

BRITISH SOCIETY OF DENTAL AND MAXILLOFACIAL RADIOLOGY



CORE CURRICULUM IN DENTAL
RADIOGRAPHY AND RADIOLOGY FOR
UNDERGRADUATE DENTAL STUDENTS

2008

INTRODUCTION

A core curriculum in Dental Radiography and Radiology for undergraduate dental students was approved by the Council of the British Society of Dental and Maxillofacial Radiology (BSDMFR) in October 1993. It received wide circulation following circulation as Appendix C of Guidelines for Radiology Standards for Primary Dental Care¹.

Regulation 11 paragraph 1 of The Ionising Radiation (Medical Exposure) Regulations 2000 (IRMER)² states that no **practitioner** or **operator** shall carry out a medical (or dental) exposure or any practical aspect without having been adequately trained. The requirements for adequate training are set out in Schedule 2 of the Regulations. The Schedule states that **practitioners** and **operators** shall have completed training, including theoretical knowledge and practical experience in

- i) Radiation production, radiation protection and statutory obligations relating to ionising radiations, as are relevant to their functions as practitioner or operator; and
- ii) Diagnostic radiology as relevant to their specific area of practice.

The core curriculum is intended to meet the requirement for adequate training in those subjects specified in Schedule 2 of IR(ME)R 2000, which are indicated by an asterisk (*) in the text that follows. Implementation of this core curriculum into the undergraduate dental course will also fulfil the requirements of the second edition of the First Five Years³.

It is 6 years since the first revision of the 'Core Curriculum', and it was felt by BSDMFR council at the April 2008 meeting that there had been sufficient developments to warrant further revision.

THEORETICAL INSTRUCTION

Radiation Physics

Electromagnetic spectrum

Background radiation - natural and man-made

*Production of X-rays

Relationship of energy, frequency and wavelength

*Properties of radiation

*Attenuation of ionising radiation and factors affecting attenuation

*Scattering and absorption

*Biological effects of radiation

*Risks/benefits of radiation

*Dose optimisation

*Dosimetry- absorbed dose, equivalent dose, effective dose and their units

*Factors affecting radiation dose

*Image quality versus radiation dose

Radiation Protection

*General radiation protection including the ICRP principles of radiation protection

*Use of radiation protection devices

- patient

- personal

*Procedures for untoward incidents involving overexposure to ionising radiation

*Pregnancy and potential pregnancy

*Infants and children

*Justification of the individual exposure

*Patient identification and consent

*Use of existing appropriate radiological information

*Alternative techniques

*Clinical evaluation of outcome

*Medico-legal issues

*Regulations

*Local rules and procedures

*Individual responsibilities relating to medical exposures

- *Responsibility for radiation safety
- *Routine inspection and testing of equipment
- *Notification of faults and Health Department hazard warnings
- *Clinical audit

Apparatus and equipment

Basic circuitry of stationary anode, self-rectified and direct current x-ray sets

X-ray tube - cathode, anode, focal spot size and vacuum

Heat production and how it is dispersed

Basic components of the dental x-ray set

Timers

Applied potential (kV), tube current (mA) and exposure setting (mAs) - how change affects x-ray quality and quantity

Films and processing

Film types - direct action and indirect action/screen film

Intensifying screens

Black and white final image production - effect of exposure

Emphasis on processing - chemistry, wet and automatic processing and film faults

Darkroom - design and safelights

Digital imaging

Principles of digital image production

Intra-oral and extra-oral systems using:

- Solid state detectors
- Photostimulable phosphor plates

Digital image faults and Quality Assurance

Data storage and retrieval, and data protection

Radiographic techniques of which an appropriate level of theoretical knowledge is required

Skull views, tomography and contrast radiology, eg sialography, arthrography and angiography

Other modalities, eg Cone Beam CT, conventional CT, MRI, ultrasound and radionuclide scanning

PRACTICAL INSTRUCTION

Practical instruction in this curriculum should be undertaken by students to obtain experience in the radiographic techniques carried out with x-ray equipment normally available to dental practitioners, to a level such that they are able to comply with current legislation.

Principles of imaging

Geometric requirements for image production
Importance of quality of image - effects of distortion
Use and limitation of radiography as a diagnostic aid

Film handling

Storage - protection from heat, damp and radiation
*Conventional film processing
Film fault identification
Filing and retrieval
Information exchange

Digital Imaging

Care of digital imaging receptors
Identification of digital image faults
Image storage and data protection

Techniques

Students should know the *fundamentals of radiological techniques used in dentistry and be able to select and use the correct equipment

Intra-oral techniques (using conventional and digital systems)

Bitewings
Periapical views - paralleling technique and bisected angle technique
Image receptor holders and secondary collimation
Endodontic radiography
Occlusal radiography

Extra-oral techniques (using conventional and digital systems)

Oblique lateral views of the jaws

Panoramic radiography (dental panoramic tomography)

Cephalometry

Quality assurance for conventional and digital imaging systems

*Quality assurance and quality control

The use of the three-point quality rating scale for radiographs⁴

Care of patients

Children

Special care patients

Infection control

Communication of risks to patients

RADIOLOGY

Principles and practice of interpretation

Guidelines on making a radiological differential diagnosis

Reporting on films - methods and conventions

****Fundamentals of radiological anatomy***

Teeth and periodontium

Jaws, facial bones and cranium

Neck

Soft tissue shadows and air spaces

Normal development of teeth and jaws

Pathology

Definition of fundamental terms

Methods of describing radiological lesions

Developmental abnormalities

Disorders of teeth and periodontium

Infective disorders, caries and periapical infection

Cysts of jaws

Tumours and tumour-like lesions of the jaws

Fibro-osseous lesions

Metabolic disorders of significance in dental practice

Trauma including fractures - teeth
- facial bones

Disorders of the temporomandibular joints

Disorders of the salivary glands

Disorders of the paranasal sinuses

Time required

This course could be covered using lectures, practical radiography and seminars. Other teaching styles may also be used such as computer-aided and problem-based learning. The main objective of the course is that upon graduating students should be competent to undertake dental radiography and radiology to a level and standard required for general practice. It is suggested that a total of 80 hours is normally sufficient to cover the course but this is not prescriptive since the number of hours taught is not as important as the quality of the teaching received⁵.

Examination

It is considered essential that this curriculum is formally assessed within the examination structure of the individual dental schools, and that each major area is identifiable. This will ensure that the dental degree certificate is evidence of 'adequate training' as required under IR(ME)R 2000².

Tuition

The implementation of this course is dependent on the appointment to the staff of each dental school/hospital of an adequate number of properly trained dental radiologists, at least one of whom should be a specialist³ and preferably a consultant in view of the service commitments.

REFERENCES

1. National Radiological Protection Board. Guidelines on Radiology Standards for primary dental care Report by the Royal College of Radiologists and the National Radiological Protection Board. Documents of the NRPB 1994:5:No 3.
2. The Ionising Radiation (Medical Examination) Regulations 2000. SI 2000 Number 1059 London: The Stationery Office 2000.
3. General Dental Council. The first Five Years A framework for undergraduate dental education. Second edition London: General Dental Council 2002
4. National Radiological Protection Board/Department of Health. Guidance Notes for Dental Practitioners on the Safe Use of X-ray Equipment. Chilton: NRPB 2001. (http://www.hpa.org.uk/radiation/publications/misc_publications/dental_guidance_notes.pdf)
5. Rohlin M and Hirschmann PN. Designing an undergraduate curriculum in oral radiology is more than hours and content (Editorial). Dentomaxillofacial Radiol 1998; 27:1-2

ACKNOWLEDGEMENT

This document was approved by the Council of the British Society of Dental and Maxillofacial Radiology at its meeting in September 2008. Council wishes to acknowledge warmly the contribution of Mr Nicholas Drage, Consultant Oral and Maxillofacial Radiologist, University Dental Hospital, Cardiff, Mr Paul Nixon, Consultant Oral and Maxillofacial Radiologist, Liverpool University Dental Hospital and Mrs Alison Menhinick, Superintendent Radiographer/Honorary Lecturer, Dundee Dental Hospital & School in the preparation of this document.

Further copies of this document can be obtained from the secretary of BSDMFR.