



Australian Government
**Australian Radiation Protection
and Nuclear Safety Agency**



Computed Tomography (CT) Incidents from the Australian Radiation Incident Register (ARIR)

ARIR is the national register to which the Australian radiation regulators contribute reports. This flyer is an extract of the latest annual report, covering incidents which relate to the use of CT scanner from 2018. The full report and further information is available on arpansa.gov.au.

Unplanned procedures (e.g. wrong patient, wrong procedure, w

The principles of justification and optimisation ensure that a patient receives only procedures which have been justified for them, and that the amount of radiation is optimised without jeopardising the outcome. Procedures are planned to be delivered to a patient for a specific benefit such as for the diagnosis of disease. Procedures that differ from what was planned (where the referral was not followed as intended) form the largest fraction of incidents in CT.

These incidents have the potential to significantly affect patient outcomes if not detected and wrong clinical decisions may be made based on this imaging. Where incidents are detected and patients rescanned, it is not only resource and time consuming for both the medical imaging practice and the patient, but the patient also receives extra radiation exposure from the repeated imaging.

Patient identification and procedure matching is a critical control for these types of incidents. While patient identification requirements apply to all practices, local requirements differ across jurisdictions and implementation will vary between hospitals or practices.



1

Verification of patient

Verification of the patient presenting for imaging should always be carried out with at least three identifiers e.g. full name, date of birth and address/medical record number. These should be framed as open questions (what is your name?) rather than closed questions (are you John Smith?). If the patient is unable to confirm these details, they should be confirmed with the patient's designated representative. If unavailable, then the patient's identification band or a staff member accompanying the patient is used to verify the patient's identity.



Example case

A radiographer attempted to identify the patient with closed questions. The patient confirmed the details (of a different patient) and was scanned using the procedure for that patient at the incorrect site. (Effective dose: 3.7 mSv)



2

Matching information provided on the patient e.g. to the referral

Patient matching procedures include 3C procedures (correct patient, correct site/side, correct procedure), and should confirm the referral information and clinical need.



Example case

Failure to observe 3Cs protocol resulted in the misinterpretation of a request for CT examination of abdomen and pelvis (i.e. common acronym of 'CTAP') which was confused with 'CTCAP' (CT Chest/Abdo/Pelvis). The scanning of the chest region was not required and did not have clinical benefit. (Effective dose: 4.7 mSv)



3

Time-out prior to the procedure

Immediately before the procedure, after all preparation steps have been completed, a 'time-out' is to be called. Team members will then verbally confirm the correct patient identity, the correct procedure to be performed, and the correct site/site is identified (and marked if applicable).



Example case

The radiographer requested Patient A, but the porter collected patient B by mistake (they have the same initials). A 3Cs check was not fully performed and patient B was incorrectly scanned with CT KUB protocol. (Effective dose: 2 mSv)



4

Post-procedure image recording

Following image acquisition, the images and information are often required to be used by another health professional, such as a specialist or the referrer. Post-procedure confirmation of the image is required to confirm (at a minimum) that patient details and the side (laterality) marker attached to the post-processed image are correct. In addition, it is important to ensure that any electronic file is verified and linked to a record correctly. Post-procedure image reviews affords an opportunity to compare the images to the request. These checks also provide effective detection of where the above processes have failed to prevent unnecessary imaging.



Example case

A CT chest scan for an inpatient was requested with the notes 'no contrast - post pleural tap'. Staff completed the CT scan and when reviewing images noted there was fluid remaining in the chest. Staff then checked clinical history where they realised the pleural tap had not been completed. It was noted that discussion with patient would have concluded that no recent pleural tap has been performed. (Effective dose: 1.7 mSv)

Learnings

- > Radiographers/medical imaging technologists and clerical staff need to be trained regularly in correct patient and procedure matching procedures, and the entering of patient and imaging details.
- > Common acronyms which are similar should be avoided (e.g. 'CTCAP', 'CTAP', 'CTPA'), instead the procedure should be written out (e.g. 'CT Chest/Abdo/Pelvis', 'CT pulmonary angiogram').
- > Selection lists of procedures should be managed to:
 - include procedures for common settings (e.g. 'low dose scanning protocol') which removes the need to modify parameters
 - delete unused or inappropriate protocols from selection list.
- > Procedures should clearly provide for situations where imaging requires a special protocol.
- > It's important for radiology staff to check the scan histories at the time of booking and the time of the procedure. The following measures were identified by users to improve the request system:
 - display alert if a study is booked within a certain timeframe (e.g. 48 hours) of a previous identical episode. The user must acknowledge this alert in order to continue
 - scheduling software to include a display of the requested date of the procedure on screen
 - digital referral systems can provide controls to help prevent selecting the wrong patient. These controls should be reviewed where failures are identified
 - all inpatient request forms to have a coloured sticker placed on the request, detailing if the patient has had a previous CT scan within the last five days
 - the use of patient labels on the request form can lead to the wrong sticker on the wrong form.

Supervision and training/pregnancy



Supervision and training

The regular training of staff to maintain competencies, and when gaining experience in new modalities or procedures, needs to be effectively managed. Ineffective training and supervision were a factor in a number of reported incident. The medical field frequently has students, new staff, and changing practices, which impose specific training requirements on operators.



Example case

A student did not realise they had not completed pre-injection scans (for placement of bolus tracking region of interest) and told a nurse they were ready for contrast injection. Pressing the scan button triggers the injection of contrast, and there is a delay prior to bolus tracking for the nurse to supervise the injection and exit the room prior to the scan starting. With the nurse still in the room, the student pressed the scan button and the pre-injection ROI scan (single image) was completed. Supervision of the student was inadequate due to distraction of the supervising radiographer by a phone call regarding another patient.

Learnings

- > A second radiographer should be present to complete other tasks such as answering phone calls, organising patients etc. to enable full supervision of the trainee/student.



Pregnancy

A number of patients underwent CT scans while being unaware of their pregnancy. In all cases the patient indicated that they were not pregnant and standard procedures were followed. Dose to the foetus was typically less than 10 mGy, however the maximum was 23 mGy.



Example case

Patient presented for a CT examination. All patient checks were performed appropriately and the patient was questioned about her pregnancy status. The patient believed she was not pregnant at the time of the examination. However, from the CT images it was evident that the patient was pregnant. (The radiation dose to the foetus as a result of the incident was approximately 6 mGy)

Learnings

- > These cases highlight that these checks are important, and that the testimony of the individual is not always reliable. Pregnancy tests are only required prior to therapeutic procedures, but may be carried out in some cases involving a significant dose to the uterus.

More about ARIR

The ARIR is the repository of radiation incident information from Commonwealth, state and territory radiation regulators. It is intended to raise awareness of radiation safety and to facilitate the sharing of lessons learnt from radiation incidents across Australia.

What you can do to help

The ARIR relies on information submitted by individuals and organisations to their regulator. You can help us by ensuring your report identifies the underlying causes which contributed to the incident and clearly outlining lessons learnt or potential strategies which others may be interested in. More information on underlying causes and holistic safety can be found on the ARPANSA website.