and Dr. Wilson only)
    - Patellar views not necessary if an ossified patella is NOT seen on the Lateral view.
    - Please make distinction between Sunrise and Merchant views in tech note

Femur:

- AP
- Lateral
    - Please include both joints.

Hip:

- Perform that same as a standard two view of the pelvis
- AP Pelvis
- Frog- leg of BOTH hips (Whole Pelvis)

****Rare cases where only small field of view neural / frog-leg of ordered hip obtained, when specifically requested / discussed with ordering clinician or radiologist ****

Pelvis:

- AP

****When doing an upright, please have the patient "pull-up" excess abdominal adipose tissue. ****

Pelvis AP and Lateral:

- AP
- Frog-leg Lateral
  - Under 6 months: Add von Rosén Method (if Requested, rare)
    - ❖ AP with femur and knees extended.
    - ❖ 45° abduction with max internal rotation
    - ❖ For DX of: dislocation/subluxation, hip click or dysplasia.
  - **Under 4-6 months of age with XR request to evaluate for hip dysplasia → Ultrasound is study of choice. Contact Radiologist to discuss before performing study if possible.**

Hip AP and Lateral

- AP pelvis
- Frog-leg lateral of entire pelvis (both hips)
  - **Perform a frontal and/or frog-leg lateral only of the single hip ONLY if specifically requested and approved by ordering physician and/or radiologist.**

Pelvis Inlet/Outlet Views:

- **Inlet View** – Evaluates for posterior displacement of pelvic ring or opening of pubic symphysis and symmetry.
  - ***Male/Female:***
    - Position patient for AP view of pelvis.
    - Central ray directed 25-35° caudally
    - Centered at the ASIS and exiting the pubic symphysis.
- **Outlet View** - Evaluates the vertical shift of the pelvis and symmetry of the obturator foramina.
  - **Males:**
    - Position patient for AP view of pelvis.
    - Central ray directed 25-35° cephalad
    - Centered 2" distal to the superior border of the pubic symphysis.
  - **Females:**
    - Position patient for AP view of pelvis.
    - Central ray directed 30 - 45° cephalad
    - Centered 2" distal to the upper border of the pubic symphysis.

Judet Views:

- **RPO/LPO** – 45° obliques of the pelvis
  - Central ray should be mid pelvis perpendicular to the film.
  - Both hips will be on the same film.
    - **Judet views of a single hip may be ordered if doctor desires.**

Sacroiliac Joints:

- AP Sacrum
- Bilateral Obliques
  - Oblique patient 25° - affected side up.

Standing Lower Extremity:

- **Leg Length 1 view**
  - AP bilateral lower extremities.
  - Must include hips to ankles
  - For DX: Bowlegs/Knock Knee (Blount)
  - Ruler not needed!!
- **Leg Length Study**
  - AP bilateral lower extremities.
  - Must include hips to ankles
  - For DX: Leg length discrepancy
  - Ruler Needed.
  - Also, check with Radiologist to see if a CT would be preferable

**** Please make note if these are true standing views, upright while being held, or nonwieghtbearing**

CHEST & ABDOMEN:

Chest:

- PA (AP if patient cannot achieve PA position.)
- Lateral
  - **Portable Lateral Chest**
    - Only when requested and portable is only option due to patient's condition
  - **Foreign Body/Aspiration:**
    - If ordered, add expiration PA OR AP. If Decubitus films are ordered do bilateral decubs on full expiration.
  - **PICC Line:**
    - Typically position the patient with his/her arm down by their side.
  - **NICU Studies**
    - Patients arms in "W-position" with humeri at 30-45 degrees

Ribs:

- AP or PA (Include both sides all ribs, Use rib technique)
- Bilateral obliques (always bilateral, unilateral should not be performed or ordered)

Sternum

- RAO
- Lateral
  - For trauma do LPO instead.

Tip for Abdominal Imaging:

- **Must include lung bases and the entire pelvis.**
- **Always remove soiled diapers.**
- **See current shielding recommendations.**
- **If DX feeding tube or NG tube placement: Included inferior to only to the iliac crest and superiorly to mid chest and level of carina**

Abdomen (KUB):

- AP Supine

Abdomen 2 view:

- **Flat/Upright:**
  - AP Supine
  - AP patient Upright (Do Left Lateral Decub. if the patient cannot stand due to age or condition, or if specifically requested)
- **AP/Lateral:**
  - AP Supine
  - Lateral
    - ✓ Mostly done for Baclofen Pump, Foreign Body, Shunt Series

- ✓ Free air evaluation preference always LLD, if not possible then cross table lateral
- ✓ If Baclofen pump indication→include pump and tubing within FOV

- **Shunt Series**
  - AP **/** Lateral Skull
  - Oblique C-Spine
    - ✓ No Angulation with head turned away from the side of the shunt.
  - AP **/** Lateral Chest
  - AP **/** Lateral Abdomen
    - ✓ Please use proper technique so that the shunt in not "burned –out" on the Lateral images. **
- **Shunt Series Portable**
  - AP **/** Lateral Skull
  - Oblique C-Spine
  - **AP** Chest Only
  - **AP** Abdomen Only
    - ✓ **On young patient can combine Chest /Abdomen into one cassette**

NECK, SPINES:

Cervical:

- **Routine Cervical:**
  - AP
  - Lateral
  - **Odontoid and Obliques upon request.
- **Nasopharynx:**
  - Lateral Cervical
    - ✓ Expose during **nasal** inspiration.
    - ✓ Position patient with slight hyperextension of the neck.
    - ✓ Include sella turcia and nasopharynx.
- **Neck Soft Tissue:**
  - AP
  - Lateral
    - ✓ Expose during inspiration for both views.
    - ✓ Position the patient with slight hyperextension on the Lateral.

- **Davis Series (Cervical):**
  - AP Cervical Spine
  - Neutral Lateral
  - Flexion Lateral
  - Extension Lateral **NEVER force flexion or extension**
    - ❖ If the patient has on a collar, it can only be removed by a physician!

Thoracic:

- AP
- Lateral **Swimmers when necessary to visualize the anatomy. **

Lumbar:

- AP
  - ✓ *Collimate, but the SI joints must be included.*
- Lateral
- Lumbosacral spot (only if necessary)
- Obliques – (only if requested by physician, usually for spondylolysis)

Thoracolumbar

- Since this order is nonspecific, need to clarify if Thoracic and Lumbar series or Scoliosis series is desired. The order for this study will be removed.

Sacrum/Coccyx:

- AP Sacrum 15° cephalic angulation
- AP Coccyx 10° caudal angulation
- Lateral

Scoliosis (1st exam):

- AP
- Lateral (standing)
  - ❖ If cannot stand→sitting upright
  - ❖ If cannot sit upright →supine

*****It is very important to indicate if scoliosis series are done with the patient standing, sitting upright, or supine. Please make a note or indicate on study (arrow assumes standing)**

Scoliosis (Follow-up):

- AP Only –
  1. If the patient had previous films, a lateral is not necessary unless requested.

HEAD:

Skull 4+ views:

- AP
- Townes
- Both Laterals

Skull < 4 views:

- AP
- Lateral

Sinuses:

- Water's view (shallow if the patient is <2 years)
- Caldwell – 0 degree angulation
- Lateral – if supine, do cross table for air fluid level.

*****Please do all films upright if possible**

Orbits:

- Water's
- Caldwell
- Lateral

*****Rarely performed; usuallyevaluated with CT. Check with Radiologist before exam.**

Nasal Bones:

- Water's view ("smell the flowers" can be useful instruction)
- Right OR Left Soft tissue Laterals

Facial Bones:

- Water's
- Caldwell – 0 tube angulation
- Lateral
  - Trauma – Include Zygomatic Arches (SMV)

Mandible Limited:

- Caldwell – no angulation
- Rt./LT. Lateral
  - Primarily used for patients with distractors.

Mandible Complete:

- AP
- Townes
- Both Obliques – Affected side down.

Exams that are rarely perfomed that has orderables:

- Mastoids
- Optic Foramen
- Sella Turcica
- Internal Auditory Canal
- TMJ

*****Contact Radiologist if ordered. CT/MRI usually more appropriate test. Refer to the Merrill's for positioning.**

Miscellaneous:

Skeletal Survey:

Indications include NAT, Dysplasias (including OI evaluation), and LCH

*****All portions of survey should be performed even if recent imaging. A portion can be excluded if same day imaging already performed but is case-dependent and must be approved by radiologist. If survey and second view of extremity ordered at same time, the other view should be separate accession #. Remove overlying material and support devices as much as possible.**

- AP/Lateral Skull
- AP/Lateral Chest
  - Note: For lateral Chest – spine technique, no collimation
- Bilateral Oblique Ribs
- AP Abdomen
- Lateral L-Spine (collimated, no longer entire abdomen)
- Right Upper Extremity
  - AP Humerus
  - AP Forearm
  - AP Hand
- Left Upper Extremity
  - AP Humerus
  - AP Forearm
  - AP Hand
- Right Lower Extermity
  - AP Femur
  - AP Tib/Fib
  - Lateral Ankle
  - AP Foot
- Left Lower Extremity
  - AP Femur
  - AP Tib/Fib
  - Lateral Ankle
  - AP Foot
- Lateral C – Spine

Rickets:

- Frontal view of both wrists
  - If any order for Rickets indication other than wrists, call ordering clinician to inquire if they want wrists. Can perform any part the clinician specifically wants (including knees).

Syphilis:

- As with Rickets, other imaging can be obtained if confirmed with ordering clinician. Below is the default and suggested imaging.
- Right Upper Extremity
  - AP Humerus
  - AP Forearm
- Left Upper Extremity
  - AP Humerus
  - AP Forearm
- Right Lower Extermity
  - AP Femur
  - AP Tib/Fib
- Left Lower Extremity
  - AP Femur
  - AP Tib/Fib

Osseous Survey:

- **Same as skeletal survey**

Intravenous Urogram (IVP/IVU):

- **Call Radiologist** to let them know there is an IVP and to make sure they are available for the entirety of the exam. Give them the reason for the exam and confirm protocol, which will often need to be altered for the specific indication.
- Orders needed for:
  - IV insertion
  - Creatinine: make sure you have current one within 30 days.
  - Pregnancy Test (if needed)
  - Contrast (Isovue 300 or Optiray 320)
- Call Radiology RN @6-1474 to get patient in line for their IV.
- Complete General information in Epic chart.
- Call Radiologist with creatinine value/allergies and how much contrast material you will be administering based on patients weight in kg.
- Tech administers contrast and saline flush
- Once all the images are obtained, call RN to have patients IV removed.

Standard Protocol:

- KUB scout
- Administer contrast
- 1 minute 'kidney shot'
- 3 minute KUB
- 5 minute KUB (after these images call the radiologist to confirm if 15 minute film is needed or any other additional / delayed films).
- 15 minute KUB
- Post Void—at the discretion of the Radiologist

Contrast Amount:

- Patient weight **UNDER** 5kg: 3mL per kg not to exceed 100mL.
- Patient weight **OVER** 5kg: 2mL per kg not to exceed 100mL.