A DENTAL NURSE’S PERSPECTIVE OF RADIOGRAPHY IN PRACTICE: THINGS TO CONSIDER

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Introduction
As a dental nurse, you may not have chosen to take radiography as an extended duty. Dental nurses are required to take a registered course and exam before being able to do this, but even without extending your duties in this area, you still have an important role in patient protection, quality assurance, equipment maintenance and ensuring CQC compliance. This article aims to provide an overview of the tasks that a registered dental nurse should consider in their day to day work within the clinical environment.

The GDC states that, as a dental professional, you are responsible for the following:
1. Putting patients’ interests first and acting to protect them
2. Respecting patients’ dignity and choices
3. Protecting the confidentiality of patients’ information
4. Cooperating with other members of the dental team and other healthcare colleagues in the interests of patients
5. Maintaining your professional knowledge and competence
6. Being trustworthy

Patient protection is paramount
The most effective way to reduce the amount of radiation that any patient is exposed to is to avoid taking unnecessary radiographs. We can see that not all patients require routine x-rays as part of a clinical examination. We can also understand that the radiation dose that each individual is exposed to should be optimised to be as low as is reasonably achievable (practicable) (ALARA/ALARP) while maintaining the quality of the image. A dental nurse can support this by ensuring accurate, full record-keeping and documentation. This does not mean that the dental nurse has ultimate responsibility for accurately recording and justifying the use of radiographs, as this lies with the clinician carrying out the treatment; rather, it means that there is a vital supporting role in terms of ensuring that the necessary information has been documented.

Protective clothing
It is generally accepted that, due to developments in x-ray equipment and updated procedures, a lead apron is no longer routinely required. However, there are times when it is helpful to provide protective clothing, so it is advisable that a lead apron is available in the practice.

Examples of these times are:
• When there is a carer present.
person should be shielded and asked to stand so that their body area is out of the main beam

- When the patient requests it. If a patient is anxious about radiation levels and requests an apron we should supply it. It is not relaxing or a good use of time to argue the evidence for not using it. Much better to reassure the patient that you respect their concerns and are willing to help.

- When taking a vertex occlusal radiograph. This is essential if the patient is pregnant. The FGDP(UK) standards publication, Selection Criteria for Dental Radiography, advises that “where (vertical occlusal radiographs) may happen, it is an official guideline to use abdominal lead protection when a fetus lies in the primary beam.” However, it goes on to state that:

“…evidence indicates fetal dose from scattered radiation during dental radiography of a pregnant woman approach an immeasurably low level; consequently, normal selection criteria for dental radiography do not need to be influenced by the possibility of a female patient being at any stage of pregnancy.”

However, the same logic stated above applies here. It is not a good use of time or a pleasant experience for an anxious patient to argue the evidence for proceeding with radiographs unless absolutely necessary. The general consensus is that radiographs should not be taken unless unavoidable during pregnancy.

**Equipment maintenance**

It is also very important that a routine quality control procedure for testing equipment is established within the practice, to compliment the formal acceptance testing from local authorities. The International Atomic Energy Agency (IAEA) suggests that professional societies, in collaboration with national authorities, will often recommend that users make regular image quality performance checks on x-ray equipment (and viewing screens where relevant). This is particularly important for dental cone-beam CT systems and panoramic equipment. The FGDP(UK) standards publication, Selection Criteria for Dental Radiography, advises that the practice should “ensure that processing conditions are satisfactory before processing a film”, and “ensure regular quality assurance in processing”. To enable users to do this, manufacturers should provide details of the test procedures and the expected results in the equipment’s instruction manual. Any test objects or phantoms that are necessary for these tests and specific to individual equipment models or manufacturers should be provided with the equipment as standard. Making sure these tests and guidelines are adhered to will often fall to qualified and competent dental nurses in the practice.

The IAEA’s guidance on Radiation Protection of Patients (RPOP) goes on to say that dose reduction through equipment should be of the highest standard:

“For intraoral equipment:

- Rectangular collimation which approximates the size and shape of the receptor reduces dose significantly in comparison to circular collimation; a dose reduction exceeding 60% can be achieved in dental radiology by using rectangular collimation.
- The fastest available film consistent with achieving satisfactory diagnostic results should be used. E-speed and F-speed films reduce dose by more than 50% compared with D-speed films.
- Digital detectors have the potential for further dose reduction, even compared with F-speed film, provided the repeat rate and use of higher exposure factors than necessary are controlled.
- Using tube voltage in the range 60 to 70 kV

- The x-ray tube filtration should be sufficient to reduce entrance skin dose to the patient consistent with producing satisfactory image quality.
- A position indication device which ensures a minimum focus-to-skin distance of 20 cm should be attached to the tube head (eg. by use of a long collimator/cone as opposed to a short conical one)
- Exposure settings used should be the minimum consistent with the speed of the imaging system used. Advice on exposure settings should be provided in the manual for the x-ray equipment, which should be available in the user’s native language and written in easily understood terminology.
- Where old x-ray equipment is used, it may be possible to take immediate action to achieve a significant reduction in patient dose.
- The Radiation protection supervisor can ensure all these protocols are met.

For panoramic and cephalometric equipment:

- Only the fastest screen-film combinations (at least 400) that are compatible with imaging requirements should be used for panoramic and cephalometric imaging. Note that the intensifying screen and film must be spectrally matched, for example, if the screen emits light in the green region of the spectrum, the film used should be one that is sensitive to green light. Furthermore, the physical condition of screens deteriorates over time and it is important that their condition is monitored and that badly damaged screens are replaced.
- The x-ray beam for cephalometric imaging should be collimated to the area of clinical interest.
- The inclusion of wedge filters in cephalometric equipment reduces exposure to the soft-tissue facial profile and allows optimal imaging, while the provision of asymmetric collimation allows the exposed area to be confined to the area.
of clinical interest

- Modern panoramic systems also allow the field to be limited to the area of clinical interest, thereby offering a significant potential for dose reduction. If available, limitation of field size to the area required for diagnosis should be used for panoramic radiography
- Where available, paediatric examination modes should always be used for examinations of children. If not available, the exposure factors (such as kV, mA, exposure time) should be suitably adjusted. This may result in a dose saving to the patient of 50% or more”  

Radiation protection supervisor
Another way that dental nurses can be involved in radiography within the practice without having taken radiography as an extended duty is by becoming the practice radiation protection supervisor (RPS). There is an individual at every practice who is legally responsible for all radiography undertaken in the practice. This is usually the practice principle. This person can then appoint one or more radiation protection supervisors (RPSs), who will have the authority to monitor and implement radiation protection policies within the practice. It is essential that RPSs have further training, and this is an appropriate role for both dental nurses and dental hygienists/therapists. You do not have to hold a radiography qualification to be an RPS.

We are all ‘operators’
According to the guidance set out in IR(ME)R 2000, an ‘operator’ is any person who is entitled to carry out all or part of the practical aspects associated with a radiographic examination. Practical aspects include:
1. Patient identification
2. Positioning the film, the patient and the x-ray tube head
3. Setting the exposure parameters
4. Pressing the exposure button to initiate the exposure
5. Processing films
6. Clinical evaluation of radiographs
7. Exposing test objects as part of the quality assurance programme

In fact, any single exposure could involve a number of different operators performing the various functions. Because of the wide range of functions carried out by operators, it is essential that the functions and responsibilities of individual operators are clearly defined by the person who is legally responsible for radiography within the practice. In general dental practice, it will be common for the referrer and IR(ME)R practitioner to be the same person, who may also act as an operator. However, many dental nurses or other DCPs will also perform some of the functions of an operator. All operators must be adequately trained to undertake these functions. It is worth referring to the local policies for your area here, as well as ensuring that you are up to date with guidance relevant to your duties and responsibilities within the practice.

Non-clinical team members such as practice managers and receptionists should not normally undertake the majority of operator’s duties. Some of the more straightforward operator’s duties may be undertaken by non-clinical staff, but these staff must have been appropriately trained for all the tasks they perform and all training must be recorded. It can also be really useful for the practice principal or practice manager to make contact with the external Radiation Protection Advisor for the practice on a regular basis to ensure that up to date advice on radiology and radiation protection is always available.

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REFERENCES
1. GDC. Standards for Dental Professionals. London, UK. GDC; 2009