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 Care\(^1\).

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 Years\(^3\).

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 radiographs*4

**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 received\(^5\).

**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 2000\(^2\).

**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 specialist\(^3\) and preferably a consultant in view of the service commitments.
REFERENCES

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

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