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Radiography: an indispensable tool

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Radiography responsibilities

Few dental procedures can be carried out without using radiography somewhere along the way. Dental care professionals (DCPs) are an integral part of the dental team. Some may already take, process and interpret radiographs used in general dental practice. Radiography does, however, come with significant responsibilities. As such it is important that DCPs are aware of the legal duties in this area.

The law

Radiation protection is governed by two specific pieces of legislation which, despite the regulatory upheaval of recent years, have remained unchanged since 2001. The *Ionising Radiations Regulations 1999 (IRR99)* exist primarily to protect the dental team. However, they also include references to the equipment aspects of patient protection. The Health and Safety Executive (HSE) is enforcing these regulations. The 'legal person' (usually the practice owner) is ultimately responsible for compliance and appointing the correct individuals.

The regulations also require the provision of a Radiation Protection Advisor (RPA). This is an individual who is able to advise on how to comply successfully with the legislation. This includes installation, quantity assurance and safety. They should be suitably qualified and are usually provided by an outside company or organisation.

Amongst other things, IRR99 requires that a risk assessment is undertaken so that the dose of radiation to those working with it is limited, equipment is maintained, staff are trained, a controlled area is designated, local rules are implemented and finally, a Radiation Protection Supervisor (RPS) is appointed. The RPS differs from an RPA in that it can be a member of the dental team. This is an internal position and the person is able to advise members of staff on how to comply with local rules.

The *Ionising Radiation (Medical Exposure) Regulations 2000 (IRMER)* concern the protection of patients. These regulations are governed by the Care Quality Commission (CQC) and require that radiographs are produced at optimum quality and with minimum exposure to the patient, and most notably, that every single exposure is clinically justified. There is legal requirement to ensure that radiographs are audited at suitable intervals (usually every six months) and that staff are suitably trained according to their role (see below).

The IRMER regulations also define positions of responsibility. The position most likely to be occupied by a DCP is the operator. An operator is a person conducting any practical aspect of a medical exposure including exposing the radiograph and processing the film/image receptor and reporting. In terms of training, this means that the person has had practical training in terms of patient identification; positioning the film, the patient and the X-ray tube head; setting the exposure parameters; pressing the exposure button to initiate the exposure; processing films; clinical

evaluation of radiographs; and exposing test objects as part of the quality assurance (QA) programme.

Becoming an operator

Dental hygienists and dental therapists are trained to take, process and interpret radiographs. If a dental nurse would like full operator duties, they are required to possess the Certificate in Dental Radiography from a course conforming to the syllabus prescribed by the College of Radiographers. British Dental Association (BDA) Education runs an excellent course leading to the NEBDN Certificate in Dental Radiography (previously reviewed in *Vital!*). For operators it is important when selecting an update training course to ensure it covers the appropriate topics set out in the IRMER regulations.

IRMER operators should attend a continuing education and training course every five years. See below for the course contents. Therefore, by complying with IRMER update training, DCPs will also meet their GDC requirements. In terms of CPD, *dental radiography and radiation protection* is recommended as a core subject by the GDC and must be included as part of a registered DCP's five year CPD cycle.

The BDA provides an IRMER compliant update course presented by some of the UK's foremost experts in dental radiography. However, there are many radiography courses available which cover radiography and radiation protection which often fail to provide the breadth of training recommended.

Appropriate update training courses for operators should cover:

- The principles of radiation physics
- Risks of ionising radiation

- Radiation doses in dental radiography
- Factors affecting doses in dental radiography
- The principles of radiation protection
- Statutory requirements
- Quality assurance.

If a dental nurse wishes to simply press the button on an X-ray machine, it is acceptable to do this under direct supervision once it has been set up by a trained operator. Again, if simply processing radiographs, documented in-house training will suffice.

Documentation

Under the two sets of regulations, every practice must have a **radiation protection file**. It contains two elements: Local rules (as required in IRR99) and Employers Written Procedures (as required in IRMER 2000).

Local rules and the controlled area

Local rules are intended to identify the key working instructions to ensure that exposure to staff is restricted. The following information should be provided: name of RPS; contingency arrangements; name and contact details of RPA; identification and description of 'controlled area'; dose investigation level; arrangements for personal dosimetry; summary of working instructions; name of 'legal person' and arrangements for pregnant staff.

The controlled area is a defined safe area around the X-ray equipment that prevents anyone other than the patient entering it when radiographs are being taken. It will normally be within 1.5 metres of the X-ray tube and the patient and within the primary X-ray beam until it has been sufficiently attenuated by distance or shielding. The controlled area should not normally extend beyond the X-ray room or surgery. All personnel should stand outside this area, preferably 2 metres in total. It should still be possible to see the patient throughout, however. Dental staff do not normally require dosimeters unless they are performing more than 100 intra-oral radiographs or 50 panoramic radiographs a week, or a combination of both.

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At a workload below level it is unlikely that the annual dose would exceed the recommend annual exposure limit of 1 millisievert (1mSv).

Written procedures

The legal person is required to have written procedures to describe the protocols for patient protection that are in place. These include: identification of patients; use of diagnostic reference levels; identification of referrer, practitioner, operators; authorisation and justification of all exposures.

Specific guidance on written procedures and policies has been produced for dental practices in Scotland and Northern Ireland. If your principal is a member of the BDA, this guidance is available via the BDA website. These procedures and policies can also be adopted for use by practices in England and Wales.

Maintenance checks on equipment

When new X-ray equipment is installed, it should be subject to a *critical examination*. This will be performed by the installer and will include information on whether the equipment complies with safety requirements as well as a description of the equipment and its location. The *acceptance test* builds on the critical examination and includes information on whether the equipment is operating within agreed performance parameters as well as measuring the patient dose. It also establishes baseline values. Modern X-ray equipment should operate with a range of 60-70 Kv. Older equipment operating at 50 Kv should be withdrawn from use.

Routine testing is generally done every three years unless there has been a significant change to the equipment. This measures patient dose, the location of the equipment and compares the results to previous tests. However, as with all equipment in the surgery, manufacturers' servicing instructions should be followed.

CT scanners

Since the publication of the current dental guidance notes in 2001, there has been an increase in the use of dental cone beam computed tomography equipment (CT scanners), particularly in implant cases. Working procedures and precautions that are well-established for conventional dental

Table 1 A simple subjective image quality rating audit

Rating	Quality	Basis
1	Excellent	No errors of patient preparation, exposure, positioning, processing or film handling.
2	Diagnostically acceptable	Some errors of patient preparation, exposure, positioning, processing or film handling but which do not detract from the diagnostic utility of the radiograph.
3	Unacceptable	Errors of patient preparation, exposure, positioning, processing or film handling, which render the radiograph diagnostically unacceptable.

Table 2 Performance targets

Rating	Percentage of radiographs taken (target)
1	Not <70%
2	Not >20%
3	Not >10%

radiography equipment will not be adequate for CT scanners. The Health Protection Agency (HPA) working party has prepared detailed guidance on the use of CT scanners and is available on the HPA website.

Quality assurance audits (QAs)

It is a legal requirement under IRMER rules to perform QAs at least every 12 months. The purpose of this is to ensure that all those performing radiographs are obtaining excellent diagnostic information, whilst keeping patient doses as low as reasonably practicable (ALARP).

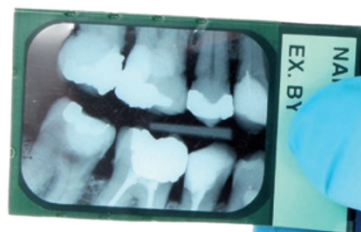
The method employed is open to choice but the most common

The performance targets should

be as listed in Table 2.

Radiography is an indispensable tool in clinical diagnosis. There are a wide range of measures and regulations that if followed, make it safer than ever before for both staff and patients. Whilst the rules may seem complex and verbose, the general principles are easily grasped. By adopting techniques to give excellent diagnostic results, staff can serve their patients even better.

Verifiable CPD questions are on page 49.



one is the use of a simple subjective image quality rating. The table above shows how to achieve this: select a random sample of radiographs and rate according to Table 1.