25 Dental X-ray Equipment

Scope

1. This chapter describes the requirements for keeping and use of dental X-ray equipment.

Statutory Requirements

2. In addition to the general requirements of the Health and Safety at Work etc. Act 1974, and the Management of Health and Safety Regulations 1999, the following specific legislation applies:

a. Ionising Radiations Regulations 2017 (IRR17);

b. Ionising Radiation (Medical Exposures) Regulations 2017 (IRMER17).

Duties

3. Duties as detailed in Chapter 39 apply. In addition, the following duties also apply.

Radiation Protection Supervisor (RPS)

4. The RPS is to ensure that X-ray equipment is correctly used in accordance with local orders for radiation safety (including local rules, instructions and procedures) and reporting procedures for incidents are followed. The RPS does not need to be present all the time X-rays are being used. The RPS is normally the Practice Manager or Senior Dental Officer within the unit and should be appropriately trained for the role. This training should be refreshed at least every five years.

Hazard

5. X-ray sets generate an in-beam exposure hazard. In addition, radiation from X-ray head leakage and scatter from the beam may affect areas around the X-ray head and beam. A dose rate of approximately 5 $mGys^{-1}$ is produced at the end of the collimator of a typical Gendex or Acteon X-mind intraoral set.

Radiation Safety Assessment for New or Refurbished Facilities

6. For new or refurbished dental X-ray facilities the RPA is to be consulted at the design stage to ensure that the design of the facility, including any shielding required, is sufficient to keep doses to personnel as low as reasonably practicable.

Acceptance Testing of New X-ray Equipment

7. Acceptance tests are to be carried out on all newly installed dental X-ray equipment and when an X-ray tube is replaced as advised by the Medical Physics Expert (MPE) to ensure that radiological functions are satisfactory and to specification.

Critical Examination and Design of New X-Ray Facilities

8. A critical examination including an assessment of the adequacy of room shielding is to

be carried out on all new or structurally modified dental X-ray facilities prior to being brought into routine use as advised by the RPA. Guidance on design of dental X-ray facilities is given in References A and B.

Controlled and Supervised Areas

9. General requirements relating to controlled and supervised areas are provided in Chapter 4. For specialist techniques, such as cephalometry, guidance is to be sought from the RPA.

10. An entire dental surgery or X-ray room need not be demarcated as a controlled area where all of the following conditions apply:

a. a single intra-oral dental X-ray equipment is the only equipment operated in the examination room at any one time;

b. the workload does not exceed in any week 100 single X-ray exposures;

c. the equipment is of sound construction and properly maintained;

d. the operator can see any person within the vicinity of the controlled area defined as:

(1) within the primary beam until it has been sufficiently attenuated by distance or by absorption, and

(2) within 2 m of the X-ray tube or the patient's head in any other direction, or unless at a lesser distance, the radiation has been adequately absorbed;

e. the X-ray equipment can be quickly de-energised from the normal operating position.

11. Radiation warning signs incorporating the radiation trefoil warning symbol and wording 'X-rays' are to be posted on entry doors to dental surgeries and dedicated X-ray rooms containing installed X-ray sets, together with the name and contact number of the RPS.

Exposure Protocols

12. Where pre-set exposure times are not programmed into the X-ray controller, written protocols must be in place for each type of standard radiological practice for each piece of equipment. These are to be recorded in the form of an exposure chart and signed and dated by the RPS.

13. A record of the type of exposure or exposure factors used must be made in each patient's notes.

Practitioners, Operators and Referrers

14. Reference C requires that each individual dental exposure is justified by an IRMER Practitioner and any practical aspect, associated with the exposure carried out by an IRMER Operator:

a. requests for a radiological examination are initiated by the Referrer i.e. any registered medical or dental practitioner or other health professional who is entitled to refer individuals for dental exposure to a Practitioner and

b. the dental practitioner is normally the IRMER Practitioner and may simultaneously fulfil the roles of Referrer, Practitioner and Operator.

Training

Employer's Procedures

15. Reference C requires that there are written standard operating procedures for patient protection for medical exposures. The written procedures are to include the matters set out in Schedule 2 to Reference C, where appropriate.

Referral Criteria

16. Employers have a duty to define referral criteria for dental exposures, including radiation doses, to all those acting as referrer. Guidance on referral criteria is given at Reference D.

Quality Assurance and Patient Dose Assessment

17. All units and establishments are to operate a quality assurance (QA) programme for dental X-ray and film processing equipment. The QA programme is to include routine testing carried out by department staff and testing by the RPA every 3 years. Guidance on such testing is given at Reference E.

18. Routine testing comprises a radiographic image quality test prior to radiography or on a daily basis and recording reasons for clinical radiographs assessed as less than perfect. It should also include a routine check of the condition of X-ray and digital imaging equipment.

Protection of Patients

19. Radiation doses to patients are to be as low as reasonably practicable in accordance with the intended purpose:

a. if the patient is an individual of childbearing potential who is or who may be pregnant **and** where the X-ray beam is directed towards the abdomen a protective lead apron may be considered to protect the abdomen; and

b. the patient record is to be annotated to confirm that each exposure has been justified and that evaluation of each radiograph has taken place.

X-ray Equipment Records

20. All units and establishments are to maintain the following records for X-ray equipment:

a. an inventory of equipment including the name of manufacturer, model number, serial number or other unique identifier, year of manufacture and year of installation; and

b. a record of all equipment defects, maintenance and QA tests.

Recording and Reporting of Accidental or Unintended Exposures

21. If a person undergoing a dental X-ray is known to have or is suspected to have received an accidental or unintended exposure the procedure detailed in Chapter 14 must be followed.

References

22. Reference A -Medical and Dental Guidance Notes, Prepared by Institute of Physics and Engineering in Medicine, 2002.

23. Reference B - Guidance Notes for Dental Practitioners on the Safe Use of X-ray Equipment, 2nd Edition, Faculty of General Dental Practice, 2020.

24. Reference C - Ionising Radiation (Medical Exposure) Regulations 2017.

25. Reference D - Selection Criteria for Dental Radiography, Faculty of General Dental Practitioners (UK) Good Practice Guidelines.

26. Reference E - Institute of Physics and Engineering in Medicine (IPEM) Report 91, Recommended Standards for the Routine Performance Testing of Diagnostic X-ray Imaging Systems.