VETERINARY DENTAL RADIOGRAPHY GUIDANCE

Legal requirements

- It is not necessary to notify HSE of an additional X-ray machine.
- A risk assessment is required.
- Installation may depend on pre-authorization by the RPA.
- Local rules must be drawn up appropriate for dental radiography.

Public Health England has published *Guidance on the Safe Use of Hand-held Dental X-ray Equipment* (February 2016). This has some relevance but note that there are fundamental differences with veterinary use.

HSE now require, where practicable, that all warning lights are fail-safe – ie if the bulb fails then the X-ray generator is inoperative. All sites should seek qualified advice as to the practicality of complying. If deemed impractical then defined procedural protocols must be in place to minimize any risk associated with inappropriate entry into a controlled area. Duplicate LED lights would be suitable if a fail-safe option is deemed impracticable.

WALL MOUNTED/MOBILE DENTAL X-RAY

Controlled area

The controlled area exists whenever the X-ray machine is connected to the power supply.

The minimum requirement is for the controlled area to extend 2 metres around any projection of the primary beam, unless interrupted by a suitably attenuating barrier (eg brick/block wall). For practical purposes the 2 metre distance is measured from the edges of the dental treatment table.

The ideal situation is to have a dedicated dental treatment room with solid (non-partition) walls and a single entrance door. The entrance door does not have to be lead lined if the operator can stand just outside the room (at least 2 metres away from the table) and is able to observe any approach. With an entrance door in excess of 2 metres from the table edge the (ungowned) operator can stand inside the room or in the doorway although it is always preferable to stand as far away as is practicable if there is no intervening barrier.

With partition walls less than 2 metres from the dental table it may be necessary to extend the controlled area into an adjacent room (rarely a practical proposition) or to increase the lead equivalence of the barrier. Occasionally a positioning constraint can be introduced to limit the tube head position to be a suitable distance from an insubstantial barrier. On site scatter radiation measurements may indicate a partition wall or glass panel just within a 2 metre boundary may be sufficiently attenuating.

The exposure button must be on a cable of sufficient length to allow the operator to stand outside the controlled area at an appropriate position when an exposure is made. Correct operator position also applies where wireless remote operation is employed.

Dental radiography may be carried out at a dental table in the preparation room. The controlled area definition is as for a dedicated dental treatment room. The operator should always be positioned to observe any approach to the controlled area.

It is preferable to have a fixed, wall mounted dental X-ray machine although a mobile unit is acceptable if wall mounting proves impracticable. Any mobile unit which is not permanently plugged in should have a unique plug/socket combination to prevent connection to an inappropriate circuit - ie not connected to the warning light(s). A T-pin earth connection is suitable.

Warning signs and automatic warning lights

Warning notices and automatic warning lights are required at any entrance to the dental controlled area. This includes any door close to 2 metres from the dental table and any open approach (eg in a prep room). Note the requirement for fail-safe operation of warning lights.

This requirement is at variance with previous advice (BVA Guidance Notes 2014).

Electrical isolation

It must be possible to isolate the X-ray set from a radiation safe position. This is most easily achieved if the control panel is outside the controlled area, adjacent to the operator position. It may be suitable to isolate the power supply at the consumer unit, if this is easily accessible. It is noted that the level of possible exposure from scattered radiation associated with dental radiography is much less than that for main X-ray generators.

Lead sheeting

In order to attenuate the primary beam and to reduce scatter, a sheet of lead or lead rubber (minimum 1.0 mm lead equivalence) should be placed under the patient's head for all exposures. The lead dimension should exceed that of the primary beam.

HAND-HELD DENTAL X-RAY

Hand-held devices may be used although rigorous protocols must be in place defining use only by senior clinicians. Effective security and training must be established. Unit security has to be considered.

Controlled area

The controlled area will extend a minimum of 2 metres to the side or behind the position of the tube head or patient unless interrupted by a solid, attenuating barrier. This distance may exceed 2 metres depending on the angulation of the beam. The area in front of the primary beam is controlled as far as a suitably attenuating barrier.

It is often convenient and practical to define a larger controlled area, for example to reach the boundaries of the dental treatment room.

If the hand-held unit is used for non-dental exposures (eg intraoperative orthopaedics) then the same controlled area constraints apply.

The controlled area will not normally extend beyond the physical boundaries of the enclosing room unless such areas are either inaccessible during radiography or clearly visible to the operator.

Warning signs and lights

Warning notices and warning lights are required at any entrance to the dental controlled area. This includes any door close to 2 metres from the dental table and any open approach (eg in a prep room). Battery-operated warning lights are suitable.

Beam direction/use of PPE

The hand-held device should always be directed to achieve as near a horizontal beam as practicable.
It should be noted that the PHE guidance assumes a horizontal beam is used at all times. The patient is positioned to achieve this. In veterinary use standard projections require some angulation of the beam and this may increase the operator dose.

Published exposure doses to the operator are based on the assumptions that no PPE is worn, the beam is directed horizontally and that the equipment incorporates a back-scatter shield.

It is recommended that the operator wears a lead gown, thyroid protector and lead protective glasses.

Hand-held devices without a back-scatter shield will offer reduced shielding to the hands and lead mittens should be worn. Mittens allow greater manual dexterity but may compromise hand exposure through tube head leakage. If the device incorporates a remote switch this should be held under a lead gown.