Radiograph Protection - Legislation IRR(99) and IR(ME)R 2000 (Core Subject)

Aims: This article aims to outline the legislation relating to ionising radiation in dental practice and record keeping and training.

Objectives: On completion of this verifiable CPD article the participant will be able to demonstrate, through completion of a questionnaire, the ability to:

- Be able to explain some of the requirements of the IRR99 regulations
- Be able to explain some of the requirements of the Ionising Radiation Regulations 2000 (IR(ME)R)
- Demonstrate knowledge of some of the required documents in the radiation protection file
- Demonstrate knowledge of the training required for dental radiography
- Pass a multiple choice questionnaire, scoring higher than 70%

Introduction

Dental radiography can be considered to be one of the dental clinicians' most important diagnostic aids. However, radiography does come with a significant number of responsibilities to protect the patient, general public and workers. There are two sets of regulations in the UK governing the use of ionising radiation. Firstly, the Ionising Radiation Regulations 1999 (IRR99) which are enforced by the health and safety executive and are primarily concerned with the radiographic equipment, the workers and the public. Secondly, the Ionising Radiation (Medical Exposure) Regulations 2000 (IR(ME)R2000) which are governed by the Care Quality Commission and are primarily concerned with the protection of the patient. Both the IRR(99) and IR(ME)R 2000 place clear, but different responsibilities on the legal person to establish and maintain QA programmes in respect of dental radiography. These documents both form part of the Health and Safety at Work Act 1974.

Digital Radiography

Digital radiography is now a common technique which is used in dentistry. It is a reliable and versatile technology that expands the diagnostic and image-sharing possibilities of radiography in dentistry.

Even if a dental practice is only using digital images the conventional x-ray equipment is still used (x-ray tube) and this means that the same regulations still apply. A dental practice that is only using digital radiography
still needs to adhere to the Ionising Radiation Regulations 1999 (IRR99) and the Ionising Radiation Regulations 2000 (IR(ME)R).

When a digital system is introduced to a dental practice the necessary computer hardware and software needs to be installed and staff need to undergo appropriate training in the use of the software and computer maintenance of the images. When adopting this system, risk assessment and auditing should still be completed by the dental practice.

1) Ionising Radiation Regulations 1999

These regulations primarily protect the dental team. However, they also include references to the equipment and aspects of patient protection. Some of the essential legal requirements of IRR99 are outlined below:

- The Health and Safety Executive must be notified of the routine use of dental x-ray equipment and any change of practice ownership or premises
- The installer is responsible for a critical examination and report of all new or significantly modified dental equipment
- All equipment must be routinely tested as part of the quality assurance programme
- A risk assessment must be undertaken before work commences and this must be subject to a regular review
- A Radiation Protection Advisor (RPA) must be appointed. This is an individual who is able to advise on how to comply successfully with the legislation
- A Radiation Protection Supervisor should be appointed. This differs from the RPA in that it may be a member of the dental team
- The international commission on radiological protection cover all aspects of radiological protection. The recommended system of dose limitation is summarised into three basic components. That is that there should be:
  - Justification of practice.
  - Optimisation of radiation protection.
  - Dose limits for individuals at work and for members of the public.

The primary concern is to keep exposures at the lowest practicable level. In English law this is known by the acronym ALARP which is keeping exposures:

As
Low
As
Reasonably Practicable

This requirement is specifically included in the Ionising Radiations Regulations 1999 and employers deemed not to be keeping exposures as low as they reasonably can, could be at risk of prosecution.

- Information, instruction and training needs to be provided as appropriate, and records need to be kept. Practices should have a radiation protection file

- The legal person and employee must:
  - not knowingly expose themselves or any other person to x-rays to an extent greater than is reasonably necessary for the purposes of their work
  - exercise reasonable care when working on any aspect of dental radiology
  - Immediately report to the legal person whenever they have reasonable cause to believe that an incident or accident has occurred with the x-ray equipment and they or some other person have received an overexposure.

- All practices should have a set of Local Rules. Information should include:
  - the name of the RPS
  - identification and description of the controlled area
  - summary of working instructions including names of staff qualified to use the x-ray equipment and details of their training as well as instructions on the use of equipment
  - contingency arrangements in the event of an equipment malfunction and/or accidental exposure to radiation
  - the name of the person with legal responsibility of compliance with the regulations
  - the name and contact details of the RPA
  - details and results of dose-investigation levels (a dose constraint of no higher than 1 mSv per year is recommended for practice staff)
  - arrangements for pregnant staff
  - a reminder to employees of their legal responsibilities under IRR99
2) The Ionising Radiation (Medical Exposure) Regulations 2000 (amended in 2006 and 2011)\textsuperscript{5}

The Ionising Radiation (Medical Exposure) Regulations 2000 (IRMER) concern the protection of the patient.

The regulations require that radiographs are reproduced at optimum quality and with minimum exposure to the patient and that every exposure is justified.

Practices should keep an inventory of each item of equipment and the maintenance history. Clinical audits must be carried out and these topics can include the various aspects of the quality assurance programme. Such topics may include:

- image quality
- patient dose
- darkroom, films and processing
- training

IR(ME)R 2000 define positions of responsibility. These are:

- The employer
- The referrer- The registered dental professional entitled to refer a patient to a practitioner for a medical exposure
- The practitioner- No exposure can take place unless it is justified by the IRMER practitioner.\textsuperscript{4} For an exposure to be justified the benefit to the patient from the diagnostic information should outweigh the detriment of the exposure. The 2013 Selection Criteria in Dental Radiography states that there is no justification for routine radiographs to be taken on new patients.\textsuperscript{3}
- The operator who is the person conducting any practical aspect of a medical exposure (for example processing the films or reading phosphor plates.)

A Closer Look at Justification

Although the exposure to ionising radiation in dental radiography is small compared to medical radiography, any X-ray exposure entails a risk to the patient. Therefore, it is essential that any X-ray examination should show a net benefit to the patient, weighing the total potential diagnostic benefits it produces against the individual detriment that the exposure might cause.
An IRMER practitioner is the person who takes responsibility for an individual’s medical exposure. This would be the dentist or DCP that is qualified to take a dental radiograph. “No exposure can take place unless it is justified by the IRMER practitioner.” For an exposure to be justified the benefit to the patient from the diagnostic information should outweigh the detriment of the exposure.

When justifying an exposure the IRMER practitioner should take into account many factors such as:

- “The specific objectives and the characteristics of the individual involved.
- The total potential diagnostic benefit to the patient.
- The individual detriment that the exposure may cause.
- Alternative available techniques.
- The information supplied by the referrer, including information available from previous radiographs.”

Therefore, the efficacy, benefits and risk of available alternative techniques having the same objective but involving no or less exposure to X-rays should be taken into account. The anticipated benefits are that the X-ray examination would add new information to aid the patient’s management. This indicates that dental radiography should not be performed routinely, but should be prescribed according to the individual patient's clinical examination.

Each dental radiograph should be clearly justified in the patient's clinical records and the findings clearly noted.

**Record Keeping**

Every radiation employer should, in respect of any controlled area or, any supervised area, make and set down in writing local rules that are appropriate to the radiation risk and the nature of the operations carried out in that area (this means each surgery that contains x-ray equipment must have its own set of local rules). The radiation employer should ensure that the local rules are brought to the attention of those employees and other persons who may be affected by them and should appoint one or more suitable radiation protection supervisors for the purpose of securing compliance with these rules and the local rules should contain the names of the individuals appointed.
It is important to maintain a radiation file that is comprehensive and contains access to:

- A practice declaration that it complies with the IRR99 Regulations;
- An inventory of all x-ray equipment (including assessment reports/maintenance reports);
- Details of all processing equipment and chemicals;
- Details of risk assessments carried out;
- Local rules for each controlled area;
- Details of how patient safety is maintained;
- Details of quality assurance- This includes evaluation of image quality, processing procedures, handling of chemicals, maintenance of processor equipment, justification and reporting of radiographs;
- X-ray audits carried out. (These should be carried out in a time period not exceeding 12 months. Any part of the quality assurance programme may be audited); and,
- A record of all staff involved in radiography at the practice and details of training each person has taken part in. This does not just refer to the clinician taking the radiograph but also to all staff involved in any aspect of the procedure. This includes the developing and storing of radiographs and related equipment and chemicals used in dental radiography. Every employer should also ensure that employees who are engaged in work with ionising radiation are given appropriate training in the field of radiation protection and receive such information and instruction as is suitable and sufficient for them to know -
  ✓ the risks to health created by exposure to ionising radiation;
  ✓ the precautions which should be taken; and
  ✓ the importance of complying with the medical, technical and administrative requirements of the IRR99 regulations.¹
Dental hygienists, dental therapists, clinical dental technicians and dental nurses who are IR(ME)R Practitioners and operate x-ray machines must have received adequate training in accordance with the relevant regulations. The National Radiological Protection Board describes an adequately trained DCP as one who “possesses a Certificate in Dental Radiography conforming to the syllabus prescribed by the College of Radiographers”\(^7\) Following qualification, the National Radiological Protection Board state that those who operate x-ray machines are recommended to attend a continuing education and training course every five years to comply with The Ionising Radiation (Medical Exposure) Regulations 2000. Appropriate courses would be expected to cover:

- the principles of radiation physics;
- risks of ionising radiation;
- radiation doses in dental radiography;
- factors affecting dose in dental radiography;
- the principles of radiation protection;
- statutory requirements; and,
- quality assurance.\(^4\)

DCPs whose duties include other duties in relation to radiography, such as film processing, clinical evaluating of radiographs and quality assurance must have received adequate and documented training, specific to the tasks they undertake, and this training may be provided ‘in house.’ In addition, the General Dental Council advise that DCPs should undertake five hours of verifiable CPD in Dental Radiography and Radiation Protection in each five year CPD cycle.

The Guidance Notes for Dental Practitioners on Safe Use of X-ray Equipment state that “Dental nurses who ‘press the exposure button’ as part of a patient exposure that has been physically set up by an adequately trained operator, may only do so in the continued presence, and under the direct supervision, of that operator. They must have received documented instruction appropriate to this task.”\(^4\)
Non-Verifiable CPD Tips

We recommend that you carry out non verifiable CPD related to this subject. The following documents are available to you from the non verifiable CPD section of the website:

- The Ionising Radiation Regulations 1999 (IRR99)
- The Ionising Radiation (Medical Exposure) Regulations 2000 (IRMER)

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References

1. Ionising Radiation Regulations (1999) Available at:

2. Ionising Radiation (Medical Exposure) Regulations (2000) Available at:

3. FGDP UK (2013) Selection criteria for dental radiography 3rd edn. Faculty of General Dental Practice


5. Ionising Radiation (Medical Exposure) Regulations (2000) Available at:
