Medical Imaging of Pregnant Patients Procedure

1. Purpose

The aim of this document is to provide all medical imaging staff employed by the WA Country Health Service (WACHS) with a consistent procedure when conducting a diagnostic imaging radiology procedure on a patient who is pregnant or possibly pregnant.

All imaging specialists must ensure that the As Low As Reasonably Achievable (ALARA) principle is adhered to.

This document does not refer to nuclear medicine procedures.

2. Procedure

Imaging is only to be performed when clinically indicated.

For any x-ray procedures that may result in a fetal dose of 1 mSv or higher, a reasonable attempt to establish the pregnancy status of biological female patients aged 12 to 55 must occur immediately before the commencement of the procedure.

It is good practice to ask all biological females aged 12 to 55, or even outside this age range if considered appropriate by the Imaging Specialist or clinician, if there is any possibility of pregnancy, and the date of their last menstrual period (LMP).

Unless an institution can provide supporting documentation (which must be approved by a credentialed radiology medical physicist), it is to be assumed that the following procedures may result in a fetal dose of 1 mSv or higher:

- conventional radiographic/fluoroscopic examinations of the lumbar spine or abdominal/pelvic region
- CT examinations of the chest and/or lumbar spine or abdominal/pelvic region
- interventional fluoroscopy procedures.

For biological female patients aged 12 to 55 years, a reasonable attempt to establish pregnancy status must be made prior to the administration of iodine or gadolinium contrast agent.

In situations where pregnancy has not been ruled out, high risk gadolinium-based contrast agents are contraindicated. Iodine-based and low or medium risk gadolinium-based contrast agents are to be restricted to urgent indications following consultation with a radiologist. Information on gadolinium risk can be found on the Diagnostic Imaging Pathways website: Gadolinium contrast for MRI Scans.

Checks of pregnancy status must be documented in the patient's notes (if available), recorded in the Radiology Information System (RIS) and noted on the imaging referral form.

The patient is to be asked in a private and discrete manner; “Is there any possibility you may be pregnant?” Verbal or written assurance by the patient is to be considered sufficient. The response is to be noted in the RIS against the visit.

If doubt exists regarding the pregnancy status, a blood (serum β-HCG) or urine test will be done prior to imaging. This is superseded if imminently life threatening e.g. high speed multi trauma and bleeding/low Glasgow Coma Scale (GCS).

Biological females who are deemed not to be pregnant may be examined applying appropriate radiation safety precautions.

Women whose last menstrual period was more than 28 days prior, should be considered possibly pregnant, unless they fall into one of the following categories:

- previous tubal ligation or hysterectomy
- negative pregnancy test during current hospital presentation.

If a patient is conscious and their pregnancy status cannot be confirmed, they may be referred back to the referring clinician.

In the event of an unconscious patient, responsibility for imaging lies with the referring doctor or radiologist.

If a pregnancy test is performed, the results must be documented in the patient’s notes, entered into RIS, and noted on the imaging referral form.

It is expected of the imaging specialist to ensure that the ALARA principle is adhered to, and that the minimum exposure settings and minimum number of views are utilised to maintain a low procedural dose while still providing the necessary diagnostic information.

2.1 Procedure if pregnant or possibly pregnant

The decision concerning the degree of urgency of the examination is the responsibility of the referring doctor.

Where possible, all patients who may be or are pregnant are to be provided with a copy of Inside Radiology – Radiation Risk of Medical Imaging During Pregnancy prior to their exam.

Where possible, all patients who may be or are pregnant should be provided with a copy of Inside Radiology – Gadolinium Contrast Medium (MRI Contrast agents) prior to an exam requiring gadolinium.

A radiologist **must** be consulted prior any examination being performed on pregnant patients which is inclusive of the lower abdomen and pelvis. For all other procedures, lead protection must be used to cover the abdomen and pelvis. When WACHS Medical Imaging Technologists (MITs) cannot access a radiologist, the situation must be documented, and the referring clinician engaged to determine appropriate next steps.

2.2 Non-Urgent

If the examination is non-urgent, for procedures with fetal dose well below 1 mSv (refer Appendix A). The patient must be advised that the risk to the fetus is negligible. Verbal or written informed consent is acceptable and must be documented in RIS.

For procedures with fetal dose ≥ 1 mSv, informed consent must be in writing (i.e. patient signature obtained). Prior to the procedure, an estimate must be made and recorded of the fetal dose (should be performed by a medical physicist) and the risks explained to the referrer. Clinical discussion between the consultant radiologist and the referrer can occur to determine appropriate imaging pathway.

2.3 Medical Emergency/Urgent

If the examination is considered a medical emergency or urgent, and it would normally require a pregnancy check but it is not practical to do so, it may only proceed following consultation with a clinician. Consultation should be with a radiologist, but if this is not possible, it must be with a member of the treating (referring) medical team. A written record of the consultation must be noted on the referral form.

If the situation is immediately life-threatening, the consultation requirement may be waived.

The MIT is to plan the examination using the minimum number of exposures possible applying appropriate radiation safety precautions. After normal working hours, the on-call radiologist must be contacted.

Alternative imaging modalities not requiring the use of ionising radiation (e.g. ultrasound or MRI) should be considered first. If no alternative imaging modalities are applicable to the clinical circumstance, the radiologist and MIT are to plan the examination in order to minimise the degree of radiation exposure.

Note: When an examination proceeds, a complete record of the number of exposures, image sizes and factors used for each exposure, must be noted in the RIS for subsequent fetal dose assessment.

For further information on Imaging and pregnant patients please refer to:

- Government of Western Australia Radiological Council
- The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)

ATTENTION

For any x-ray procedures that may result in a fetal dose of 1 mSv or higher, a reasonable attempt to establish the pregnancy status of female patients aged 12 to 55 must occur immediately before the commencement of the procedure.

The fetal dose limit of 1 mSv is consistent with the requirements of the ARPANSA Code of Practice RPS 14 (ARPANSA 2008a).

There is no specific age range that can be clearly defined as “of child bearing capacity”. However, advice from the National Association of Testing Authorities (NATA) regarding

accreditation requirements (pers. comm. D. Hobday 21/5/2014) is that it is preferable to specify an age limit rather than stating “of childbearing capacity” and leaving the judgement to the MIT.

It is known that these procedures are likely to result in an embryo or fetal dose of greater than (or equal to) 1 mSv (or 1 mGy) (ARPANSA 2008b, Dauer et al. 2012).
Note that in this context, 1 mSv and 1 mGy are equivalent.

The main risks to the conceptus from ionising radiation depend on its stage of development and the radiation dose. Immediately post-conception, when the number of cells is small, the most likely effect is death or failure to implant. The main risks to a developing embryo or fetus are increased risk of cancer, and tissue reactions such as organ malformation and retardation (ICRP 2000).

Aside from cancer, the dose necessary to produce these effects is widely accepted to be at least 100 mGy (ICRP 2000, ICRP 2007), and hence doses of 1 mGy or below present negligible risk. With respect to cancer, an embryo or fetal dose of 1 mGy has an associated risk of childhood cancer of below 1 in 10 000 which is considered acceptable compared to the natural risk (approximately 1 in 500) (Wall et al. 2009). Therefore, any x-ray procedure delivering an embryo or fetal doses of 1 mGy or less could be considered effectively safe.

For procedures delivering less than 1 mGy; it is common practice to perform such procedures regardless of the patient’s pregnancy status (ACR 2013, RANZCR 2005, Wall et al. 2009). Given that information on pregnancy status will not affect decisions regarding imaging the patient, there is no need to obtain it. This is consistent with the relevant ARPANSA Code of Practice (ARPANSA 2008a)

Verbal or written assurance by the patient is to be considered sufficient. If doubt exists regarding the pregnancy status, a blood (serum β-HCG) or urine test should be considered.

When inquiring about the possibility of pregnancy, it is important to explain to the patient why this information is needed. This helps prevent misunderstandings, reduces the risk of causing offence, and encourages honest responses. If language barriers are present, the assistance of a qualified interpreter should be sought. This is consistent with what is considered best practice. ARPANSA Safety Guide (ARPANSA 2008b)

The use of iodine- and low or medium risk gadolinium-based contrast agents should not be used for biological female patients aged 12 to 55 unless it is clinically indicated or the pregnancy status has been established and the patient is not pregnant. High-risk gadolinium-based contrast agents are contraindicated in pregnancy.

This is consistent with current guidelines e.g. Diagnostic Imaging Pathways (WA Gov’t 2015a, b), RANZCR (RANZCR 2009, 2013) and European Society of Urogenital Radiology (ESUR 2012). Note that the ESUR guidelines are referenced by both Diagnostic Imaging Pathways and RANZCR.

For non-urgent exams which may result in a fetal dose of at least 1 mSv, before the procedure is performed, the risks must be fully explained to:

- the referrer
- the pregnant patient

Before the procedure is approved, an estimate of the expected radiation dose to the embryo or fetus must be made and recorded. This should be performed by a medical physicist.

This is closely based on Schedule B of the ARPANSA Code of Practice (ARPANSA 2008a). The only addition is the reference to a Medical Physicist. It is felt that since this is a medical physicist's area of expertise, ideally it would be a physicist performing the dose calculation. The word "should" has been used to acknowledge the fact that sometimes it will not be possible to have a physicist perform the calculation e.g. in an out-of-hours emergency.

3. Roles and Responsibilities

The **Medical Imaging Technologist** is responsible for:
- establishing age and pregnancy status prior to the commencement of procedure
- applying appropriate radiation safety precautions
- consulting the referring doctor or radiologist prior to any examination performed on pregnant patients.

The **Radiologist** is responsible for:
- ensuring the examination requested is appropriate for the clinical indications
- ensuring the examination minimises the degree of radiation exposure.

The **referring doctor** is responsible for:
- establishing the degree of urgency for the imaging
- liaising with the consultant radiologist to determine imaging pathway for pregnant patients.

All staff are required to comply with WACHS policies and procedures relevant to their roles and responsibilities. If staff are uncertain about which policies, procedures, or guidelines apply to their role or scope of practice, if they are unclear about how to apply them, they should consult their manager in the first instance.

4. Monitoring and Evaluation

Evaluation and review of this procedure will occur periodically or as deemed necessary due to changes in standards of practice.

- All new staff are to be introduced to the policy as part of their orientation, including understanding the process for capturing data when imaging patients and reporting.
- All imaging providers and MIT's must report exposure incidents and document pregnancy status in the RIS.
- Implement a system to track and review incidents involving radiation exposure to pregnant patients, ensuring compliance with the policy.

Future policy reviews will be undertaken utilising staff feedback to assess the effectiveness of processes, protocols and the efficiency of data capture and reporting.

5. References

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6. Definitions

Term	Definition
Credentialed Radiology Medical Physicist	A credentialed radiology medical physicist is a person who has satisfied the requirements for registration as a Qualified Medical Physics Specialist in Radiology Physics by the ACPSEM. The ACPSEM Register of Medical Physics Specialists can be found on the ACPSEM website.
Imaging Specialist	MIT or clinician who is in control of a fluoroscopic or radiographic procedure and meets the requirements specified in the relevant conditions of registration or licensing as per the Radiation Safety (General) Regulations 1983. For further information please refer to the conditions in your Registration of Premises.
Practice staff	In the context of Standard 2.2 of DIAS (DoHA 2010) this refers to the staff that are normally responsible for obtaining patient information. This may vary between sites but could include MITs, nursing staff, radiologists, booking and clerical clerks.
Radiation Medical Practitioner	The practitioner responsible for the overall conduct of the procedure involving the exposure of the patient to ionising radiation and in diagnostic or interventional

	radiology, this person will usually be a radiologist, but might also be, for example, a cardiologist or, for limited procedures, a general practitioner.
Responsible Person	In relation to any radioactive source, radiation-producing equipment, prescribed radiation facility or premises on which radioactive sources are stored or used, this is the person: (a) having overall management responsibility including responsibility for the security and maintenance of the source, radiation-producing equipment, facility or premises (b) having overall control over who may use the source, radiation-producing equipment, facility or premises (c) in whose name the source, radiation-producing equipment, facility or premises would be registered if this is required. In Western Australia this is the Registrant.

7. Document Summary

Coverage	WACHS wide
Audience	WACHS Medical Imaging Staff
Records Management	Clinical: Health Record Management Policy
Related Legislation	*Radiation Safety Act 1975* (WA) Radiation Safety (General) Regulations 1983 (WA)
Related Mandatory Policies/Frameworks	• Clinical Governance, Safety and Quality Policy Framework
Related WACHS Policy Documents	• Medical Imaging – Radiation Safety Plan • Imaging Clinical Practice Standard
Other Related Documents	Nil
Related Forms	Nil
Related Training	Nil
Aboriginal Health Impact Statement Declaration (ISD)	ISD Record ID: 4132
National Safety and Quality Health Service (NSQHS) Standards	1.07, 1.10, 1.11, 2.04, 2.05, 6.1, 6.2
Aged Care Quality Standards	Nil
Chief Psychiatrist's Standards for Clinical Care	Nil
Other Standards	Diagnostic Imaging Accreditation Scheme Standards 2.2

8. Document Control

Version	Published date	Current from	Summary of changes
2.00	21 July 2025	21 July 2025	• change to title • changes to age range • updated references • updated Documentation of Pregnancy Status

9. Approval

Policy Owner	Executive Director Clinical Excellence
Co-approver	Executive Director Nursing and Midwifery Services Executive Director Medical Services
Contact	Chief Medical Imaging Technologist
Business Unit	Clinical Excellence and Medical Services
EDRMS #	ED-CO-17-71002

This document can be made available in alternative formats on request.

Appendix A: Approximate Fetal Effective Doses

Approximate fetal effective doses (mSv) arising from common radiological examinations of pregnant patients†		
Examination	**1st trimester**	**3rd trimester**
Conventional Radiography*		
Skull	<0.01	<0.01
Chest	<0.01	<0.01
Cervical spine	<0.01	<0.01
Thoracic spine	<0.01	<0.01
Lumbar spine	2	6
Abdomen	1.5	2.5
Pelvis	1	2
Intravenous pyelogram (IVP)	2	10
Extremities	<0.01	<0.01
Mammography	<0.01	<0.01
Barium meal	1	6
Barium enema	7	25
CT**		
Head	<0.005	<0.005
Neck	<0.005	<0.01
Chest without portal phase	0.1	0.6
Chest with portal phase	1	7
Chest (pulmonary embolism)	0.1	0.4
Chest/abdomen/pelvis	12	13
Abdomen/pelvis – single phase	12	12
Abdomen/pelvis – multi phase	15	30
Thoracic spine	0.2	1.0
Lumbar spine	10	25
Pelvimetry	-	0.2

* Based on data from Sharp et al. and simulations using PCXMC code.
** Estimates for CT examinations are obtained using the ImPACT dose calculator and typical technique factors.

† Table reproduced from Annex A of 'Safety Guide: Radiation Protection in Diagnostic and Interventional Radiology', Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), Radiation Protection Series 14.1 (2008). Note that all doses should be treated as indicative only as individual doses can differ from the tabulated values by as much as a factor of 10, except for those examinations remote from the lower abdomen.

Appendix B: Radiology Procedure for Imaging Pregnant Patients