

Radiography and responsibility

Barbara Lamb outlines the importance of the dental nurse as part of the IRMER team.

My name is Barbara Lamb and I am a Specialist Radiographer, that is, a whole body radiographer who has specialised in the head and neck area.

I have worked in the dental field for the past 35 years in practice, hospital and community settings and have also been involved in research. As time went on I became more involved in teaching undergraduate and postgraduate dentists, pre-certificate dental nurses, dental hygienists, dental hygiene/therapists and radiography students.

A few years ago I decided to become self-employed to concentrate on teaching. I now work throughout Britain and Northern Ireland giving courses to all members of the dental team.

IRMER

In 2000, new regulations, the Ionising Radiation (Medical Exposure) Regulations came into force. Often known as IRMER, it is an overall umbrella under which the team works to ensure that X-ray films are taken to the highest standards with the lowest possible exposure that gives a good diagnostic image. Dental nurses are an important part of that IRMER team. Not only are they often the first person to be in contact with the patient, ensuring that patient details are in order and previous radiographs are on hand to view, but they are very involved with the documentation of the radiographs that are taken, for example the number of films taken and their exposure factors, processing or scanning of films and setting up of film holders.

IRMER regulations are primarily concerned with the safety of the patient. They came into force on 13 May 2000 and replaced the Ionising Radiation (protection of persons undergoing medical examination or treatment) Regulations 1988 ie IRR88.

In every dental practice, hospital and salaried dental service there will be a large folder called the Radiation Protection File. This file will have a great deal of information that relates particularly to your workplace when taking X-rays. All dental care professionals (DCPs) should be aware of the contents of the file and have a look at the information that it contains. In it will be found the duties of employers; examples are:

1. Written procedures

- Procedures to identify patients
- Identification of the persons mentioned below ie referrers, practitioners and operators
- Authorisation and justification of conventional exposures
- Justification of medico-legal exposures
- Identification of pregnant patients
- Compliance with quality assurance programmes
- Assessment of patient doses
- Use of diagnostic levels ie range of acceptable exposures to particular areas
- Carrying out and recording clinical evaluation
- Reducing probability and magnitude of accidental and unintended dose to patients
- Provision for clinical audits
- Written protocols and exposure settings
- Procedures for accidental overexposure (not machine malfunction).

Some of these will be areas that the DCP is involved in to a greater or lesser degree.

There are also new positions of responsibility within the IRMER team.

2. Employer, Referrer, Practitioner and Operator

Let's take a closer look at who is who.

2a. The Employer can be a number of different people

The Employer in the team is often also called the Legal Person. The Employer can be a corporate body or a senior member of staff. They are often appointed as the **Radiation Protection Supervisor (RPS)**. The RPS is, in effect, your X-ray line manager. Their responsibilities include providing referral criteria and establishing protocols for patients and operators. It is their responsibility to ensure that all the people working in the team are qualified to do so, are trained and have ongoing continuing professional development (CPD).

Workers have dose limits but the patient does not. Every film taken on the patient is taken for a reason that will either change the patient's future prognosis or management. If this is not the case the film is not justified and should not be taken until more information is gathered and justification is fulfilled. There is evidence to suggest that the younger the patient the higher chance there is of contracting a radiation-induced malignancy; it is therefore essential to remember that:

- The lower the age, the higher the risk
- We must have justification for every film
- We must all dose limit to the patient for every exposure and this is achieved by good technique, high quality assurance and correct selection criteria.

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Doses for dental radiography are very low in relation to other parts of the body, but it should be remembered that all doses are cumulative; they all add up. We are all exposed to an amount of radiation every day of our lives.

It comes from the ground and out of the atmosphere and is called natural background radiation. Our doses for medical and dental radiography are manmade and add on to what we already get from background radiation.

Background radiation is measured in Sieverts. One year of background radiation would be approximately 2.7 millisieverts. When we take intraoral radiographs the dose would be measured in a small number of microsieverts which are one thousandth of a millisievert.

The dose limits are:

- Non-classified workers (most dental staff) - 6 millisieverts
- General public - 1 millisievert
- Foetus of a pregnant member of staff - 1 millisievert in a nine month period.

It would be most unusual, if local rules are observed, to find dental staff receiving an annual effective dose that came close to the dose limits. The effective dose is calculated for any X-ray technique by measuring the energy absorption in a number of key organs in the body so that the final figure is a representation of whole body detriment.

The decision was therefore made to introduce a measure called a dose constraint. This represents a dose that should not be exceeded if local rules are being followed. If a member of staff received a dose that was close to dose constraint level, investigations would be undertaken to determine how this happened and to ensure it did not occur again. At this point another member of the IRMER team could be asked for their advice. This member of the IRMER team is not usually somebody you would meet on a day-to-day basis; they are usually medical physics experts that can be called upon to advise the IRMER teams which they oversee and are called **Radiation Protection Advisers (RPAs)**. Every practice must have an RPA and the RPS would be able to contact them for advice. It is recommended that the contact details of the RPA are included in the local rules which can be found in the radiation protection file.

Dose constraints are:

- Employees directly involved with the radiography within the practice - 1 millisievert
- Employees not directly involved with the radiography and for members of the general public - 0.3 millisievert
- Foetus of a pregnant member of staff - 1 millisievert in a nine-month period.

2b. The Referrer can be:

- A general dental practitioner (GDP) referring to another GDP or a radiographically qualified member of staff such as a suitably trained DCP
- A GDP referring to a hospital, clinic or X-ray department
- A GDP referring to him or herself.

There must have been a history and clinical examination taken prior to the referral and any previous radiographs that are relevant to the examination should accompany the patient. Diagnostic information should be entered in writing. Radiographs should normally provide new information to aid management and prognosis; one exception to this would be radiographs taken for medico-legal reasons. In this situation the patient should be informed of the situation before the radiograph is taken and their consent in writing could be obtained. These examinations should be critically examined when assessing whether they are justified and it is recommended that they should only be requested by doctors and dentists.

On the referral form there should be spaces to indicate the view(s) requested, the clinical reasons for the request, particular areas of interest to be included on the film and any relevant medical history. If a computerised system is being used the signature can be electronic. If a computerised system is not in use the request should be signed.

2c. The IRMER practitioner

The IRMER practitioner is the person who justifies the

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radiograph according to written procedures. The important word here is ‘justifies’. This is the person who takes **legal responsibility** for the radiograph that is to be taken. They must have all the clinical information to ‘authorise’ the request, and the request must be signed. If the practitioner asks a radiographically qualified member of staff to take the radiograph they can delegate the task but they cannot delegate the responsibility. The IRMER practitioner takes responsibility for the exposure. The practitioner relies on clinical information provided by the referrer which must be on the request form and should be signed by the referrer and the practitioner.

The IRMER practitioner can be:

- Another dentist
- A radiologist
- A radiographer with additional training (a specialist radiographer).

Every exposure should be justified on the grounds of the availability and/or findings of previous radiographs. The specific objectives of the exposure in relation to the history and the radiograph requested should be considered. The total potential diagnostic benefit to the patient and the radiation risk associated with the examination should be taken into account.

The benefits should outweigh the risks.

2d. The Operator

The operator can be any person who carries out any practical aspects of taking and processing

radiographs. They must be properly trained and understand their responsibilities in relation to IRMER.

The operator should have another member of the IRMER team that they can delegate their responsibilities to when they are not in the practice or the hospital workplace. The quality of the film cannot be allowed to deteriorate due to external pressures which can impact on the IRMER team. The exposure factors ie the Kv, ma, and time are shown for each area either on an exposure chart for your X-ray machine or on the anatomical display beside the exposure buttons. The only time that the exposure may be changed from the set exposure factors is if the state of the patient’s dentition, or the reason for the radiograph being taken, warrants it, for example assessment of caries, other pathology or bone levels. There can be no exposure change to the patient due to the state of the processing chemicals or, in the case of digital imaging, sensor deterioration. Both of these must be kept at a constant high quality which should be checked and assured on a daily basis.

Responsibilities of the operator in relation to practical aspects should include:

- Patient’s identification (do not tell them who they are ... ask them!)
- Preparation of film holders and setting of exposure parameters
- With sufficient training, initiation of the exposure
- Processing films and the evaluation of the results from a quality assurance view point
- Radiographically qualified operators will be expected to give the clinical evaluation of radiographs
- Exposure and grading of test object films as part of the quality assurance programme.

Although this article may be an overview showing the importance of the dental nurse in the IRMER team, I hope that it gives you a little of the background and will encourage you to look for more information.

Recommended reading

- Whaites E. *Radiography and radiology for dental care professionals*, 3rd ed. Churchill Livingstone, 2013.
- Health Protection Agency. *Guidance Notes For Dental Practitioners On The Safe Use Of X-Ray Equipment*. Available at: <https://www.gov.uk/government/publications/dental-practitioners-safe-use-of-x-ray-equipment>

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