Medical Imaging - Radiation Safety Plan

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1. Introduction

This document describes the management of radiation safety at WA Country Health Service (WACHS) sites. It lists the regulatory publications, guidelines and general policies that are applicable to radiation safety and is intended to be read by any person responsible for any aspect of radiation safety across WACHS.

The scope of this document is to provide policy and procedural information, and traceability to both legislation and other documents that define the framework for radiation safety across WACHS.

2. Radiological Council and Radiation Health

The Radiological Council is an independent statutory authority appointed under the Radiation Safety Act in WA to assist the Minister for Health to protect public health and to maintain safe practices in the use of radiation.

The *Radiation Safety Act* regulates the keeping and use of radioactive substances, irradiating apparatus (e.g. x-ray equipment) and certain electronic products (e.g. lasers). The Act applies to both ionising and non-ionising radiation. Registration of premises and radiation sources and licensing of individuals are the principal means by which the use of radiation is regulated.

Daily administration of the Act is undertaken by personnel of Radiation Health acting through the Secretary of the Council. Radiation Health has separate responsibilities to WA Health and is under the direction of the Managing Health Physicist.

3. Registration of Premises and Equipment

All WACHS sites which have irradiating apparatus, either in storage or in use, are registered under the *Radiation Safety Act 1975*, Section 28. The Registrant for all WACHS sites is the relevant Regional Director.

The registrant is the person in whose name a certificate of registration has been issued by the Radiological Council for a particular premises and specified x-ray equipment, and they ensure that:

- the irradiating apparatus or devices containing radioactive substances are registered under the Act and comply with the relevant design and performance criteria in the regulations
- the equipment or radioactive substances are used only for the prescribed purposes and only by persons holding a licence under the Act (or by persons otherwise approved by the Radiological Council)
- appropriate instruction is given and facilities and safety devices provided to minimise the radiation dose received by radiation workers and the public
- a radiation safety officer (RSO) is appointed to perform the duties imposed on the registrant and the radiation safety officer by the regulations. This appointment requires the prior approval of the Radiological Council. (A registrant may also be the RSO). The appointment of a RSO or a radiation safety committee (RSC) does not lessen the registrant’s liability for any failure by the RSO or RSC to perform their duties

- the RSO carries out the duties imposed by the regulations
- the RSO is notified in writing of:
  - the duties that he or she is required to carry out on behalf of the registrant and otherwise imposed on the radiation safety officer by Radiation Safety (General) Regulations 1983, 19(3)
  - any conditions, restrictions or limitations which are imposed on the registration
  - any changes in the duties or to the conditions, restrictions or limitations
- each radiation worker is:
  - licensed (under the *Radiation Safety Act*), or
  - supervised by, and working under the direction of, a person who is licensed, or
  - exempt from the requirement to be licensed.

4. Radiation Safety Officer

The preferred RSO for each hospital is the site Senior/Chief Medical Imaging Technologist (MIT). In the X-Ray Operator hospitals, the preferred RSO is the Approved Radiographer for that site. In some circumstances, other professions, including nurses (if they are a registered X-ray Operator [XRO]) may fulfil the role of RSO. All nominations must be approved by the Council.

The Radiation Safety Officer:

- prepares working rules for the safe use and operation of radioactive substances, x-ray equipment and prescribed electronic products if required by the Council, the regulations, or by a condition, restriction or limitation imposed on the registration
- ensures that no radioactive substances are used or stored and no x-ray equipment or prescribed electronic products are installed unless the Council has approved plans for the premises and the premises conform to those plans
- ensures that all shielding, safety devices, protective equipment, radiation monitoring and radiation surveying devices required by the regulations or by a condition, restriction or limitation are installed or available, regularly tested and serviced, and repaired and replaced when necessary
- makes recommendations to the registrant on the need or otherwise for the medical examination of radiation workers
- maintains all records required by the Act or the Regulations
- ensures that any conditions, restrictions or limitations imposed on the registration (and of which the RSO has been informed) are complied with
- notifies the registrant of any suspected or known contravention of the Regulations or of any condition, restriction or limitation imposed on the registration as soon as practicable after becoming aware of it.
- Evaluates the radiation dose received by any individual from an abnormal or unplanned exposure to radiation in accordance with any directions given by the Council
- Notifies the registrant of an exposure to any person (other than the patient for medical purposes) which exceeds the limits prescribed in regulation 15 of the *Radiation Safety (General) Regulations*
- Notifies the registrant of any abnormal or unplanned radiation exposures.

5. Abnormal or Unplanned Exposures

The following matters are specified as abnormal or unplanned radiation exposures, as outlined in Radiation Safety (General) Regulations (1983), 19A.

- There is an unintended emission of radiation as a result of damage to, or the malfunction of x-ray equipment, a prescribed electronic product, a device or thing containing a radioactive substance or a device controlling the application of radiation from a radioactive substance
- Any diagnostic procedure other than as prescribed delivered:
  - to the wrong patient
  - to the wrong site on the patient
  - using the wrong modality.

Additional requirements to those specified in Section 19A of these regulations were endorsed by the Radiological Council on 10 September 2013, and the registration of each site was amended to include the Medical Incident Reporting Standard Condition. The actions to be taken in the event of an incident as well as the method and content of the notification to Council can be found in Regulation 19A (2) and 19A (3).

6. Radiation Safety (General) Regulations (1983) : Regulation 19A

As soon as practicable after becoming aware of the occurrence of one of the incidents listed in section 5 above, the registrant:

- ascertains the cause of the exposure
- if the cause of the exposure was damage to, or the malfunction of, any irradiating apparatus, prescribed electronic product or radioactive device:
  - ensures the apparatus, product, device or thing is repaired or removed from the premises and taken to a safe place; and
  - ensures that until it is repaired or removed, it is not used or if the damage or malfunction can be isolated without adversely affecting the safety or performance of the apparatus, product, device or thing, that it is so isolated.
- informs any persons who may have been exposed to the abnormal or unplanned radiation exposure of the occurrence of the exposure; and
- notifies the Radiological Council in writing of the incident **within seven (7) days**, including:
  - the nature, type and cause of the abnormal or unplanned radiation exposure
  - the location and time of, and the people involved in its occurrence
  - the area over which any radioactive substance may have been dispersed
  - the details of any personal injury or exposure sustained by any person, including an assessment of the radiation dose received and the actions taken to rectify the situation and to prevent a recurrence.

To facilitate incident reporting, an electronic Radiological Council Radiation Incident Report is used.

The Radiological Council can be contacted as follows:

The Secretary
Radiological Council
Locked Bag 2006 P O
NEDLANDS W A 6009

Tel (08) 9388 4999
Fax (08) 9382 0701

e-mail: radiation.health@health.wa.gov.au.

7. Fluoroscopy licences for non-radiologist medical specialists and non-specialists

For a non-radiologist medical specialist to be obtain a license to use fluoroscopic x-ray equipment, a person must have attended a recognised Fluoroscopy Radiation Safety Course and be registered as a medical specialist with the Australian Health Practitioner Regulation Agency (AHPRA).

Persons other than Radiologists registered as medical specialists with AHPRA and using fluoroscopy must hold their own fluoroscopy licence and are not permitted to work under the supervision of another licensee. Persons training for specialist qualifications may work under the supervision of a licence holder. A medical imaging technologist (MIT) must also be present at all times during the use of fixed or mobile fluoroscopic equipment.

Certain WA Country Health Service sites have an exemption under the *Radiation Safety Act*, Condition No. 156, permitting non-specialist medical practitioners to use registered fluoroscopic apparatus for the reduction of fractures only, in the presence of an MIT.

8. Policies and Site Procedures

WACHS wide Medical Imaging policy documents are published via the WA Health HealthPoint site.

9. Compliance Testing

All x-ray equipment is serviced regularly and checked for compliance by licensed compliance testers and qualified experts as per the Radiation Safety Act. A copy of licensed compliance testers is available from Radiation Health.

A compliance test is a suite of tests that is carried out on an x-ray unit to see if it is performing within specification, in order to minimise radiation doses to patient and operator and ensure image quality is maximised. Validated current compliance certificates are displayed in the work area of the relevant equipment at each site, and a compliance sticker is applied to the relevant piece of equipment.

It is an offence to use irradiating apparatus for the purpose of human diagnostic imaging unless it has one of the following:

- A current **compliance certificate**
- A **conditional compliance certificate**. Conditional compliance may be granted to non-complying equipment provided the equipment was registered before the relevant regulations standards came into effect. However, the Radiological Council requires evidence that the item of non-compliance cannot be reasonably rectified and does not unacceptably increase radiation dose
- A certificate **of exemption from compliance**; X-ray equipment that cannot meet either full or conditional compliance but which the registrant believes serves an ongoing clinical need, may make application to the Radiological Council for an exemption from compliance, or

  A **notice of non-compliance** - depending on the circumstances, the registrant may be directed to immediately cease use of the equipment until the identified item(s) of non-compliance are corrected. However, if the need for correction is non-urgent, the registrant may be directed to ensure that the identified item(s) of non-compliance are to corrected within 3 months of the compliance test or within three (3) months after expiry of the current compliance certificate

The prescribed intervals for compliance testing are as follows:

C-arm or U-arm fluoroscopy (fixed or mobile) .... 12 months
Mammographic... 12 months
Other fluoroscopy .... 24 months
Radiographic .... 24 months
CT.. 24 months
Dental .... 36 months

10. Justification/ Optimisation and General Precautions

Medical imaging examinations are only undertaken upon compliance with the Referral for Service process as per the WACHS Imaging Clinical Practice Standard and additional precautions including but not limited to the following:

- Only persons essential to the conduct of the examination are present in the room during exposure.
- Unless behind an approved protective screen, all persons present stand the maximum practicable distance from both the patient and the x-ray tube during exposure.
- Radiation exposure times are kept as short as reasonably practical.
- The radiation beam is collimated to the area of clinical interest in all cases.
- All protective doors into the x-ray room are closed during exposure.
- Non-radiographic staff are instructed on aspects of radiation safety regarding entering X-ray rooms, observation of warning signs etc.
- Medical imaging staff are directed not to hold children or uncooperative adults for X-ray examinations. Parents, carers or other staff must be used for this purpose if absolutely necessary.

- Written signs in several languages, as well as pictorially, are displayed throughout the department alerting female clients of reproductive age to advise the MIT/XRO if they believe they may be pregnant. As per WACHS Radiology - Imaging Pregnant Patients Procedure, it is good practice for all female clients between the ages of at least 16-50 to have their pregnancy status confirmed prior to undergoing an imaging procedure involving ionising radiation.
- All staff being mindful of the 'As Low As Reasonably Achievable' (ALARA) principle at all times.

11. Diagnostic Reference Levels

Radiation doses administered to a patient for diagnostic purposes must be periodically compared with diagnostic reference levels (DRLs) for procedures for which DRLs have been established in Australia (e.g. CT examinations). DRLs should be further evaluated with the view to establishing practice reference levels (PRLs), as part of departmental continuous quality improvement and accreditation activities.

If DRLs are consistently exceeded then the procedure/protocol should be reviewed to determine whether radiation protection has been optimised.

Each WACHS site Senior/Chief Medical Imaging Technologist is responsible for implementing a program to ensure DRLs/PRLs are monitored and appropriately documented.

12. Warning Signs/Labels

12.1 Radiation warning signs are placed adjacent to and at eye level of all X-ray room doors. Illuminating signs may also be present which light up when in preparation of and for the duration of the exposure. The lights are checked periodically for functionality. XRO sites may not have a light that is illuminated at the preparation of and duration of an exposure of radiation, but may have a light situated at the entry of the room that can be switched on or off to indicate the possible use of radiation.

12.2 All shielding walls, windows and screens are to be labelled with their lead equivalence at a specified energy. Any changes to the requirements of the structural protection assessment must not be undertaken without prior approval from the Radiological Council

13. Personal Radiation Monitoring Devices

In accordance with the *Radiation Safety (General) Regulations 1983* Section 25, each person occupationally exposed to radiation on the premises is individually issued with and wears an approved personal monitoring device, to record his or her cumulative radiation dose, and:

- each device is used only by the person to whom it was issued
- when wearing a lead apron, the device is to be worn under the apron
- the device(s) are returned for assessment at three monthly intervals

- continuing records are maintained of all personal monitoring
- the results of this monitoring, when received, are made available to the individuals concerned
- higher than usual result/s will be investigated by the RSO.

The Senior MIT arranges film badge monitoring for all hospital staff who are occupationally exposed.

The Area Chief MIT arranges and provides the film badges for the relief staff employed by the WACHS Central Office for state wide relief.

Film badges are worn at waist level, as a representative dose to the gonads.

Film badges are changed every three months, as supplied by the service provider.

Results from the personal radiation monitoring devices are required by EQuIP criteria 3.2.1 to be reviewed each monitoring period, and any anomalies are notated and reported to the designated safety/quality review committee at each site.

The reports are filed at each site and are also available online from the service provider.

14. Maximum Permissible Dose Limits

The dose limits for radiation workers are:

- in any period of five (5) years, an average effective dose of 20 millisieverts per year
- in a period of 12 months, an effective dose of 50 millisieverts
- in any period of less than 12 months but not less than one (1) month, an effective dose of the amount which is the product of 50 millisieverts and the ratio of that period in weeks to 52 weeks
- in any period of less than one (1) month, an effective dose of 1/12 of 50 millisieverts.

The dose limits for a radiation worker who has notified her employer that she is pregnant, are:

- for external radiation exposure, an equivalent dose to the surface of her abdomen for the remainder of her pregnancy of 2 millisieverts, and
- for internal radiation exposure, 1/20th of the Annual Limit on Intake (ALI) determined by reference to the values set out in the publication entitled Dose Coefficients for Intakes of Radionuclides by Workers being ICRP Publication 68 published for the International Commission on Radiological Protection.

The dose limit in a single planned special exposure referred to in regulation 24 (2) is an effective dose of 100 millisieverts.

The dose limits for persons other than radiation workers are:

- in any period of five (5) years, an average effective dose of 1 millisievert per year
- in any period of 12 months, an effective dose of 5 millisieverts, and
- in respect of an area which such persons might continuously occupy:
  - an effective dose of 20 microsieverts in any one (1) hour, and
  - an effective dose of 250 microsieverts in any period of seven (7) days.

15. Personal Protective Equipment

Personal protective equipment (PPE) is required to be used in a range of circumstances involving the use of radiation. Lead protective aprons and thyroid shields are supplied in the Medical Imaging Department. Aprons are equivalent to at least 0.25mm of lead.

Lead protective aprons are worn:

- by any person (other than the client) while in an X-ray room while X-rays are being used, unless they are behind an approved lead protective screen
- by any person (other than the client) while in a room while exposures are made on a mobile X-ray machine
- by any person (other than the client) while in theatre while X-ray exposures are made.

It is good practice for any client who is pregnant to wear a lead gown during any exposure.

Lead protective gloves are worn by anyone who is holding a client or item in, or close to, the primary X-ray beam. Lead protective thyroid shields are available for staff in close proximity to the X-ray beam during screening procedures. All lead protective devices are stored without creases or folds when not in use.

Lead protective devices are visually checked on a yearly basis as a minimum, and results recorded in the QA file. For those sites where there is a screening unit, the lead protective devices used on that site are to be screened using fluoroscopy on an annual basis and results (cracks, damage to lead lining) recorded on. For sites with no fluoroscopy unit on site, lead gowns are to be x-rayed annually, and any degradation addressed, using a fixed general or mobile x-ray unit.

16. Roles and Responsibilities

As described throughout the document.

All Staff are required to work within policies and guidelines to make sure that WACHS is a safe, equitable and positive place to be.

17. Compliance

Failure to comply with this policy may constitute a breach of the WA Health Code of Conduct (Code). The Code is part of the Employment Policy Framework issued pursuant to section 26 of the *Health Services Act 2016* (HSA) and is binding on all WACHS staff which for this purpose includes trainees, students, volunteers, researchers, contractors for service (including all visiting health professionals and agency staff) and persons delivering training or education within WACHS.

WACHS staff are reminded that compliance with all policies is mandatory.

18. Evaluation

This document is to be reviewed every two years by the Area Chief MIT.

19. Standards

National Safety and Quality Health Service Standards (First edition) – 1.3.2
National Safety and Quality Health Service Standards (Second edition) – 1.6, 1.25
EQuIPNational Standards – 15.3, 15.12, 15.14.1, 15.16

20. Legislation

The current WA legislation governing radiation (ionising and non-ionising) safety that is applicable to WACHS is:

- *Radiation Safety Act (1975)*
- Radiation Safety (General) Regulations (1983)
- Radiation Safety (Qualifications) Regulations (1980)
- Occupational Safety and Health Regulations (1996) (specific to lasers)
- Radiation Safety (Transport of Radioactive Substances) Regulations (2002)

All documents are amended by the Radiological Council as required and are available from the Parliamentary Counsel's Office website.

21. Related Policy Documents

WACHS Role and Responsibility of Approved Radiographers (MIT) and X-ray Operators Policy
WACHS Radiology - Imaging Pregnant Patients Procedure
WACHS Imaging Clinical Practice Standard

22. WA Health Policy Framework

Clinical Governance, Safety and Quality Policy Framework

This document can be made available in alternative formats on request for a person with a disability

Contact:	Area Chief Medical Imaging Technologist (M.Melville)		
Directorate:	Medical Imaging	**TRIM Record #**	ED-CO-14-33685
Version:	3.00	**Date Published:**	16 August 2018