Radiation regulations in *your* practice

Priya Sharma¹ provides a comprehensive update on dental radiation.

Author information

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Introduction

Dental radiographs are a valuable diagnostic aid in the clinical management of oral health. Generally, it can be said that under normal circumstances radiation doses in the dental practice environment are relatively low. However, x-rays use ionising radiation and as such carry the potential risk of harm. In turn it is imperative that the dental team keeps this risk as low as reasonably possible.

There are various standards and legislation that dental professionals and practices must comply with and adhere to. This article will highlight all the various regulatory requirements and good practice advice that must be incorporated into practice.

General Dental Council (GDC)

The GDC's *Standards for the dental team* clearly states the following:

'1.5 You must find out about the laws and regulations which apply to your clinical practice, your premises and your obligations as an employer and you must follow them at all times. This will include (but is not limited to) legislation relating to...
- radiography...'

Therefore, you are required to comply with all relevant legislation.

Care Quality Commission (CQC)

Radiation falls into CQC's key line of enquiry (KLOE) of safety, that is: 'How do

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systems, processes and practices keep people safe and safeguard them from abuse?’. It is imperative that there is full compliance and all documentation is retained by the dental practice in the practice’s radiation file.

Legal person

The legal person is routinely the practice owner who has full responsibility for ensuring all regulation and legislation is being complied with.

Registration with the Health Safety Executive (HSE)

All dental practices should have registered with the HSE in January 2018. This is the responsibility of the legal person. Only a single registration is required for multiple practices. Once registered the certificates should be included in your dental practice files.

Ionising Radiation (Medical Exposure) Regulations 2017 (IR[ME]R2017)

The IR[ME]R2017 are regulations that protect the patient from the risk of harm when being exposed to radiation. It is imperative to reduce any unintended, excessive or incorrect exposure to radiation. Justification must be carried out for each x-ray to ensure they are in the patient’s best interest and benefits outweigh any risks. This replaced the IR[ME]R2000 and all associated amendments from 2006 and 2011.

Ionising Radiations Regulations 2017 (IRR2017)

The IRR2017 relate to the protection of all staff and the public. This regulation came into force on 1 January 2018 and supersedes IRR99.

what to do in the event of an accidental radiation exposure, when to seek advice and so on. The RPS will also ensure safe working arrangements as set out in the Local Rules. They often are directly involved in formulating practice policy and procedures, Local Rules, risk assessments and audits. The RPS will be involved in staff inductions and training. They are the dental team’s first point of contact for any ionising radiation queries. It is important to note that it is not mandatory to have an RPS (or RPSs) onsite at all times but you must have a sufficient number to make sure that all radiation work is adequately supervised.

Radiation Protection Adviser (RPA) and Medical Physics Expert (MPE)

Both the old and new regulations require that dental practices have access to an RPA. However, the new regulations require that practices have an MPE. This may be the same person as the RPA. They can, and usually are, an externally appointed person or organisation that the dental practice will have access to. This needs to be well documented in the practice’s radiation policy and procedures with all dental staff having the appropriate contact details.

Local Rules

All practices must have a set of written Local Rules which outline the protocols relating to radiation protection specific to a particular x-ray machine. This will allow all employees to adhere to all relevant legislation and involves a more bespoke practical application of legislation. Relevant details are outlined in this that highlight detailed working arrangements around the equipment. The Local Rules are basic steps to demonstrate compliance with radiation regulations.

Regulation 18 of IRR2017 states the following:

(1) *For the purposes of enabling work with ionising radiation to be carried on in accordance with the requirements of these Regulations, every employer engaged in work with ionising radiation must, in respect of any controlled area or, where appropriate having regard to the nature of the work carried out there, any supervised area, make and set down in writing such local rules as are appropriate to the radiation risk and the nature of the operations undertaken in that area.*

(2) *Local rules must identify the main working instructions intended to restrict any exposure in that controlled or supervised area.*

Radiation Protection Supervisor (RPS)

At least one RPS must be appointed by the employer. The RPS should be suitably trained and they will be responsible for ensuring ionising radiation is being used safely in the dental practice and the practice is compliant.

They must be fully aware of the risks associated in the exposure to ionising radiation, all preventive measures that can be taken to restrict exposure to radiation,

According to IRR2017 essential content for the Local Rules are as follows:

- Name of the appointed RPS(s)
- Identification and description of the area covered
- The dose investigation level
- Summary of the working instructions
- Identification of any contingency arrangements in light of any foreseeable accidents.

You can tailor your Local Rules as required, further optional content is as follows:

- The name of the legal person
- Contact details of the RPA
- Testing and maintenance of engineering controls and design features, safety features and warning devices
- Examination and testing of radiation monitoring equipment
- Radiation and contamination monitoring
- A programme for reviewing whether doses are being kept as low as reasonably practicable and local rules remain effective
- Personal dosimetry
- Details of significant findings of risk assessment and where it can be found
- Arrangements for pregnant and breastfeeding dental practice members
- Details of the management and supervision of the work
- Procedures for ensuring staff have received sufficient information, instruction and training
- Procedures for initiating investigations.

It is important to create Local Rules that are personalised, targeted and relevant. They are 'local' because they are specific to your particular x-ray machine and the surrounding working area around the x-ray machine. It is important to review the Local Rules regularly to ensure they remain relevant to the specific 'location'. Keep them brief and point the reader to the full details found in the Radiation Protection File.

Controlled area

The controlled area is 1.5 metres around the x-ray tube, patient and within the primary x-ray beam. When x-rays are being taken only the patient should be present in the controlled area. All other people should be at least 2 metres from the x-ray tube and the patient.

Risk assessment

According to IRR2017 *'An employer, before commencing a new activity involving work with ionising radiation in respect of which no risk assessment has been made by that employer, must make a suitable and sufficient*

assessment of the risk to any employee and other person for the purpose of identifying the measures the employer needs to take to restrict the exposure of that employee or other person to ionising radiation'.

Essentially this must address all potential hazards whilst working with ionising radiation. The nature and extent of the risks to the dental team and patients arising from these potential hazards must be evaluated. The risk assessment must be revisited if there has been a notable change in the actual work activity. If no significant change has occurred, it is imperative to still review the risk assessment regularly to ensure that it remains relevant.

to justify each individual exposure. This is an analysis where the benefits of exposure to radiation must outweigh the risks. This exercise has numerous dimensions which the clinician should consider, such as: the availability and findings of previous radiographs, what they would like to ascertain post-exposure, will it have a diagnostic value to the treatment and management of a patient's oral health, what are the risks involved and if there are other diagnostic tools available that will have the same clinical objective? Although the risk *versus* benefit analysis is a basic tenet of dentistry, the IR(ME)R2017 expects clinicians to rigorously consider the potential harm of each individual radiation exposure, albeit low, in dentistry.

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Dose investigation

Generally, the dose of exposure to radiation is quite low in dentistry. Dosimeters should be worn if a weekly radiation workload exceeds 100 intra-oral or 50 panoramic x-rays. The majority of dental professionals are probably not being exposed to this level and hence no monitoring is required.

Patient protection

The employer and/or practice owner must have comprehensive written policies and procedures addressing patient safety. According to the Guidance by the Department of Health & Social Care, IR(ME)R2017 *'...addresses the radiation protection of persons undergoing medical exposures whether as part of their own medical diagnosis or treatment, as part of research, as asymptomatic individuals, as those undergoing non-medical imaging using medical radiological equipment or as carers and comforters of persons undergoing medical exposures'*. This involves adequate training of all dental professionals involved in radiation.

Justification of individual exposures

It is the responsibility of the practitioner

The Regulations also demand that the authorisation of the exposure is recorded in the patient's record.

Optimisation

The principle of optimisation is to ensure that every dental x-ray exposes the patient to the lowest dose as reasonably practicable whilst consistent with the intended purpose. The majority of this lies in the professional competence and skill of the clinician.

Pregnant patients

Female patients will be asked if they are/may be pregnant. If the possibility of pregnancy is ruled out by the patient then the dental professional can carry out a radiographic examination. If the patient is or may be pregnant then the x-rays may be delayed until after delivery.

Estimates of population dose

According to IR(ME)R2017 the employer must collect dose estimates from medical exposures factoring in the age and gender of patients. These should be carried out every three years. The dental practice will need to retain these records.

'It is best to minimise all unintended exposure to radiation.'

Regular validation of equipment, risk assessments and audits will aid in the prevention.'

Accidental or unintended dose to patients

Although the Regulations do not clearly define a significant unintended exposure, it is considered mandatory under the duty of candour to comply with being transparent. Dental professionals should inform the patient of any unintended exposure to radiation. An investigation should be carried out by the employer including the exact nature of what happened, identifying any contributory factors, estimating the dose involved and any remedial action required. This must be reported to the RPS and the advice of the RPA sought.

It is best to minimise all unintended exposure to radiation. Regular validation of equipment, risk assessments and audits will aid in the prevention. It is advisable to switch off the mains supply once the x-rays have been taken, follow manufacturer's instructions at all times and be vigilant to prevent unintended dose to patients.

Clinical evaluation of radiographs

Every radiograph should be evaluated and recorded by the clinician; this may include findings on the patient's oral health management, prognosis and so forth. There should be sufficient information for a general audit later.

Quality assurance

Routine quality assurance should be carried out from a fair sample of radiographs which in turn will reveal consistent adequate diagnostic information while keeping the radiation dose as low as reasonably practicable.

A simple rating is allocated to radiographs based on the image quality where the following apply:

- Rating 1 – Excellent – No errors are noted
- Rating 2 – Diagnostically acceptable –

Some errors of patient preparation, exposure, positioning, processing or film handling however there is still a diagnostic value to the x-ray

Rating 3 – Unacceptable – Numerous errors and the radiograph is diagnostically unacceptable.

The following targets should be met: at least 70% must be rated 1, less than 20% will hold a rating of 2 and less than 10% should have a rating of 3.

The quality assurance should be kept along with any analysis and remediation proposed where targets are not being met. This analysis should help improve radiography.

Clinical audits

Dental practices must carry out an annual clinical audit as appropriate. This audit will ensure robust quality assurance.

Conclusion

It is of utmost importance to keep up with all regulation in order to ensure you are practising at safe and optimal standards. This year there will be the second edition of *Guidance Notes for Dental Practitioners on the Safe Use of X-ray Equipment* which will have practical applications of relevant radiation protection legislation. Watch this space.

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