

SESLHD PROCEDURE COVER SHEET



Health
South Eastern Sydney
Local Health District

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SUMMARY	Procedure for the handling, investigation and reporting of radiation incidents

COMPLIANCE WITH THIS DOCUMENT IS MANDATORY

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Handling, Investigation and Reporting of Radiation Incidents

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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 for the handling, investigation and reporting of radiation incidents.

2. BACKGROUND

2.1 Possible types of incidents:

Incidents can occur that result in one or more of the following events:

- Radiation exposure of a member of staff or visitor
- Incorrect radiation exposure of a patient
- Radioactive contamination of one or more persons and/or the environment
- Loss of a radioactive source.

Incidents involving patients include:

- Procedure performed on the wrong patient
- Wrong procedure performed on the correct patient
- Procedure performed on the correct patient, but to the wrong site
- Incorrect activity administered for a nuclear medicine procedure
- Incorrect radiopharmaceutical administered for a nuclear medicine procedure
- Incorrect dose fraction or incorrect total dose delivered during a radiotherapy procedure
- Unexpected tissue reactions (e.g. erythema) particularly from interventional radiology procedures (this is not a radiation accident in the legal sense, but must still be investigated).

2.2 Definitions of a radiation accident in the NSW Radiation Control Regulation 2013:

Clause 37 of the Regulation states:

1. For the purposes of this Regulation, a radiation accident is to be treated as having occurred if there is an occurrence that involves the unplanned or unexpected emission of radiation (including spillage or leakage of a radioactive substance or damage to radiation apparatus) and that is of such a nature or extent that it is likely:
 - a. that one or more persons have, or could have, received an effective dose of radiation equal to or in excess of:
 - i. 5 millisieverts, in the case of an occupationally exposed person, or

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- ii. (ii) 1 millisievert, in any other case, or
 - b. that premises or the environment may have become contaminated within the meaning of section 21 of the Act.
2. For the purposes of this Regulation, a radiation accident is to be treated as having occurred if there is an occurrence that involves the misuse of radiation apparatus or maladministration of a radioactive substance used for medical purposes, including any of the following:
 - a. the administration of a radioactive substance for diagnostic purposes in a quantity of more than 50 per cent more than that prescribed,
 - b. the administration of a radioactive substance for therapeutic purposes at an activity differing by more than 15 per cent from that prescribed,
 - c. administration of a therapeutic dose of radiation from radiation apparatus or a sealed source device which differs from the total prescribed treatment dose by more than 10 per cent,
 - d. the administration of a dose of radiation for diagnostic and interventional purposes from a radiation apparatus that results in one or more persons receiving an effective dose of radiation,
 - e. the unintended administration of radiation as a result of a malfunction of radiation apparatus,
 - f. the administration of a radiation dose to the wrong patient or to the wrong part of a patient's body,
 - g. administration of a radiopharmaceutical otherwise than as prescribed.

3. RESPONSIBILITIES

3.1 The Department Manager:

- must ensure that the following procedures are followed whenever a radiation incident is known or suspected to have occurred.

3.2 The Radiation Safety Officer (RSO):

- will assist the Department Manager in the response to the incident and will be responsible for reporting the incident to the Hospital General Manager and to the Environment Protection Authority (EPA), if required.
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4. PROCEDURE

4.1 Immediate actions following an incident occurring

- Persons suspected of being significantly contaminated by radioactive material should be removed from the area of contamination.
- Ascertain whether any person(s) involved requires medical attention.

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- Any obvious injuries should be treated immediately, taking care to avoid the spread of contamination.
- Directly notify the Radiation Safety Officer who will assess the severity of the incident and initiate any remedial action (e.g. decontamination of staff and/or the work place).

4.2 Investigation and Reporting Requirements

All incidents should be investigated, including “near misses”, to minimise the likelihood of such incidents occurring again. The investigation should be aimed at:

- establishing what happened
- identifying the failure; deciding on remedial action to minimise the chance of a similar failure
- estimating the likely radiation doses received by the patient, staff and/or member of the public.

Any patient accidentally or unintentionally irradiated must be informed of the event and counselled as to the likely implications of the unintended exposure. When the patient is unable to comprehend the information given, it may be more appropriate to inform the patient’s representative or parent/guardian. The referring doctor must also be informed.

The investigation will normally be undertaken by the Sector RSO together with the supervisor of the area in which the incident occurred. The Department Manager shall review the radiation safety processes and shall update the current risk assessment and control procedures to minimise the likelihood of a repeat of the incident. This may require additional training for the staff by the RSO.

A written report should be prepared which describes the occurrence, its cause(s) and effects, the radiation doses received, and which recommends all necessary corrective and preventive actions. Copies of the Incident Report, Risk Assessment and control procedures shall be forwarded by the Department Manager to the appropriate Senior Manager.

The Incident Report must be tabled at the Sector Radiation Safety Committee. Any recommendations from this Committee shall be provided to the Department Manager. The RSO shall add the Incident Report to the Register of Radiation Incidents. The Incident Report should be reviewed by the Department Manager with the relevant staff (e.g. at a staff meeting). The Senior Manager shall sign off the Incident Report when all the recommendations have been actioned.

The General Manager and Chief Executive should be informed as soon as possible where the incident has resulted in a patient or member of the public receiving a radiation dose of more than 1 mSv or a staff member received more than 2 mSv.

This procedure is in addition to the requirement to report the incident in the Incident Information Management System (IIMS).

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4.3 Notification of internal and external authorities

Certain radiation incidents must be reported to the EPA. The RSO shall decide whether a particular incident must be reported, based on the Radiation Control Regulation 2013.

If a report to EPA is required:

- The EPA shall be notified by the relevant RSO in writing within 48 hours of a radiation accident occurring. This is most easily achieved by sending an email to radiation@environment.nsw.gov.au.
- A copy of this notification must be sent to the relevant hospital General Manager.

The relevant Network Workforce Safety and Injury Management Service (WSIMS) shall be notified immediately if the accident involves an injury or illness to workers, where Workers Compensation is or may be payable. Worksafe New South Wales shall be notified immediately by WSIMS if a radiation accident causes a fatality, serious injury or illness to workers or was immediately life threatening but without fatality or serious injury.

4.4 Investigation report for EPA Radiation Control Branch

If an accident has been notified to EPA, a full report must be prepared for the EPA, following the accident investigation, which includes the following requirements (Clause 38 of the Regulation):

- particulars of the accident, indicating, as far as possible, the place where it occurred and the period during which emission of radiation was uncontrolled
- particulars of the area over which any radioactive substances may have been dispersed
- particulars of any steps taken to rectify the accident
- particulars of any personal injury or exposure that may have resulted
- particulars of any assessment of the radiation dose to which any person may have been exposed as a result of the accident
- particulars of all measures put in place to prevent a recurrence of the accident.

This report must be sent to EPA within 10 days of the incident and a copy of this report must be provided to the General Manager and Chief Executive.

4.6 Management of Radioactive Contamination

4.6.1 Decontamination of Persons

Persons suspected of being significantly contaminated by radioactive material should be removed from the area of contamination and the situation reported immediately to the department manager and the RSO. In the event of a major spill involving radioisotopes of iodine, the use of thyroid blocking agents (e.g. potassium iodide) should be considered. Such thyroid blocking agents are most effective in blocking uptake of radioiodine by the thyroid if they are given immediately after exposure.

Any obvious injuries should be treated immediately, taking care to avoid the spread of contamination to wounds, eyes, nostrils or mouth.

Contaminated clothing should be removed and a contamination survey of the person should be performed. Personal decontamination should be undertaken according to the area(s) of the body contaminated, as follows:

- eyes should be irrigated with saline solution (a 0.9 percent sodium chloride solution), or with distilled or mains water
- hands should be washed with tepid water and mild soap or handwash solution (preferably neutral pH). If this is inadequate, repeat once or twice. Contaminated fingernails may be scrubbed lightly with a soft nail brush. For contamination that is difficult to remove, disposal rubber gloves may be worn for several hours to promote perspiration of the hands, which may assist in removing of contamination while preventing its spread to other surfaces
- skin, other than that of the hands, should be swabbed gently with a cotton wool pad soaked in a mild soap or handwash solution (preferably neutral pH) and rinsed well. Do not vigorously scrub the skin or use detergents as this may affect the natural skin barrier and increase the risk of internal contamination
- contaminated wounds should be washed under a fast running tap. If the wound is on the face, care should be taken not to contaminate the eyes, mouth or nostrils. Finally, the wound should be washed with water, and a gentle antiseptic and a waterproof dressing applied
- attempts to remove all contamination from skin may not be feasible or desirable. Some radioactivity may be trapped in the outermost layers and will remain until normal sloughing occurs (12-15 days). Personal decontamination should be continued until monitoring shows that less than 10% of the residual contamination is removed at each cycle, unless there is the risk of the contamination entering the bloodstream through the roughening or breaking of the skin.

4.6.2 Decontamination of surfaces or contaminated equipment

Many of the radioisotopes used in hospitals have relatively short half-lives. In many cases it will be preferable to store or isolate the contaminated item until the level of radioactivity is reduced to an acceptable level rather than to attempt decontamination. If the decision is made to decontaminate the item, advice should be sought from the RSO on appropriate methods.

It is usually desirable to initially attempt decontamination with detergents, such as a customised commercially available detergent. Specialised cleaning methods such as the use of ultrasonic cleaning baths may also be appropriate. The use of chelating agents such as a 10% solution of sodium citrate may prove effective. If the contamination is due to iodine radioisotopes, the affected area should not be treated with any material that contains oxidising agents or acids as these can result in the production of volatile molecular radioiodine and the risk of inhalation. The use of acid on metal surfaces may also cause unnecessary corrosion and result in greater difficulty in future decontamination procedures.

The contaminated item should be monitored before and after decontamination has been performed. Decontamination seldom exceeds 99.9% effectiveness and is usually much less effective. If the measurement of residual contamination indicates that the level of

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radioactive contamination remains greater than permissible, the item should be stored to allow radioactivity to decay; and also action should be taken to prevent the accidental return of the item into stock or other use.

If a spill occurs, care should be taken to avoid the spread of contamination. The liquid may be absorbed with disposable plastic backed absorbent paper or mopped-up by the use of a radioactive spill kit. All material used in the clean-up should be monitored and stored appropriately. If a wet mop will not remove the residual contamination, a decontamination method suitable for the particular surface material should be used. The contaminated area should be covered and isolated until the residual radioactivity has decayed to an acceptable level. In rare instances it may be necessary to cover the contaminated area with lead sheeting in order to provide adequate shielding, or to remove and replace the covering material on a bench surface or floor.

4.6.3 Contents of a Spill Kit

A spill kit containing the necessary cleaning materials and protective clothing to deal with possible radioactive spills should be available in suitable locations and include items such as:

- plastic overshoes and gloves
- disposable absorbent materials for liquids
- plastic bags for radioactive waste
- self-adhesive labels, marking pens and radiation warning signs
- detergent such as Decon 90® or Radiacwash™
- remote handling tools such as forceps
- a container of alkaline sodium iodide/sodium thiosulphate solution (0.1 mol/L Sodium Iodide, 0.01 mol/L NaOH and 0.1 mol/L Na₂S₂O₃) (if radioiodine is manipulated).

4.6.4 Contact Details for Sector RSOs

	Business Hours	After Hours / Weekends
SESLHD Northern Sector RSO	9382 8067	via Switchboard – 9382 2222
SESLHD Southern Sector RSO	9113 3130	via Switchboard – 9113 1111
Email	SESLHD-RadiationSafetyOfficer@health.nsw.gov.au	

5. DOCUMENTATION

- Radiation Incident Report Form ([F066](#))
- Register of radiation incidents
- AIMS incident management database

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6. AUDIT

The following records should be available for audit:

- Radiation incident reports
- IIMS incident reports

7. REFERENCES

- [1] Radiation Control Regulation NSW EPA 2013

8. REVISION AND APPROVAL HISTORY

Date	Revision No.	Author and Approval
July 2010	draft	Richard Smart, Area Radiation Safety Officer in conjunction with the Area Radiation Safety Committee
Nov 2010	Revised draft	Richard Smart
February 2011	0	Approved by Combined Clinical Council
December 2015	1	Periodic Review
October 2016	1	Updates endorsed by Executive Sponsor
March 2020	2	Updates endorsed by Executive Sponsor