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Revised guidelines for the endodontic education of dentistry students in Australia and New Zealand (FEBRUARY 2021)

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Introduction

The original 'ASE Guidelines for Educational Requirements for Undergraduate Training in Endodontics' were published in 1982 in the October issue (p.11–13) of the *Australian Endodontic Newsletter*. These guidelines were revised by the Australian Society of Endodontology Inc. (ASE) Subcommittee for Endodontic Education in 1991 and published in the *Aust Endod Newsletter* 1991;17(2):10–2. They were further revised in November 2007 during a meeting held in Melbourne of the teachers of Endodontics from all Australian University Dental Schools and distributed to the Universities by the ASE.

The present revision (version 2021) has involved representatives of the ASE Inc. and The New Zealand Society of Endodontics in a process that began in April 2019

Abstract

These revised guidelines for contemporary endodontic education in Australia and New Zealand (version 2021) propose the minimum criteria for the training of dentistry students. The document contains a definition of endodontics and a description of the scope of endodontics. It proposes a general outline for education programmes in endodontics as part of general dental practice.

during the Endodontic Educators meeting held in Adelaide and which was finalised in February 2021. All endodontic discipline leads in the dental schools in Australia and New Zealand have commented and contributed to this document and are in agreement with its content.

Definition of endodontics

Endodontics is defined by the ASE Inc as the branch of dentistry concerned with the morphology and pathology of the pulp–dentine complex and the peri-radicular tissues. The study and practice of endodontics encompass the basic clinical sciences including the biology of the normal pulp, and the aetiology, diagnosis, prevention, and treatment of diseases and injuries to the pulp and associated peri-radicular tissues.

Endodontic education

The ability to diagnose pulp and peri-radicular conditions and to provide appropriate endodontic management is expected of all newly qualified dentists. Hence, education and training in endodontics should enable dentists to provide a high standard of patient care.

The discipline of endodontics is well established in Australia and New Zealand. The contents of the undergraduate endodontic curriculum are extensive, and considering its critical role in the modern practice of dentistry, it should ideally be designated as separate subject status within the dental curriculum.

It is recognised and accepted that educational institutions deliver their didactic and clinical training programmes using different teaching models. The recommendations in this document are presented as Guidelines to assist dental schools and their associated teaching institutions in the planning and delivery of educational programmes in endodontics. The Guidelines contain flexibility and can be adapted to each school's or institution's overall requirements.

Scope of the endodontic curriculum

At the conclusion of their endodontic course, dentistry students should be able to demonstrate *detailed knowledge of*, and *be competent in*, the following:

- Pulp Biology, Anatomy and Microbiology
 - Pulp biology including structure and function of the pulp–dentine complex
 - Reaction of the pulp–dentine complex to caries, dental procedures, tooth wear and traumatic dental injuries
 - Pathogenesis of pulp, root canal and peri-radicular conditions
 - Root and root canal anatomy
 - Microbiology and immunology of endodontic diseases.
- Diagnosis, Treatment Planning and Prognosis
 - Diagnosis of pulp, root canal and peri-radicular conditions, including the differential diagnosis of lesions that mimic endodontic pathosis
 - Differential diagnosis of odontogenic and non-odontogenic pain
 - Diagnosis of tooth resorption
 - Diagnosis and management of cracked and fractured teeth
 - Diagnosis and management of concurrent endodontic and periodontal diseases
 - Radiography, including the indications for cone beam computed tomography (CBCT) in relation to endodontics
 - Endodontic case selection, indications and contra-indications for endodontic treatment, case difficulty assessment and treatment planning

- Evaluation of endodontic treatment outcomes.
 - Endodontic Treatment
 - Materials and instruments used in endodontics
 - The use of magnification in endodontics
 - Emergency treatment procedures – including the relief of pain and management of endodontic infections
 - Conservative pulp therapy – including dentine desensitisation and protection, direct pulp capping, indirect pulp capping, partial pulpotomy, pulpotomy and partial pulpectomy
 - Pulpectomy and related clinical procedures – including:
 - Instrumentation of root canals
 - Irrigation and medication of root canals
 - Root filling techniques
 - Interim and temporary restorations used during endodontic treatment.
 - Treatment of pulpless teeth, with or without periapical pathosis
 - Bleaching of endodontically treated teeth
 - Restoration of endodontically treated teeth
 - Endodontic management of medically compromised patients
 - Pain control during and following endodontic treatment
 - Endodontic record keeping and legal responsibilities of a dentist.
 - Dentoalveolar Trauma
 - The immediate assessment and management of traumatic dentoalveolar injuries including:
 - Incidence, aetiology, pre-disposing factors and classification of traumatic dentoalveolar injuries
 - Examination of patients following traumatic dentoalveolar injuries
 - Crown, crown/root and root fractures
 - Luxation injuries
 - Tooth avulsion
 - Alveolar bone fractures
 - Soft tissue injuries
 - The medium-term and long-term endodontic management of teeth following dentoalveolar trauma.
- At the conclusion of their endodontic course, dentistry students should have an *understanding* of the following:
- The indications for, and principles of, surgical endodontics
 - Management of teeth with tooth resorption
 - Management of teeth with endodontic procedural errors
 - Endodontic management of teeth with developmental defects
 - The principles of management of non-odontogenic orofacial pain
 - Prevention of dentoalveolar trauma.

At the conclusion of their course, dentistry students should *be aware* of the following:

- The role of the specialist endodontist in patient management
- Specialist referral pathways
- Endodontic re-treatment case selection and procedures
- Endodontic management of immature teeth
- Root extrusion indications and techniques
- The role of the root in preserving alveolar bone.

Pre-clinical and clinical sciences

The need for a high standard of teaching in pre-clinical and clinical sciences is fundamental to the study and clinical practice of Endodontics. The pre-clinical science courses should include all aspects of the following that are relevant to Endodontics:

- Anatomy, physiology and histology of the teeth and peri-radicular tissues
- The immunological responses of these tissues to inflammation and infection
- The mechanisms of pain specific to the pulp–dentine complex and the peri-radicular tissues
- Microbiology
- Pharmacology
- Dental Materials Science

The clinical science courses such as those in the following disciplines should include their relevance to Endodontics and an inter-disciplinary approach to patient management. Teachers in these disciplines should be aware of the role and scope of Endodontics within the framework of modern dentistry:

- Oral Diagnosis
- Radiology
- Anaesthesia and Pain Control
- Restorative Dentistry
- Periodontology
- Paediatric Dentistry
- Oral Surgery
- Oral Medicine
- Oral Pathology.

Attendance at inter-disciplinary treatment planning seminars is encouraged.

Endodontic teaching

Theoretical teaching

Sufficient time should be allocated in the curriculum to address all educational and competency requirements. As a general guideline, a minimum of 50 h should be allocated over the dentistry course for the teaching of the theoretical aspects of Endodontics including lectures,

case-based or web-based learning, videos, seminars and tutorials, or a combination of these. If possible, these should be supplemented by a library of audio-visual and/or computer-based teaching aids that are freely available to students. The availability of material designed for self-directed learning enables students to revise the material presented in lectures and seminars and to review clinical procedures before undertaking them.

Practical teaching

Dental education in Australian and New Zealand Universities typically extends over four or five years and consists of theoretical and clinical components. The practical pre-clinical teaching of endodontics should ideally be completed in such time as to allow for at least two years of clinical experience in providing endodontic treatment to patients, during which time didactic endodontic teaching can be continued.

Pre-clinical teaching

Endodontic techniques should ideally be taught in a manner that simulates the clinical situation. A combination of plastic tooth models and extracted human teeth (if available) should be used for pre-clinical technique exercises. Ideally, models or teeth should be mounted in arch forms in dental manikins to allow the use of dental dam. Exercises should involve a variety of tooth types. The pre-clinical course should also include a variety of techniques for dental dam placement, root canal preparation and root canal filling.

Before commencing clinical endodontics, students must demonstrate competency in all pre-clinical endodontic exercises.

Clinical practice

The clinical teaching of endodontics should extend over at least two years. Although ideally Endodontics should be taught as a dedicated subject, in the clinical situation it should be practised as an integral part of the comprehensive care of a patient. The development of an endodontic treatment plan should involve consultation with representatives of the different clinical disciplines, as appropriate. An inter-disciplinary approach to treatment planning is recommended.

Before any endodontic management is commenced, a formal endodontic examination, diagnosis and case difficulty assessment must be carried out. Students must be able to identify cases within their own clinical competency and those cases that should be referred for specialist management. They should also be able to discuss and

identify patients' future needs following endodontic treatment, including recall periods, restorative requirements and referral to specialists for restoration before commencing endodontic treatment.

Where possible, students should restore the teeth that they have treated endodontically.

It is recognised that the number and type of teeth treated will depend on the availability of patients requiring endodontic treatment at each teaching institution, their specific curriculum and the availability of clinical facilities. Nevertheless, students should treat a variety of anterior and posterior teeth and disease conditions during their course.

Clinical competency

The *Professional competencies of the newly qualified dentist* document by Australian Dental Council states (February 2016) that:

'The goal of dental education in Australia is to develop dental practitioners who are competent to practise safely and effectively within the professions and their individual scope of practice, and who have an appropriate foundation for professional growth and development so that they can respond to diverse and changing health needs throughout their professional lives'.

The term 'competencies' covers the complex combination of knowledge, understanding, skills and attitudes needed by the graduate dentist. On completion of the dentistry course, students should demonstrate competency in the various aspects of Endodontics mentioned above in the scope of practice expected of a graduating dentistry student, including clinical endodontic management of patients. A formal review of clinical cases completed by the students is recommended.

Teaching personnel and supervision

Whenever possible, practising endodontic specialists and/or practitioners with particular endodontic expertise or training should be utilised to supervise the pre-clinical and clinical components of the course. Students should be encouraged to undertake endodontic treatment in sessions where specialised supervision is available. Ideally, a particular area of the clinical facilities should be designated for endodontics.

Where pre-clinical and clinical teaching is being carried out by staff other than those referred to above, staff induction is considered important and periodic staff refresher and calibration seminars should be held to ensure that all teaching is appropriate, effective,

scientifically based, up-to-date and consistent with the teaching by the permanent academic and specialist staff in the discipline.

Additional requirements

Although it is recognised that physical conditions, nomenclature and circumstances may vary between different teaching and clinical institutions, in addition to the above requirements, students should be rostered, where possible, to attend clinical sessions in the related fields listed below:

- *Admissions/Primary Care Clinics* – Examination and initial diagnosis of patients
- *Emergency Clinics* – Emergency diagnosis and treatment of patients in pain, including the treatment of traumatic dentoalveolar injuries
- *Pain Clinics* – Diagnosis and management of odontogenic and non-odontogenic orofacial pain
- *Surgical Endodontics* – Didactic teaching and video demonstrations of surgical procedures within the Endodontic Teaching Unit by Endodontists
- *Radiological Techniques and Interpretation* – The specific problems and techniques for endodontic radiography.

Research projects and electives

Endodontics should be included in the lists of research projects and/or elective subjects available in dentistry programmes.

Literature reviews

Assignments on specific topics may be given during the course in order to familiarise students with the endodontic literature. Such assignments may form part of the requirements of the course and contribute to the overall assessment. Students should be encouraged to submit an entry to the ASE Inc. Annual Essay Competition.

Examinations and assessments

It is desirable that competency in Endodontics should be assessed as a separate discipline. However, where Endodontics forms part of a larger unit (i.e. when combined with other disciplines), students should be required to pass the endodontic component(s).

Conclusion

The Australian Society of Endodontology Inc. and The New Zealand Society of Endodontics believe that these

Guidelines will equip graduating dentists with the minimum level of endodontic education and clinical competencies to provide safe care for patients.

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Authorship declaration

All authors have contributed significantly, and all are in agreement with the content of this manuscript.