**Appendix 1**

**Summary of Study Recommendations**

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| **Domain / Process** | **Area** | **Recommended requirement** | **Measurement** | **Rationale** |
| 1. Personnel | Staff Experience | * 5-years experience * 6-month certificate | * Documentation of training and experience * Assessment of some images | Radiographs require a high level of technical skill and knowledge. Experienced operators produce more reliably high quality films than those with no experience or supervision |
| Radiation Exposure | Use of radiation monitoring badges | Availability and regular use of radiation monitoring badges | Ensures safe level of radiation exposure for staff |
| 1. Infrastructure | Indoor climate | * 15°C - 28°C * 80% humidity | Use of thermostat and regular monitoring of temperature and humidity | Assists in protection of solid-state circuits used for X-ray production |
| X-ray examination rooms | * Minimum area 18m2 * Ceiling height minimum 2.5m * Level floor * Unobstructed view of patient * Oxygen and suction * Gloves and gowns | Physical measurement of dimensions | * Allows appropriate access for patients * Allows for full angulation of X-ray arm swivel * Allows appropriate movement of X-ray unit * Provides appropriate care to patients and reduces risk of infection |
| Darkroom | * Lightproof * Minimum area 6m2 or 8m2 with a darkroom attendant * Ceiling height minimum 3m | * Light leakage test (Part C – Quality Control) * Physical measurement of dimensions | * Allows unprocessed films to be loaded and unloaded into cassettes without fogging * Allows for adequate space for the processor, consumables and to achieve the required work |
| Viewing room / office | * Minimum area 10m2 * Entrance not through X-ray examination room | Physical measurement of dimensions | * Allows for adequate working space for administrative and image-viewing duties * Prevents the X-ray examination room from being used as a thoroughfare |
| Consumable storage | * Viewing room or office is suitable * As per manufacturer guidelines | Site assessment | Appropriate storage avoids damage to consumables and ensures their function is optimized |
| Power supply | * Constant and reliable * Sufficient back-up supply * Symmetrical 3-phase mains | Document of electrical specifications and testing history | A reliable power supply is essential to the function of the X-ray unit and associated image processing units |
| 1. Equipment | X-ray | * Stationary X-ray unit is the primary unit * 12-pulse, high frequency generator * Efficient mobile or stationary back-up X-ray unit | * Equipment acquisition documentation * Manufacturer manuals * Maintenance (Part C – Quality Control) | * The equipment specifications are the minimum required to ensure efficient image acquisition * The generator should enable shorter exposure times and high voltages, which are required in paediatric imaging |
| Processing | * Minimum processor is an automatic processor * Computed or digital radiography preferred but not essential | * Equipment acquisition documentation * Manufacturer manuals * Maintenance (Part C – Quality Assurance) | * For the most optimal image quality, image processing is as important as image acquisition * Inferior processing methods are too unreliable |
| Servicing and maintenance | * Annual servicing by qualified personnel * Other maintenance as per Part C – Quality Control | * Documented service records * Documented maintenance procedures | * Regular equipment servicing and maintenance maintains the quality of imaging |
| 1. Identification and image labelling | Patient identification | * Clinical procedure is followed | Documentation of patient identification | All patients should be properly identified prior to imaging to ensure that the correct patient and study match the required imaging |
| Image annotations | * Patient ID * Date of examination * Side marker * Acquisition method | Image assessment by staff and readers | Annotations provide information about the patient so that they can be easily identified and how the image was acquired so that it be easily reproduced |
| 1. Chest X-ray Imaging recommendations | Patient positioning | * AP chest * Erect if facility performs this daily * Otherwise supine * Patient appropriately immobilized | Image assessment by staff and readers | Appropriately positioned patients will ensure efficient reading of images can occur |
| Technical factors | * Double emulsion film with 3-5μm crystal size * 200-400 speed intensifying screens * 2.5mmAl inherent filtration * No anti-scatter grid * No automatic exposure control * High kV * Low exposure time * 125cm SID * X-ray beam angled 10° caudal * X-ray beam collimated to area of interest | * Site assessment * Image assessment * Documentation of standard technical factors | * Film and screen types maximise the receptor’s efficiency for chest imaging * Filtration removes the lower energy radiation that would be absorbed by the patient * Anti-scatter grids require an unnecessary increase in radiation exposure for chest imaging * Automatic exposure control devices are too unreliable for patients of this size * High kV settings result in lower skin dose to the patient * Low exposure times minimize the risk of movement artefact * SID allows appropriate restriction on heart magnification without the need for an increased exposure * Beam angle ensures that the chest is displayed in the appropriate AP position * Collimation restricts the X-beam, thereby optimizing the dose to the patient and maximizing the image quality |
| Other requirements | * Remove unnecessary artefacts * Acquire image on inspiration | Image assessment | * Artefacts obscure parts of the image, decreasing the image’s diagnostic value * Images acquired in full inspiration allow for adequate assessment of lung fields |
| The final image | * Appropriately positioned * Adequate image quality * Artefacts removed * Correct annotations | Image critique and assessment feedback form | The quality of the image forms the basis of the study. A high quality image will result in a higher reliability of study results |
| 1. Image archiving | Image storage | * Hard copy images digitized * Stored in digital format * PACS preferred but not essential | Site assessment | All images are required to be in digital format for epidemiological studies, which will prevent problems associated with the potential loss of hard-copy images |
| Digitizing and transporting images | * Minimal loss of image quality * Maximum compression ratio is 50:1 * Transferred as DICOM or JPEG images * Similar sized images * Images identified from study ID requirements only | Assessment of images by study readers | * Digitized images that accurately represent the original image will ensure higher reliability of assessment * Similar sized images from a single site indicates no issues in transferral process * Images need to be identified by researchers without patients being able to be identified |