

# SESLHD PROCEDURE COVER SHEET



**Health**  
South Eastern Sydney  
Local Health District

<b>NAME OF DOCUMENT</b>	Radiation Safety – X-Ray Protective Clothing
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<b>AUTHOR</b>	Radiation Safety Officer, St. George Hospital
<b>POSITION RESPONSIBLE FOR THE DOCUMENT</b>	District Radiation Safety Officer <a href="mailto:SESLHD-RadiationSafetyOfficer@health.nsw.gov.au">SESLHD-RadiationSafetyOfficer@health.nsw.gov.au</a>
<b>FUNCTIONAL GROUP(S)</b>	Radiation Safety
<b>KEY TERMS</b>	Radiation safety; ionising radiation; x-rays; radiology; medical imaging; PPE; lead aprons; protective clothing
<b>SUMMARY</b>	Procedure to limit the risk to health of staff and members of the public arising from exposure to radiation from diagnostic or interventional radiology at SESLHD facilities.

## **COMPLIANCE WITH THIS DOCUMENT IS MANDATORY**

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## 1. POLICY STATEMENT

South Eastern Sydney Local Health District (SESLHD) is committed, through a risk management approach, to protecting employees, contractors, students, volunteers, patients, members of the public and the environment from unnecessary exposure to radiation arising from systems and processes which use radiation apparatus and radioactive substances, whilst maintaining optimum diagnostic and therapeutic quality, therapeutic efficacy and patient care.

This document provides procedures necessary to ensure compliance in relation to the provision, maintenance and use of X-Ray protective clothing for staff and the general public in departments performing radiological procedures. It applies to all departments using diagnostic or interventional radiation apparatus, such as the Cardiac Catheter Laboratory, Endoscopy and Operating Theatres, as well as the Department of Medical Imaging.

## 2. BACKGROUND

Staff involved in diagnostic or interventional radiology procedures may be exposed to scattered radiation from the patient being examined. In normal circumstances no one, other than the patient, should be exposed to the primary x-ray beam, but such exposure could occur unintentionally.

Members of the public (for example, the mother of a paediatric patient) may need to be in the imaging room while a diagnostic or interventional radiology procedure is taking place and could also receive incidental radiation exposure.

For mobile x-ray procedures, anyone standing within 2 m of the patient being examined may receive incidental radiation exposure.

Persons who may be exposed incidentally to radiation from diagnostic or interventional x-ray procedures shall be provided with x-ray protective clothing to minimise the radiation dose that they receive.

## 3. RESPONSIBILITIES

### 3.1 The Department Manager

- Is responsible for ensuring that all staff have access to x-ray protective clothing appropriate for the radiological procedures that are performed in their Department.
- Is responsible for the purchase, maintenance and cleanliness of personal protective equipment provided for their staff and visitors, including patients and carers.
- Is responsible for ensuring that all x-ray protective clothing, including privately owned pieces, passes acceptance testing and is added to the site inventory prior to being put into service.
- Is responsible for ensuring that all x-ray protective clothing in their Department, including privately owned pieces, are tested annually as described in 4.3.

**3.2 The Radiographer, Radiotherapist or Nuclear Medicine Technologist**

- Is responsible for selecting and wearing appropriate x-ray protective clothing and for advising on and providing appropriate PPE for staff, patients and carers involved in radiation procedures.

**3.4 The Medical Physicist**

- Is responsible for ensuring that any x-ray protective clothing provided for staff, patients or carers provides an appropriate level of protection for the procedures that will be performed with it. This includes:
  - Advising managers and users on selection of appropriate PPE based on current regulations;
  - Overseeing the acceptance testing of newly purchased PPE;
  - Reviewing annual screening results and making recommendations for maintenance or disposal where appropriate.

**3.5 The Radiation Safety Officer**

- Will ensure that a site inventory of x-ray protective clothing is maintained.
- Will ensure that an annual audit and safety check of x-ray protective clothing inventory is performed.
- Will ensure that items recommended for disposal are removed from service.

**4. PROCEDURE****4.1 Selection of X-Ray Protective Clothing**

X-Ray protective clothing such as lead gowns, gloves and thyroid collars shall meet the requirements of the version of Environment Protection Agency (EPA) Radiation Standard 4 *Compliance requirements for x-ray protective clothing* (the Standard) that was current at the time of purchase.

All such clothing shall meet the minimum lead equivalence specified by the Standard. In practice, their thickness shall be selected with due consideration given to the type of workload being undertaken. Individuals involved in interventional radiology should wear PPE with at least 0.5 mm lead equivalence (at 100 kVp) at the front. Where a maximum tube potential exceeds 100 kVp the suitability of using non-lead garments at this kVp must be considered.

Where aprons have two overlapping panels the total of the two panels when correctly worn must not be less than the lead equivalence required by the Standard.

Aprons must cover the full width of the front of the body from the throat to within 10 cm of the knees, as well as the sides of the body. Wrap-around types of aprons must cover from the shoulder blades to below the buttocks. Fastenings must be provided to keep aprons closed. Preferred designs are those comprising a separate vest and skirt that wrap around fully; open back designs are not recommended.

Operators and other staff shall be provided with thyroid shields in all cardiology and interventional radiology suites. Relevant staff shall be provided with protective gloves for

use during all radiological procedures in which the hands and forearms may be in the primary beam.

For female staff in particular, apron and vest designs incorporating shielded pauldrons will provide improved protection for radiosensitive breast tissue.

Lead glasses should be used during interventional radiological procedures where the dose rate at the face may be expected to exceed 5 mSv per year.

#### **4.2 Purchasing X-Ray Protective Clothing**

An appropriately qualified person, for example, a Consulting Radiation Expert, a Radiation Safety Officer, a Medical Physicist or a Senior Radiographer, must be consulted before the purchase of x-ray protective clothing, to ensure that the clothing selected is appropriate to the task and level of risk.

All X-ray protective clothing should be selected, and where necessary fitted, to suit the individual user.

All X-ray protective clothing must be clearly labelled with its lead equivalence and a unique identification number in accordance with the Australian Standard AS/NZS IEC 61331.3:2022 *Protective clothing, eyewear and protective patient shields*. The label must identify the standard that the item is certified against. This labelling must not be removed until the PPE is permanently removed from service.

Each item of x-ray protective clothing used within the facility must be identified with a locally unique identifier that is indelibly marked on the article. A database of this PPE shall be maintained by the Radiation Safety Officer.

X-Ray protective clothing is now available through a Healthshare Standard Offer Agreement (SOA). All such PPE is to be purchased via the SOA process, according to [NSW Health Policy Directive PD2024\\_027 - Procurement \(Goods and Services\)](#).

All personal protective equipment (PPE) supplied by the facility remains the property of the facility and may not be removed from the facility.

#### **4.3 Testing X-Ray Protective Clothing**

X-ray protective clothing must pass an acceptance test prior to it being put into service in an SESLHD workplace. This testing will be performed under the supervision of a qualified Medical Physicist or site Radiation Safety Officer.

Acceptance testing will include:

- verification of appropriate labelling and build quality;
- confirmation of shielding integrity using fluoroscopy or CT topogram.
- lead equivalence testing, to confirm labelling accuracy and adherence to required standards.

Protective clothing must be tested at regular intervals of no more than 12 months, or more frequently if indicated. This testing will be performed by a licenced radiographer, Medical Physicist or Radiation Safety Officer.

Annual testing will include:

- verification of label integrity;
- visual confirmation of cleanliness and good condition;
- confirmation of shielding integrity using fluoroscopy or CT topogram (per EPA Standard 4).

All test results will be reported to the site Radiation Safety Officer, who will ensure a record is maintained.

If, at any time, damage to an apron is seen or suspected, it must be reported to the Radiation Safety Officer immediately and the apron removed from service until its shielding integrity can be confirmed.

If faults exceeding EPA Standard 4 thresholds are found, an image of the faulty region must be taken and must be kept and the apron marked as faulty. The article must be immediately removed from use and returned to the Radiation Safety Officer for disposal.

#### **4.4 Maintaining X-Ray Protective Clothing**

The manufacturer's recommendations regarding the handling and storage of x-ray protective clothing must be strictly observed.

- Lead aprons must be stored either flat or on hangers to prevent the development of cracks in the protective material.
- Do not fold aprons as repeated folding of the same point can lead to fracturing of the apron material.
- Never drop x-ray protective clothing on the floor.

Storage racks shall be at a comfortable height so staff do not have to reach above their shoulder height. Use good manual handling principles when getting aprons on/off the hangers (e.g. use both hands, try and stand in front of and close to the hanger, minimise reaching and twisting).

Lead apparel shall be cleaned after clinical use. When cleaning lead aprons, use a weak neutral detergent - not soap.

Where PPE is damaged to the extent that it may not provide the necessary protection, it is to be taken out of service and either repaired or disposed of and replaced. Users of PPE must immediately inform their Manager/Supervisor of any defects or deficiencies and this information must be passed along to the Radiation Safety Officer.

#### **4.5 Wearing X-Ray Protective Clothing**

Each user must visually inspect each article of x-ray protective clothing at the time of each use and be confident of its integrity. Clothing must not be used if the surface appears cracked or damaged. (Note that most aprons have a non-shielding protective cover that may appear undamaged even if the shielding material underneath is faulty.

If there is a suspicion that protective clothing is faulty, it must be submitted for testing to the site Radiation Safety Officer.

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Correct fit is essential for the correct operation of lead PPE and must be checked before the PPE is used.

Workers, students and visitors must be instructed in the correct way to use the x-ray protective clothing. Instruction shall include the need for the PPE, its basic design principles (where appropriate), its application and limitations. Training records are to be maintained by unit managers and made available on request for inspection by the site Radiation Safety Officer.

- Seek assistance from colleague when putting lead apron on, if required.
- Lead apron to be worn prior to screening and taken off immediately after.
- Apron shall reach to within 10 cm of the knees.
- A 0.5 mm lead equivalent apron gives maximum protection during high dose-rate procedures whilst a lighter, standard compliant, apron is adequate for most other activities. The lead thickness shall be indicated on the label.
- Your personal radiation monitor must be worn on the front of your body underneath the lead apron.
- Lumbar support belts may be worn under the apron if available (e.g. in radiology), similar to a weight lifter's belt.
- To distribute the weight more equally between the shoulders and waist, use a two-piece apron (separate skirt and top).
- An open-back apron should only be worn when you can ensure that you will be facing the patient throughout the entire procedure.
- Gauntlets should be used if hands are at risk of exposure - particularly when patients need extensive assistance. Gloves and mittens may be used where you need to hold a small object (e.g. child's hand) or have greater control.
- Lead glasses are to be made available for use when working in the immediate vicinity of the patient and a lead-glass protective screen is not available.
- A thyroid collar is to be worn at all times when working in the immediate vicinity of the patient.

X-Ray PPE should NOT generally be used as contact shielding for patients undergoing radiological procedures. See SESLHDPR/551 - Optimisation of Medical Radiation Exposures in Diagnostic and Interventional Radiology.

**5. DOCUMENTATION**

- Lead clothing inventory showing the identification number, usual location, owner, date of purchase, type of clothing and appearance.
- Records of acceptance tests performed.
- Annual lead apron testing records showing the identification number, testing dates and test results.
- Records of staff training in the selection and proper use of x-ray protective apparel.

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### 6. AUDIT

An annual audit conducted by site Radiation Safety Officer in conjunction with lead apron survey will confirm:

- Lead clothing correctly accepted and added to inventory;
- Entire lead clothing inventory inspected and confirmed safe for use.

### 7. REFERENCES

- [1] NSW Environment Protection Agency (EPA). Radiation Standard 4 - Compliance requirements for x-ray protective clothing.
- [2] AS/NZS IEC 61331.3:2022 Protective clothing, eyewear and protective patient shields.
- [3] SESLHDPR/536 – Radiation Safety - Shielding and Facility Design
- [4] [NSW Health Policy Directive PD2024\\_027 - Procurement \(Goods and Services\)](#)

### 8. VERSION AND APPROVAL HISTORY

Date	Version	Version and approval notes
October 2021	Draft	Erin McKay, St. George Hospital Radiation Safety Officer
March 2022	Draft	Draft for Comment period. □
July 2022	Draft	Procedure finalised and approved by Executive Sponsor. To be tabled at Clinical and Quality Council (CQC) for approval.
September 2022	1	Approved at August CQC and published.
23 October 2024	2.0	Major review by Erin McKay, St. George Hospital Radiation Safety Officer. Addition of testing protocol to meet the requirements of the updated EPA guidance document <i>Radiation Standard 4 – Compliance Requirements for X-ray protective clothing</i> . Addition of procurement protocol for garments. Approved at SESLHD Patient Safety and Quality Committee.