1. PURPOSE

Radiographs are an essential diagnostic tool in neonatal medicine (Arthur 2001). It is, however, crucial that any staff who are involved with this process are aware of their roles and responsibilities to ensure the safety of staff, visitors and the infant. In addition, good technique will promote optimal image quality and ensure that the infant is not exposed to unnecessary environmental stressors, as a result of increased handling and position changes. The aim of this protocol is to achieve high quality diagnostic neonatal images by providing clear guidance on roles and responsibilities of the multi-disciplinary team.

2. READERSHIP

- Special Care Baby Nursing and Medical staff involved in the positioning of patients for any x-ray examination
- Radiographers undertaking x-ray examinations on the unit

3. PROTOCOL

3.1 Medical Responsibilities

- Request x-ray, as required, stating the urgency of film. The radiographers aim to complete an x-ray within 2hrs of request.
- Only urgent x-rays will be performed during 0800-0900hours (in view of high radiographic workload at this time). However, requests for non-urgent x-rays may be made during this hour
- Complete x-ray referral form and include the following information about the infant on the form:
  - Full name
  - Date of birth
  - Hospital or NHS number
  - Gender
  - Postcode or first line of home address
  - Current weight
  - Name of requesting Consultant

- Indicate the area of the infant to be x-rayed and clinical reasons on the referral form
3.2 Nursing Responsibilities

- Check x-ray referral form is completed by medical staff and check the following infant details are on the form: full name; date of birth; hospital or NHS number; gender; postcode or first line of home address and current weight
- If appropriate, ensure gastric tube is inserted prior to radiographer arrival, to allow tube position to be checked
- When radiographer arrives, wash hands and apply alcohol gel
- If x-ray is non-urgent and parents are available, ensure they are informed of investigation
- Communicate with the radiographer throughout process of obtaining x-ray
- Assist the radiographer in ensuring that all staff and visitors in the nursery are informed that an x-ray will be taking place and that they should ensure a safe distance, as agreed with the radiographer. This should be at least 2 metres away, as x-ray intensity rapidly falls with distance
- Put lead apron on
- Consider increasing inspired oxygen by 10% or preparing facial oxygen or bag-valve-mask/Neopuff ready for use, in case increased handling causes destabilisation of infant
- Remove all potential artefacts from the image field, including clothing; temperature probes; ECG dots (if these need to be in situ, ensure they are on the lateral aspect of the chest) and leads; transcutaneous discs, probes and leads and ensure radio-opaque lines/tubes e.g. umbilical catheters, gastric tubes are not lying across the skin that will appear in the image field
- The nappy may need to be removed or lowered for abdominal films.
- Remove any nesting or positioning aids in preparation for x-ray
- If sterile drapes are in position (following line insertion), these may be carefully folded up (sterile side inwards), by the nurse or doctor, to allow the radiographer to clearly see the infant for positioning, while promoting sterility
- If checking long line position, contrast may need to be administered by medical staff during x-ray. This will be done once the infant is positioned correctly for their examination as agreed with the Radiographer and Nurse, and a controlled area for x-rays has been achieved.
- Adjust incubator or mattress tilt to 10° - 15° for chest x-rays (or as agreed with radiographer) to aid good image quality
- Ask colleague to assist with holding the infant (if required) during the x-ray and ensure they put on lead apron too
- If using closed Giraffe incubator, consider turning “heat wall” on prior to opening incubator door to reduce heat loss. With other incubators, consider increasing ambient temperature, if necessary
- When the radiographer is ready to position plate beneath infant and the nurse feels that the infant is stable enough, communicate with radiographer to inform them that the plate can be positioned
- Lift the infant on a single sheet, so that x-ray plate may be positioned underneath the sheet that the infant is on. Place the infant and single sheet onto x-ray plate and ensure the incubator doors are closed. Lifting may require two or more nursing staff, if necessary. This may be particularly relevant for term infants, extremely unstable infants and those infants receiving high frequency oscillation (HFO)
- Position the infant as appropriate for x-ray
3.3 Radiographer Responsibilities

- Wash hands on arrival to the nursery and apply alcohol gel.
- Apply alcohol gel to hands between patients.
- Communicate with nursing/medical staff throughout process.
- Ensure that the x-ray cassette is cleaned with a detergent wipe and dried prior to use and after the examination is completed.
- Ensure that the referral information is complete and that the patient can be identified. The patient’s weight is also required.
- Ensure that the x-ray equipment, cassette and accessory equipment are ready to use before the patient is moved into position.
- Once the tube and lead shielding has been positioned, apply alcohol gel once again prior to introducing hands into the incubator.
- Put lead apron on and ensure neonatal staff are correctly fastened. Ascertain which members of staff are required to stand within the controlled area and ensure they are wearing lead aprons prior to preparing infant. This may be dependent on procedure being carried out (long lines) and how immobile the patient is.
- Ensure that any external artefacts are removed from the area of interest including clothing and nappy if necessary.
- Set the x-ray tube to a Film to focus distance (FFD) of 100-110 cm. The cot/incubator height may need to be adjusted.
- Set the exposure factors according to the specification of the x-ray unit and the patient’s weight.
- Verbally inform anyone within the adjacent area that an x-ray exposure will be carried out.
- Ensure staff are ready to move to a safe distance prior to moving the patient.
- Communicate with the staff assisting to ensure minimal disruption to the patient while positioning the cassette.
- Position the cassette underneath the patient’s sheet when the assisting staff direct you to do so.
- When imaging infants for long line examinations, ensure that the controlled area has been maintained prior to injecting the contrast. Ensure the positioning of the infant and cassette has been obtained prior to injection as the timing of the exposure is crucial for these examinations. Once the contrast has been injected you must wait one second post injection to expose. If you expose too soon it may be difficult to see the tip of the line on the x-ray as there may be ‘spray’ at the tip.
- Always ensure that infants for a lateral decubitus view are right side up to show clearly any free-air against the liver.

3.4 Standard Procedure for all x-ray examinations

- Ensure the hands of people holding the infant are not within the image field.
- Ensure all visitors and staff are at a safe distance. This should be at least 2 metres away as x-ray intensity rapidly falls with distance.
- Perform a final check to ensure the infant is positioned correctly and maintain this position while the radiographer takes the x-ray. The nurse should remain with the infant while the x-ray is taken to ensure good position is maintained.
Once the x-ray is complete, ensure the plate is removed safely from underneath the infant. Re-site probes/leads, as necessary and position them appropriately. Ensure incubator/mattress tilt is returned to the angle that was used prior to x-ray. If inspired oxygen was increased for x-ray, reduce as infant stabilises or as necessary

- Inform staff and visitors that x-ray has been taken
- Remove lead apron(s) and ensure that these are hung up to maintain their integrity. Folding the lead aprons or leaving them in a heap will result in the lead cracking. They should not be stored over the x-ray machine
- Pregnant staff may contact the Radiation Protection Supervisor for Level 5 x-ray or the medical physics department to discuss personal safety or any questions they may have about x-rays and pregnancy.
- In between patients, the small lead protection should be cleaned with Clinell™ wipes and returned to the x-ray unit
- The x-ray machine should be wiped daily with Clinell™ wipes. This will be done by the health care assistant on the neonatal unit or other appropriate personnel (nurse or radiographer), in their absence

3.5 Positioning For Chest X-Rays

For an AP film, the infant should be placed in a "neutral" position when supine (arms adducted and elbows slightly flexed; legs slightly abducted and knees slightly flexed). The head should be in the mid-line position. This will not be possible if the infant is receiving HFO (Sensor Medics) due to the rigidity of the oscillator tubing.

Use positioning aids, if necessary, to maintain head position (if agreed by radiographer). Unless an x-ray of the upper limb is being performed, the arms need to be out of the image field. If the infant is calm, asleep or paralysed and the arms are by their side, they may be left in this position. However, if the infant is awake and moving, their arms will need to be moved so that they are not placed in the image field. This may involve holding the arms out to the side or above the head. However, arms should not be extended above the head so that the infant’s back is arched.

The infant’s head and back should be straight. The hips and shoulders should be level. The lower limbs should also be supported (ideally in a slightly flexed position) to ensure good positioning of the infant. Ensure the infant is not rotated. **This technique should be performed, wherever possible, with two people holding the infant: one to support the head and arms and the second to support the lower limbs.** This will promote good image quality and ensure the comfort of the infant.

3.5 Positioning for lateral decubitus abdominal x-rays

For a lateral decubitus view, the infant should be lying on their left side (normally 5 mins before the x-ray is taken) as close to the x-ray plate as possible which will be placed upright against the inside of the incubator/cot wall to allow the radiographer to “shoot through”. The x-ray beam must not be directed at nearby cots/incubators.
It may be necessary to move other cots/incubators or change the angle of the cot to ensure no other patients are in the primary x-ray beam. The nurse holding the infant should try to stand to the side so they are not directly in the primary beam. **This technique should be performed, wherever possible, with two people holding the infant: one to support the head and arms and the second to support the lower limbs.**

4. **SUPPORTING INFORMATION**

5. **REFERENCES**

6. DOCUMENT HISTORY

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<td>scbu radiographic protocol - may 2016</td>
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