

# Endodontic Clinical Syllabus

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## Contents

Foreword.....	3
A. Introduction .....	4
B. Training Progression.....	5
C. Domains.....	6
1. History-Taking and Examination .....	9
1.1 Underlying and Applied Knowledge .....	9
1.2 Clinical Skills.....	9
2. Clinical Investigation and Imaging.....	10
2.1 Underlying and Applied Knowledge .....	10
2.2 Clinical Skills.....	10
3. Diagnosis and Development of Treatment Strategies .....	11
3.1 Underlying and Applied Knowledge .....	11
3.2 Clinical Skills.....	12
4. Health Promotion.....	12
4.1 Underlying and Applied Knowledge .....	12
4.2 Clinical Skills.....	13
5. Pain Control and Management .....	13
5.1 Underlying and Applied Knowledge .....	13
5.2 Clinical Skills.....	14
6. Pulp Therapy .....	15
6.1 Underlying and Applied Knowledge .....	15
6.2 Clinical Skills.....	15
7. Non-surgical Endodontic Treatment.....	16
7.1 Underlying and Applied Knowledge .....	16
7.2 Clinical Skills.....	17
8. Non-surgical Endodontic Retreatment .....	19
8.1 Underlying and Applied Knowledge .....	19
8.2 Clinical Skills.....	19
9. Endodontic Surgery .....	21
9.1 Underlying and Applied Knowledge .....	21
9.2 Clinical Skills.....	22
10. Dental Traumatology .....	24
10.1 Underlying and Applied Knowledge .....	24

10.2	Clinical Skills.....	24
11.	Restoration of the Root-Filled Tooth .....	26
11.1	Underlying and Applied knowledge.....	26
11.2	Clinical Skills.....	27
12.	Interdisciplinary Interfaces .....	27
12.1	Underlying and Applied Knowledge .....	27
12.2	Clinical Skills.....	28
D.	References.....	30

## Foreword

This clinical syllabus sets out the competence required for the attainment of the award of the Certificate of Completion of Specialty Training (CCST) and admission onto the Specialist List for Endodontics in line with the Specialty Training Curriculum for Endodontics<sup>1</sup> of the General Dental Council (GDC). It was developed in collaboration with the British Endodontic Society (BES) and maps to the domains of the Membership in Endodontics Examination of the Royal Surgical Colleges<sup>2</sup>.

The focus of the syllabus is competence-based and relates to the trainee's capability to perform their duties as a specialist and is a move away from the previous task-orientated delivery based on a competency framework focussing on the trainee's actual performance in a particular situation. This change in practice is aimed at meeting the standards expected of a specialist to deliver high quality patient care that is safe, and patient-centred amid managing increasing demands and expectations of today's patients within UK-based healthcare provision.

This clinical syllabus will be revised concomitantly with the curriculum on a 5-yearly basis.

## A. Introduction

This clinical syllabus is underpinned by the generic professional content of the specialty curriculum published by the GDC<sup>1</sup>, with ALL trainees expected to be cognisant and compliant with this framework throughout their training. It is assumed that trainees on entrance to specialty training have achieved the basic standard of knowledge and skills in dentistry with the emphasis on becoming a Specialist in Endodontics which is a three-year full-time or four-year part-time training programme. Although the focus of the clinical syllabus is endodontology, trainees involved in specialty training should be exposed to the range of dental disciplines to prepare them to be able to meet the complex and integrated treatment needs of today's young, as well as aging, population.

Training providers will be expected to fulfil the quality standards established by the GDC<sup>3</sup> and trainers should be familiar with the contents of this clinical syllabus to ensure that the trainee achieves the necessary requirements. The essential components are outlined with an indication of the expected standards and capabilities from all providers. The domains are deliberately kept broad to allow for variation in training opportunities in different institutions whilst recognising the differing experience of trainees at the start of training.

The syllabus sets out a guide for training, encompassing the contents of the specialty curriculum, to ensure that the trainee progresses through a journey of progressive sequential development. Year 1 focuses on acquisition and understanding of core knowledge, skills and behaviours which form the foundations, essential for the development of the trainee's personal learning experience and growth. During Year 2 this is consolidated and integrated into the acquisition of skills in analysis, application, adaptation and judgement, gaining higher learning towards the end of the year. By Year 3, the emphasis will be more on analytical synthesis and critical evaluation of information gathered to predict evidence-based treatment outcomes whilst excelling in clinical expertise underpinned by attributes and behaviours that foster lifelong learning beyond the completion of their training. The simplicity of the syllabus layout is aimed at making it user friendly for both trainees and trainers with an indicative blueprint of assessments that demonstrate attainment of the capabilities described by generic and specialty specific higher learning outcomes (HLOs)<sup>1</sup>.

## B. Training Progression

Training progression will be monitored throughout the training period. The longitudinal evaluation will be undertaken using programmatic assessment with low and high stakes, thus enabling the development of the trainee's capabilities and their learning experience will be monitored continually throughout their training period. Formative assessment tools will provide the supporting evidence showing trainee progression, moving away from a skill-based approach to a trainee-centred/trainee-led capability/competence evaluation mentored by trainers over the training duration.

Portfolios incorporating clinical cases, learning and reflective logs are mandatory for monitoring the trainee's learning. Completed cases, learning and reflective logs which contribute to the trainee's self-awareness will underpin their personal development plans and are essential for monitoring personal growth. Supervised Learning Events (SLEs) which highlight the gaps in learning, supported with workplace-based assessments (WPBAs), are essential for tracking the trainee's progressive learning and should include the following:

- Mini Clinical Evaluation Exercise (Mini CEX)
- Case Based Discussions (CBD)
- Directly Observed Practice Skills (DOPS)
- Evaluation of Clinical Events (ECE)
- Care Assessment Tool (CAT)
- Multisource Feedback (MSF)
- Multiple Consultant Reports (MCR)
- Entrustable Professional activities (EPAs)

The summative assessment at the end of each year will be the Annual Review of Competence Progression (ARCP) with submission of the documentation required to the Intercollegiate Surgical Curriculum Programme. The end of training will be marked by the satisfactory completion of the Specialty Membership Examination of the Royal Surgical Colleges.

## C. Domains

The key clinical domains outline the standards and describe the capabilities a trainee is expected to achieve over the duration of their training period demonstrating a longitudinal sequential progression of learning and personal development in knowledge, skills and capabilities using an evidence-based approach.

The generic capabilities, which focus on professionalism, communication and leadership, underpin the specialty focussed clinical domains and the trainee must recognise and demonstrate an appreciation of their importance throughout their training. Trainees must also be familiar with the GDC's professionalism principles<sup>4</sup> and embed and abide by them in their day-to-day practice. Trainees should also remember that where possible, all assessment and management plans and strategies undertaken at patient or professional level should be evidence-based and informed by relevant guidelines.

Each domain has subdomains with descriptors that provide guidance on the expected minimum standard of attainment a trainee should be aiming to achieve. The descriptors are intentionally left broad to allow flexibility within their training programme catering for the range of skill sets and capabilities of trainees. During Year 1, it is expected that trainees will be more at the competency level where they are acquiring knowledge, skills and abilities, understanding their application and consolidating these as they progress into the second and third years. During these latter years, it is expected that the trainee will gain competence in analysis and synthesis of information making judgements, decisions and evaluating outcomes, demonstrating that they are competent and capable by the end of their training to deliver services at the level of a specialist endodontist. The trainee's learning journey should follow a spectrum of synchronous and asynchronous experiences to enrich their learning embedding the principles of lifelong learning into daily practice, underpinned by professional attributes defined by the GDC's professionalism principles.

The trainer will support and guide the trainee throughout their training, moving from a trainer-supported journey during Year 1 to a trainee-led journey by Year 3. At the end of their training, trainees will be proficient in the synthesis and the analytical approach to the delivery of clinical patient care (Figure 1):

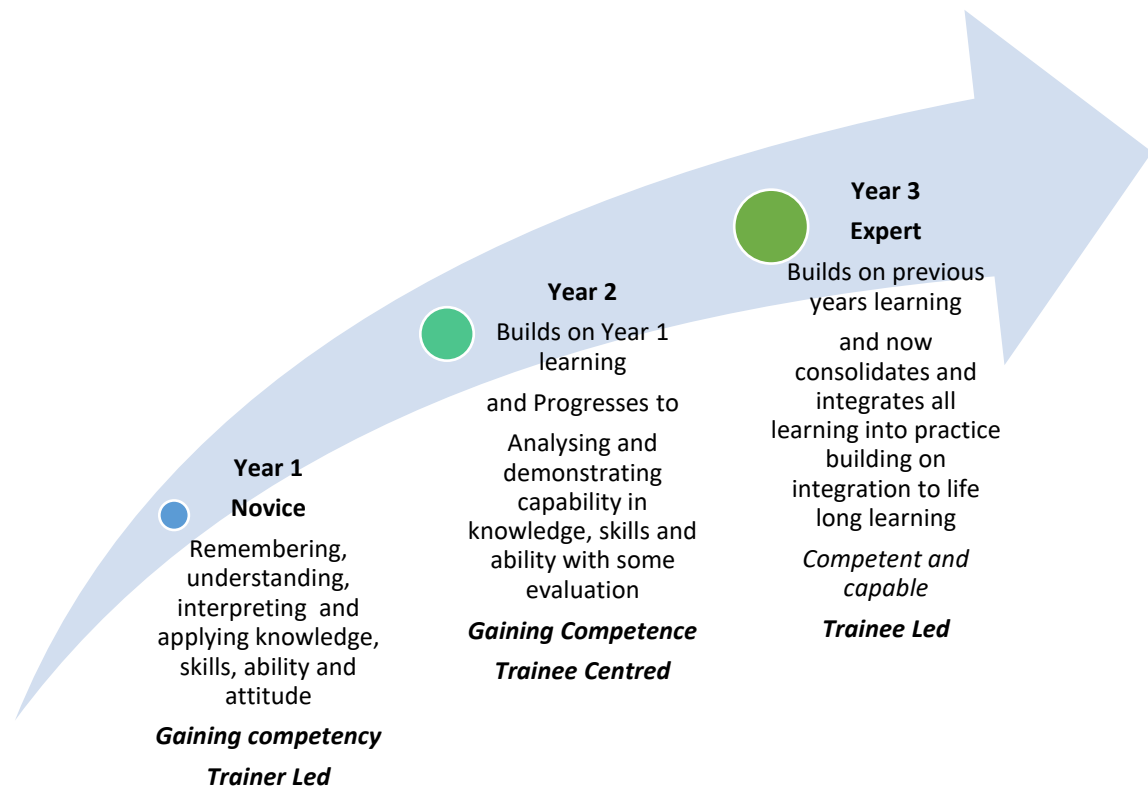


Figure 1: Diagrammatic representation of trainee progression through training.

The syllabus should ideally be delivered using a combination of theoretical, simulated and clinical learning activities. The balance of this will vary by provider; these variances are acceptable as long as the resultant specialist in endodontics possesses the requisite knowledge, skills, abilities and capabilities to manage patients with specialist endodontic treatment needs. The contents of this clinical syllabus encompassed some of these recommendations which also include the move towards a continuous longitudinal assessment of trainees

The contents within each domain has been mapped to the specialty-specific HLOs of the GDC's specialty training curriculum for Endodontics<sup>1</sup> as referenced below:

1. History-taking and examination
  - a. Demonstrates competence to carry out history-taking and a thorough examination of the patient (HLO 5.1).
2. Clinical investigation and imaging
  - a. Demonstrates an understanding and competence in relevant investigations and imaging (HLO 5.2).
3. Diagnosis and development of treatment strategies.
  - a. Demonstrates competence to synthesise information and arrive at the relevant diagnosis (HLO 5.3).

- b. Able to devise evidence-based treatment strategies in conjunction with the patient according to their needs and preferences whilst accepting the need to liaise with other specialists (HLO 5.3).
- 4. Health promotion
  - a. Demonstrates competence to apply knowledge to develop a tailored care strategy related to oral and general health and prevention of diseases (HLO 5.4).
- 5. Pain control and management
  - a. Demonstrates an understanding of pain and pain control mechanisms, can provide pain and anxiety control, and recognises the need for interdisciplinary care (HLO 5.5).
- 6. Pulp therapy
  - a. Demonstrates deep understanding of the structure and function of the pulp, appreciates the causes and effects of pulp disease, and has competence to carry out vital pulp therapies (HLO 5.6).
- 7. Non-surgical endodontic treatment
  - a. Demonstrates competence to carry out endodontic treatment at a standard expected of a specialist using the appropriate diagnostic aids and operative equipment (HLO 5.7).
- 8. Non-surgical endodontic retreatment
  - a. Demonstrates competence to diagnose and manage post-treatment endodontic disease by justifying the decision-making process and assess relevant treatment complexity and prognostic factors (HLO 5.8).
- 9. Endodontic surgery
  - a. Demonstrates understanding of the need for investigative and corrective surgery in the management of peri-radicular disease and competence to provide the appropriate surgical and soft tissue management (HLO 5.9).
- 10. Dental traumatology
  - a. Demonstrates an understanding of the nature and consequences of soft and hard tissue wound healing after trauma and competency to diagnose and manage dental trauma (HLO 5.10).
- 11. Restoration of the root-filled tooth
  - a. Demonstrates understanding of the knowledge and skills necessary to assess teeth for root canal treatment and their subsequent restoration (HLO 5.11).
- 12. Interdisciplinary interfaces
  - a. Demonstrates understanding of the importance and implications of the interrelationship between Endodontics and other clinical disciplines (HLO 5.12).



# 1. History-Taking and Examination

## 1.1 Underlying and Applied Knowledge

Trainees should be able to:

- Describe the biology, anatomy and physiology of intra- and extra-oral structures and tissues in both health and diseased states, including the hard and soft tissues of the head and neck, and dentition, specifically the tooth, root, and pulp-dentine complex.
- Describe the anatomy and physiology of pain in relation to the head and neck, and dentition.
- Explain the sequelae of congenital, developmental, and acquired conditions (namely caries, erosive tooth wear and tooth loss) on the dentition and supporting tissues.
- Explain the mechanism and spread of infection for both endodontic and non-endodontic aetiology.
- Describe the metabolic and immunological response to endodontic infection.
- Describe the clinical, radiological, and histological presentations of relevant orofacial conditions.
- Describe the limitations, sensitivity and specificity of diagnostic tests and value of other relevant investigations.

## 1.2 Clinical Skills

Trainees should be able to:

- Obtain a comprehensive patient history including presenting complaint and related history, and consider any relevant dental, medical and social factors.
- Complete a thorough examination of intra- and extra-oral structures and tissues including:
  - Extra-oral: TMJ, cervical and submandibular lymph nodes, muscles of mastication, cranial nerve function, assessment of swellings, changes in temperature, colour, or sensation.
  - Intra-oral: Soft tissues, muscles of mastication, cranial nerve function, assessment of swellings, mucosal colour or sensation, periodontal status, tooth surface loss, tooth colour, caries incidence, occlusion, parafunction, restorability, risk assessment for oral cancer.

- Evaluate the influence of peri-oral structures on the aesthetics, function, and stability of the dentition and/or prostheses.
- Compare health of intra- and extra-oral structures and tissues to disease states and apply knowledge of basic sciences when assessing patients.
- Evaluate information gained from the history-taking and examination to advise on patient care and formulate appropriate treatment plans.
- Differentiate urgency of patients requiring immediate assessment and treatment from non-urgent cases.

## **2. Clinical Investigation and Imaging**

### **2.1 Underlying and Applied Knowledge**

Trainees should be able to:

- Describe the relevant biology, anatomy, and/or physiology to know when clinical and radiological investigations are required.
- Explain the selection and justification of appropriate clinical and radiological investigation/s.
- Describe the value, relevance, and limitations of:
  - Periradicular tests.
  - Pulp vitality including sensitivity tests.
  - Crack detection techniques.
  - Selective local anaesthesia.
  - Biological inflammatory markers.
  - Radiological imaging including 2D and 3D modalities.
- Explain the sensitivity and specificity of special tests and radiological imaging modalities.
- Explain the factors which may influence interpretation of special tests and radiographic images.
- Describe the clinical, radiological, and histological presentation of odontogenic and non-odontogenic pathosis of the maxilla and mandible, including the histopathosis of lesions of endodontic origin.

### **2.2 Clinical Skills**

Trainees should be able to:

- Perform and interpret the findings of clinical investigations including:
  - Periradicular tests: palpation, percussion, tooth mobility, periodontal probing.
  - Pulp sensitivity tests: thermal and electric pulp testing.
  - Crack detection techniques: bite test, staining, transillumination, surgical exploration, and/or visualisation under Dental Operating Microscope (DOM).
  - Selective local anaesthesia.
- Perform/request and interpret the findings of radiographic investigations including:
  - Bitewing, periapical, and occlusal images.
  - Orthopantomogram.
  - Cone beam computed tomography.
  - Magnetic resonance imaging.
- Produce sufficiently detailed radiographic reports for the purposes of diagnosis and patient care.
- Adhere to the relevant guidelines regarding the use of cone beam computed tomography.

### **3. Diagnosis and Development of Treatment Strategies**

#### **3.1 Underlying and Applied Knowledge**

Trainees should be able to:

- Explain the disease processes involved and presenting features for endodontic and non-endodontic conditions, including periodontic-endodontic lesions, longitudinal tooth fractures, dental resorption, problems of iatrogenic origin, referred pain, and non-odontogenic pain.
- Classify pulp and periradicular diseases, periodontic-endodontic lesions, longitudinal tooth fractures, dental resorption, and dental trauma.
- Explain controversies regarding classification of pulp and periradicular diseases.
- Describe the histopathology and microbiology of pulp and periapical diseases.
- Describe the correlation (or lack of) between the histopathological state of the pulp and diagnostic information obtained during the history-taking and examination processes.
- Explain the prognostic and risk factors for the various treatment options and management strategies for potential complications.

- Outline the likely outcomes for various treatment options in relation to healthcare system and financial constraints.

### **3.2 Clinical Skills**

Trainees should be able to:

- Assimilate and synthesise information gained from the history, examination, clinical and special tests including radiological imaging to arrive at diagnoses, based on knowledge of disease processes involved and presenting features.
- Perform case selection based on risk assessment of various patient and tooth factors including medical history, patient compliance, and treatment complexity.
- Compare and communicate probable outcomes for various treatment options to the patient effectively, with respect to effect on oral health, quality of life, need for future supportive care, prevention, and maintenance.
- Evaluate and choose the most appropriate dental materials, equipment and techniques based on current best available clinical evidence.
- Work within a multi-disciplinary team with other clinicians involved in the care of the patient.
- Present information on treatment outcome and manage patients' expectations.
- Provide and communicate clear treatment plans for primary care practitioners and other dental specialists in relation to the provision of Specialist Endodontic treatment.
- Record contemporaneous and comprehensive clinical notes, including the patient history, results of clinical and radiological assessment, diagnosis, prognosis, restorability, discussion on risks and benefits of various treatment options, and treatment plan.
- Recognise personal limits, reflect, and seek help when necessary.

## **4. Health Promotion**

### **4.1 Underlying and Applied Knowledge**

Trainees should be able to:

- Describe preventive methods for the management primary dental diseases.
- Explain strategies to manage potential complications of primary diseases.

- Outline local, national, and international guidelines on prevention of primary dental disease and management of medically compromised patients.
- Describe the associations between oral and systemic diseases, including the connections between apical periodontitis and systemic diseases.
- Explain the impact of general health on the future prognosis of oral structures and survival of endodontically treated teeth.

## **4.2 Clinical Skills**

Trainees should be able to:

- Communicate preventative advice for primary diseases to patients including oral hygiene instruction (OHI), diet, parafunctional habits, and smoking cessation, with particular relevance to their importance in the disease prevention and long-term survival and maintenance of endodontically treated teeth.
- Advise patients on the impact on their oral health status and quality of life following prevention and the need for supportive care and maintenance.
- Explain, motivate, and engage, and ensure patients' participation and compliance in their own oral care, including possible outcomes of non-compliance and long-term oral health status.
- Recognise and manage common diseases and/or conditions of the peri-oral and dental hard and soft tissues, including dental caries, erosive tooth wear, denture related stomatitis, angular cheilitis, and periodontal involvement.
- Implement and, where necessary, discuss with the patient the relevant guidelines on prevention of primary dental disease and management of medically compromised patients.
- Plan treatment and manage medically compromised and special care patients as part of a multi-disciplinary team.
- Implement methods to prevent infection during treatment procedures between patient and staff, and during transport of pathology specimens, materials and prostheses to the laboratory.

## **5. Pain Control and Management**

### **5.1 Underlying and Applied Knowledge**

Trainees should be able to:

- Describe the basic and clinical science of acute and chronic peri-oral pain conditions, including features of non-dental and chronic pain.
- Classify pulp and periradicular diseases, acute endodontic problems, periapical lesions of endodontic origin, and orofacial pain.
- Describe the microbiology and mechanisms of periapical flare-ups.
- Describe the pharmacology and therapeutics and understand the mechanisms of failed local anaesthesia.
- Describe the primary and supplementary techniques for local anaesthesia of the pulp.
- Describe the procedures for emergency management of acute dental pain, spreading infection and sepsis.
- Explain pharmacology and therapeutics related to the use of analgesics and antimicrobials.
- Explain the pathophysiology and features of various orofacial pain conditions.
- Explain the factors contributing to emergence of orofacial pain conditions and prediction of risks following management, potential outcomes, and impact on oral health and quality of life.

## **5.2 Clinical Skills**

Trainees should be able to:

- Confidently and efficiently assess patients presenting with painful conditions.
- Appropriately manage the use of all standard local anaesthetic and analgesic regimes.
- Provide pain and anxiety control and recognise the need for interdisciplinary care.
- Perform procedures for emergency acute dental pain management and infection, including delivery of primary and supplementary techniques for local anaesthesia of the pulp and surrounding tissues and management of any associated complications.
- Recognise the signs of spread of infection and sepsis and manage appropriately, including referral to an Oral and Maxillofacial Surgery department for further management.
- Manage patient anxiety that may be associated with non-surgical and surgical care, provide support and empathy to the patient before, during and after the procedure, and

where necessary, provide appropriate adjunctive care such as sedation with the appropriate training or assistance from appropriately trained persons.

- Identify patients requiring specialist or interdisciplinary care for the management of non-dental and chronic pain conditions and have the confidence to withhold operative dental interventions in the absence of a clear dental diagnosis.

## **6. Pulp Therapy**

### **6.1 Underlying and Applied Knowledge**

Trainees should be able to:

- Describe the relevant biology, anatomy, physiology, pathology, microbiology, and technical requirements in relation to vital pulp management.
- Describe the indications, management options and expected outcome for vital pulp therapies.
- Describe procedures involving caries management, indirect and direct pulp capping, pulpotomies, and regenerative endodontic treatments, including tissue regeneration/engineering.
- Describe the response of dental tissues to operative procedures, dental materials, and microleakage.
- Describe features of appropriate recall schedules for vital pulp therapy.
- Describe features of a successful outcome for vital pulp therapy.
- Explain the management options in the face of treatment failure or uncertainty.

### **6.2 Clinical Skills**

Trainees should have the clinical skills to be able to perform vital pulp therapy procedures safely, competently, and effectively. In doing so they should:

- Assess pulp status and recognise the limitations of diagnostic tests and the impact to pulp health from operative procedures, dental materials and microleakage.
- Judge when vital pulp therapies are indicated.
- Undertake procedures involving caries management, indirect and direct pulp caps, pulpotomies and regenerative endodontic procedures.

- Restore teeth after pulp therapy treatment to function and aesthetics, considering patients' wishes, and medical and dental health, monitor treatment outcome and manage complications.
- Communicate effectively with patients regarding the provision of vital pulp therapy.
- Assess the outcome of vital pulp therapies.
- Assess the need for further intervention in the face of an uncertain outcome.
- Communicate and liaise effectively with general dental practitioners, specialist colleagues, and/or DCPs regarding the provision of vital pulp therapy including the provision of treatment plans, recall schedules.

## **7. Non-surgical Endodontic Treatment**

### **7.1 Underlying and Applied Knowledge**

Trainees should be able to:

- Describe the anatomy of the head and neck, including oral hard and soft tissues, including the dentition in relation to non-surgical endodontic treatment.
- Describe and classify root canal anatomy including common variations and developmental tooth anomalies in relation to non-surgical endodontic treatment.
- Describe the clinical, radiological, and histological features commonly associated with lesions of endodontic origin.
- Describe the indications and expected outcomes for non-surgical endodontic treatment including prognostic factors.
- Classify and describe the management of pulpal and periapical disease, dental resorption, dental trauma, longitudinal tooth fractures, and endodontic-periodontic lesions in relation to non-surgical endodontic treatment.
- Describe the aetiology and pathophysiology, including the relevant microbiology, of pulpal and periradicular diseases, including the response to caries, microleakage, preparation trauma, dental materials, dental resorption, and periodontal infection.
- Describe the objectives of non-surgical endodontic treatment.
- Explain the rationale for the replacement/repair of existing coronal restorations including assessment of restorability, dental dam isolation, access cavity preparation,



root canal preparation, irrigation, disinfection, use of intracanal medicaments, and obturation.

- Describe the characteristics of ideal and currently available materials for root canal preparation, irrigation, intracanal medicament, obturation, and temporary/interim restoration.
- Describe historic and/or modern techniques and armamentarium for working length determination, root canal preparation, irrigation, disinfection, intracanal medicament placement, and obturation.
- Describe the biomechanical properties of dentine, enamel and cementum and the deleterious effect of root canal treatment on tooth structure and existing restorations.
- Define the historic and modern criteria used to determine treatment outcome for non-surgical endodontic treatment and describe features of an appropriate recall schedule to monitor outcomes of non-surgical endodontic treatment.
- Explain the need for outcome monitoring and further intervention in the case of failure or uncertainty.
- Discuss controversies in endodontic practice including:
  - Termination points for canal preparation and obturation.
  - Apical enlargement.
  - Patency filing.
  - Single versus multiple visit treatment.
  - Focal infection theory.

## **7.2 Clinical Skills**

Trainees should have the clinical skills to be able to diagnose and manage pulp and periradicular disease by performing non-surgical endodontic treatment procedures safely, competently, and effectively. In doing so they should:

- Perform a thorough restorability assessment, including any occlusal, periodontal, aesthetic, and prosthodontic factors, and evaluate case complexity including relevant tooth and patient factors.
- Prescribe, justify, and interpret conventional film and imaging modalities, including cone beam computed tomography where appropriate, in relation to planning non-surgical endodontic treatment.
- Communicate with the patient; explaining the indication, procedure, risk, challenges and expected outcome for non-surgical endodontic treatment.

- Discuss with the patient alternative options for management including extraction with/without replacement, or no treatment and monitoring, and their associated risks and limitations.
- Discuss the need for supplemental procedures such as root resection, hemisection, and surgical repair of perforation/external cervical lesion, where appropriate.
- Appropriately select instruments, techniques, and dental materials, based on clinical and radiological findings of the pulp space and root canal anatomy, before and during treatment, to minimise the risk of procedural errors and optimise the outcome.
- Perform treatment procedures under the dental operating microscope and dental dam isolation and take relevant radiographic images during treatment whilst maintaining the aseptic field.
- Be able to dismantle coronal restorations including indirect restorations and provide temporary/interim restorations.
- Apply appropriate techniques for the use of hand, automated and/or ultrasonic instruments during chemo-mechanical preparation for clearance of calcification, orifice location, scouting, root canal negotiation, disinfection, and placement of intracanal medicament.
- Apply appropriate obturation techniques suitable for wide, narrow, confluent, and complex root canal systems.
- Coronally seal the obturated root canal systems and restore treated teeth to safeguard the coronal seal, occlusal stability, and aesthetics.
- Be able to treat cases of varying complexities that may include:
  - Anatomical challenges e.g. opened apex, severe and S-shaped curved roots, calcified canals.
  - Developmental tooth anomalies e.g. dens-in-dente, taurodontism.
  - Iatrogenic damage.
  - Dental resorption.
  - Patients factors e.g. strong gag reflex, limited mouth opening.
- Be able to effectively manage endodontic complications, including hypochlorite accident, instrument separation, ledging, canal transportation, perforation, and inter-visit/post-treatment flare-ups.
- Communicate in an effective and timely manner with relevant clinicians and with patients on prognosis, appropriate restoration, and the need for monitoring/supportive treatments.
- Communicate with the patient on aftercare including advice regarding analgesics, oral hygiene, and diet for the interappointment period and/or post-operatively.

- Advise and arrange further restorative or supportive treatments and appropriate recall schedules to monitor outcome of non-surgical endodontic treatment.
- Advise and arrange monitoring for uncertain outcomes, and further treatment for failure cases, including referral to other disciplines as appropriate.

## **8. Non-surgical Endodontic Retreatment**

### **8.1 Underlying and Applied Knowledge**

Trainees should be able to:

- Describe the aetiology, microbiology, and pathophysiology, of post-treatment endodontic disease including persistent and secondary intraradicular infection.
- Describe the indications and expected outcomes for non-surgical endodontic retreatment including prognostic factors.
- Describe the objectives of non-surgical endodontic retreatment.
- Explain the rationale for radiological investigations, including cone beam computed tomography, in relation non-surgical endodontic retreatment.
- Describe historic and/or modern techniques, materials, and armamentarium for the removal of root canal obstructions and filling material, including posts, gutta percha, gutta percha carriers, silver points, pastes, and sealers.
- Describe historic and/or modern techniques, materials, and armamentarium for the negotiation and/or repair of procedural errors including separated instruments, perforations, ledges, canal transportation.
- Describe different outcome measures following non-surgical endodontic retreatment, an appropriate recall schedule to monitor outcomes and further intervention in the case of failure or uncertainty.

### **8.2 Clinical Skills**

Trainees should have the clinical skills to be able to diagnose and manage peri-radicular disease by performing non-surgical endodontic retreatment procedures safely, competently, and effectively. In doing so they should:

- Perform a thorough restorability assessment, evaluate case complexity including relevant tooth and patient factors, and determine the prognosis to help select and plan patient care.
- Communicate with the patient explaining the indication, procedure, risk, challenges and expected outcome for non-surgical endodontic retreatment.
- Discuss with the patient alternative options for management, including surgical endodontic treatment, extraction with/without replacement, or no treatment and monitoring, and their associated risks and limitations.
- Prescribe, justify, and interpret conventional film and imaging modalities, including cone beam computed tomography where appropriate, in relation to planning non-surgical endodontic retreatment.
- Discuss the need for supplemental procedures such as root resection, hemisection, surgical repair of perforation/external cervical lesion, and periradicular surgery where appropriate.
- Appropriately select instruments, techniques, and dental materials based on clinical and radiological findings, before and during treatment, to minimise the risk of procedural errors and optimise the outcome.
- Perform treatment procedures under the dental operating microscope and dental dam isolation and take relevant radiographic images during treatment whilst maintaining the aseptic field.
- Be able to dismantle coronal restorations including indirect restorations and post-cores, and provide temporisation.
- Apply appropriate techniques, materials, and armamentarium for the removal of root canal obstructions and filling material including posts, gutta percha, gutta percha carriers, silver points, pastes, and sealers.
- Apply appropriate techniques for the use of hand, automated and/or ultrasonic instruments during chemo-mechanical preparation for the renegotiation of treated canals, location and shaping of missed canals, negotiation and/or repair of procedural errors, disinfection, and placement of intracanal medicament.
- Be able to retreat cases of varying complexities that may include anatomical challenges, developmental abnormalities, dental resorption, and complicating patient factors.
- Be able to effectively manage endodontic complications, including hypochlorite accident, cracking of tooth/root, instrument separation, root-filling extrusion, ledging, canal transportation, perforation, and inter-visit/post-treatment flare-ups.

- Be able to exercise decisive and sound judgement in the face of unfavourable findings or setbacks during non-surgical endodontic retreatment, including the decision to abort treatment and discuss alternative treatment options with the patient.
- Communicate in an effective and timely manner with relevant clinicians and with patients on prognosis, appropriate restoration, and the need for monitoring/supportive treatments.
- Communicate with the patient on aftercare including advice regarding analgesics, oral hygiene, and diet for the interappointment period and/or post-operatively.
- Advise and arrange further restorative or supportive treatments and appropriate recall schedules to monitor outcome of non-surgical endodontic retreatment.
- Advise and arrange monitoring for uncertain outcomes, and further treatment for failure cases, including referral to other disciplines as appropriate.

## **9. Endodontic Surgery**

### **9.1 Underlying and Applied Knowledge**

Trainees should be able to:

- Describe the anatomy of the head and neck, including oral hard and soft tissues, including the dentition in relation endodontic surgery.
- Describe the clinical, radiological and histological features commonly associated with odontogenic and non-odontogenic pathology of oral hard and soft tissues, including the dentition.
- Describe the underlying pathogenesis of common benign odontogenic pathology affecting the mandible and maxilla, including the spread of infection and healing process.
- Classify pulpal and periapical disease, dental resorption, root canal anatomy including common variations and developmental anomalies, odontogenic and non-odontogenic lesions of the maxilla and mandible.
- Describe the common causes for root canal treatment failure and related microbiology and pathology including extraradicular infection, foreign body reaction, cyst development, root resorption, root fracture and iatrogenic mishaps.
- Outline the indications and contraindications of endodontic surgery.

- Describe the characteristics of ideal and currently available materials for endodontic surgery and guided bone/tissue regeneration.
- Explain the relevance of human health and disease, pharmacology, hypersensitivity, social and patient related factors to endodontic surgery.
- Describe the biology of wound creation and healing.
- Describe the risk factors that may contribute to the development of external cervical root resorption, and describe various management approaches involving surgical and/or non-surgical endodontics.

## 9.2 Clinical Skills

Trainees should have the clinical skills to be able to perform the surgical endodontic procedures safely, competently, and effectively. In doing so they should:

- Obtain and evaluate patient history and formulate diagnoses of the pulpal and periapical status of teeth, identifying the cause/s of failure of endodontic treatment.
- Prescribe, justify, and interpret conventional film and imaging modalities, including cone beam computed tomography, in relation to planning endodontic surgery.
- Assess the implications of patients' general health and preferences, including the impact of any chronic health conditions, medication on their suitability for surgical endodontics.
- Based on the current available best evidence, discuss relevant risks and benefits of surgical endodontics to patients and alternative management options, including extraction and prosthodontic replacement, to obtain appropriate informed and valid consent for endodontic surgery.
- Evaluate case difficulty and the need for liaison or co-ordination of treatment with other dental or surgical specialties using a multi-disciplinary approach.
- Formulate and undertake treatment plans based on evaluation of clinical and radiological findings including root inspection, root resection, periradicular surgery, crown lengthening, perforation repair, hemisection, tooth burial, soft and hard tissue augmentation, socket preservation, resorption repair, decompression, intentional replantation, and transplantation.
- Apply surgical safety checklists to ensure confirmation of patient identity, medical history, surgical site, procedures to be undertaken, informed and valid consent, and access to imaging evidence.
- Adhere to relevant personal protective and cross-infection protocols in relation to surgical procedures, including the need for asepsis.

- Administer effective nerve block and infiltration local anaesthesia, including the need for adequate haemostatic control.
- Appraise the need for analgesics, antibiotics, steroids, and oral, inhalation or intravenous sedation.
- Select an appropriate mucoperiosteal flap design for adequate access to minimise scarring and gingival recession.
- Perform surgical procedures using magnification such as dental loupes or operating microscopes and using microsurgical instruments.
- Where required, obtain a tissue biopsy and arranging for onward histopathological investigation.
- Perform microsurgical root end resection and preparation using ultrasonic instruments.
- Select and use appropriate biocompatible materials for root-end filling.
- Select and use where appropriate, graft materials of appropriate types (e.g. autologous grafts, allografts, xenografts, synthetics), in relation to guided tissue/bone regeneration.
- Manage bleeding and haemostasis via adequate local measures.
- Complete surgical wound closure with appropriate sutures and where used, arrange removal of non-resorbable sutures.
- Manage common complications of endodontic surgery e.g. postoperative bleeding or infection and where appropriate, referral to an Oral and Maxillofacial Surgery department for further management e.g. spreading infection or sepsis.
- Record contemporaneous and comprehensive clinical notes of the surgical operation. These should include the flap design, incision and procedure type, wound closure along with relevant post-operative care instructions.
- Communicate post-operative care information including on analgesic medication, oral hygiene, and diet advice.
- Recognise and implement management for complications of endodontic surgery e.g. altered sensation and surgical treatment failure.
- Evaluate soft and hard tissue healing at appropriate recall intervals and assess the outcome.
- Communicate to patients with candour the outcome of surgical treatment, including histopathological results, the need for further reviews, treatment, and/or onward management as appropriate where cases have failed or with uncertain outcomes.

## **10. Dental Traumatology**

### **10.1 Underlying and Applied Knowledge**

Trainees should be able to:

- Describe the relevant biology and anatomy of the orofacial region necessary for the assessment of dental trauma.
- Describe the epidemiology and aetiology of traumatic dental injuries.
- Describe and apply knowledge of the anatomy and biomechanics of the head and neck, including oral hard and soft tissues, including the dentition.
- Recognise and classify facial fractures, soft tissue, dentoalveolar and tooth injuries, and dental resorption.
- Outline the intraoral approaches to managing fractures of the facial skeleton.
- Explain the immediate, medium, and long-term management of, and outline the sequelae of traumatic dental injuries.
- Describe the consequences of traumatic dental injuries to the primary and secondary dentition including the consequences of optimal and suboptimal management.
- Describe the consequences on the pulp-dentine complex resulting from dental traumatic injury.
- Describe the biology of wound and fracture healing, and tooth revascularisation.
- Describe the biomechanics of fracture fixation, limitation of non-physiological tooth movement and splinting.
- Describe the various modes of tissue healing of root fractures.
- Recognise the limitations of tissue repair following severe trauma and/or sub-optimal management.
- Describe the pathogenesis of internal and external resorption including surface, inflammatory and replacement types.

### **10.2 Clinical Skills**

Trainees should have the clinical skills to be able to diagnose and manage dental trauma competently and effectively. In doing so they should:



- Provide preventative advice for patients at risk of dental traumatic injuries.
- Communicate emergency advice to patients or responsible parties on the immediate management of dental traumatic injuries.
- Assess patients presenting with dental traumatic injuries including history-taking, and extraoral and intraoral examination of the soft and hard tissues.
- Assess patients presenting with dental traumatic injuries including identifying and prioritising immediate and urgent needs, including requiring onward referral to an Accident and Emergency or Oral and Maxillofacial Surgery department; for example, suspected loss of consciousness, fractures of the facial bones, significant soft tissue lacerations and unaccounted for lost teeth/fragments which may require further investigation or multi-disciplinary management.
- Perform and interpret, recognising the limitations of special tests including pulp sensitivity tests, crack/fracture detection techniques with respect to dental trauma.
- Prescribe, justify, and interpret appropriate 2D and 3D radiological examination, this may include soft tissue views for suspected embedded tooth fragments or foreign bodies.
- Interpret clinical and radiological information to formulate treatment plans for the immediate, medium, and long-term management of dental traumatic injuries.
- Diagnose dental traumatic injuries of the primary and permanent dentition including soft tissue lacerations, fractures of enamel +/- dentine +/- pulp, concussion, subluxation, extrusive and lateral luxation, avulsions, dento-alveolar fracture, horizontal and vertical root fractures.
- Adhere to relevant personal protective and cross-infection protocols.
- Perform timely operative management of dento-alveolar trauma including replantation of teeth, repositioning of teeth, rebonding or restoration of lost dental hard tissues, orthodontic or surgical extrusion of fractured teeth, apply rigid and flexible tooth splinting.
- Evaluate the clinical restorability of fractured teeth.
- Choose appropriate and conservative strategies to preserve pulpal health in the secondary dentition, including monitoring, vital pulp therapy using direct and indirect pulp capping, partial pulpotomy, pulpotomy or pulpectomy for injuries involving the dental pulp.
- Evaluate the need for, and perform minor surgical procedures including reduction of dentoalveolar process fracture, gingivectomy, crown lengthening, surgical repositioning

of teeth, extraction and intentional replantation, wound repair including suturing, decoronation, extraction of primary or secondary teeth, autotransplantation.

- Perform non-surgical and surgical root canal treatments including managing root resorption, incomplete root formation using apical closure/apexification techniques such as hydraulic calcium silicate cement plugs or regenerative endodontic treatment.
- Evaluate the risk of infection and prescribe local, intracanal or systemic antimicrobials where indicated, and the need for tetanus vaccination or re-vaccination.
- Record contemporaneous and comprehensive clinical notes of dental traumatic injuries, including clinical photographs, providing a medico-legal record of the injuries and management.
- Consider the psychological effects for dental traumatic injuries and the need for onward referral for psychological support.
- Interpret and apply national and international guidelines to manage dental traumatic injuries.
- Advise and communicate to patients, parents, or guardians the sequelae of dental traumatic injuries including the prognostic factors and treatment outcomes.
- Identify and formulate treatment plans following the sub-optimal management/delayed presentation of/sequelae of/ failure of dental traumatic injury management.
- Communicate options for the replacement of teeth of hopeless prognosis and the inclusion of multi-disciplinary teamworking to facilitate rehabilitation.

## **11. Restoration of the Root-Filled Tooth**

### **11.1 Underlying and Applied knowledge**

Trainees should be able to:

- Describe the principles and practice of restoring root treated teeth.
- Describe the adverse effects of endodontic and restorative treatment procedures on tooth structure, including changes to the biomechanical properties of enamel, dentine, and cementum.
- Describe the assessment of teeth for restorability including occlusal, periodontal, aesthetic, and prosthodontic factors.

- Describe the assessment of teeth for endodontic treatment, including case complexity and patient factors.
- Describe the importance of and options available for definitive restoration upon completion of non-surgical endodontic treatment/retreatment to optimise coronal seal, occlusal stability, and aesthetics.
- Explain instances where root canal treatment is indicated for teeth of poor restorability and describe the restorative management of such teeth.
- Explain the importance of case selection and have an awareness of operator competency.

## **11.2 Clinical Skills**

Trainees should have the clinical skills to be able to restore endodontically treated teeth competently and effectively. In doing so they should:

- Assess teeth for restorability and select for endodontic treatment, based on occlusal, periodontal, aesthetic, prosthodontic, case complexity and patient factors.
- Perform pre-restoration procedures such as gingivectomy, crown lengthening, and deep margin elevation where required.
- Select appropriate restorations and/or materials for endodontically treated teeth based on restorability requirements.
- Prepare and place intraradicular cores, post-cores, direct restorations with/without cuspal coverage, and indirect restorations, including single and multiple unit cast/ceramic restorations, copings for RPD abutments, and endo-crowns.
- Perform alternative/adjunctive procedures including decoronation, overdenture preparation, internal tooth whitening, and provision of hard occlusal splints.
- Communicate clearly with the patient on aftercare including OHI, diet advice and parafunction habits.
- Make appropriate and timely referral to other disciplines where needed.

## **12. Interdisciplinary Interfaces**

### **12.1 Underlying and Applied Knowledge**

Trainees should be able to:

- Explain patient and endodontic treatment management for medically compromised patients.
- Describe, in relation to the endodontic-periodontic interface:
  - Effect of periodontal disease and treatment on the pulp-dentine complex.
  - Effect of endodontic disease on the periodontium.
  - Assessment, diagnosis, and management of endodontic-periodontic lesions.
  - Influence of periodontal disease and treatment on the outcome of endodontically treated teeth.
- Describe, in relation to the endodontic-orthodontic interface:
  - Effect of orthodontic tooth movement on vital, non-vital, traumatised, and endodontically treated teeth, including the pulp-dentine complex, root dentine, and pre-existing periradicular pathology.
  - Orthodontic management for traumatised teeth that are displaced, intruded, and/or have root fractures.
  - Endodontic management of traumatised teeth prior/during planned orthodontic treatment.
  - Role, indications, technique, and outcome of autotransplantation.
  - Procedure for forced eruption of teeth for restorative needs e.g. management of fractured teeth, subgingival caries, and perforation repair.
  - Effect of orthognathic surgery on the pulp-dentine complex.
- Describe, in relation to the endodontic-prosthetic interface:
  - Evidence for the use of endodontically treated teeth as bridge and partial denture abutments.
  - Biological rationale, and indications for endodontic treatment prior to prosthetic treatment.
  - Biological rationale, and indications for dental implants and planning.
  - The clinical techniques for the placement, restoration and maintenance of dental implants.
  - Indications, contraindications and technique for block grafting, socket preservation, sinus lift, and guided-bone regeneration, and associated complications.
  - Role of endodontic treatment in preservation/regeneration of alveolar bone for future dental implants.
- Describe, in relation to the endodontic-pedodontics interface, the indication and contraindication of pulp treatment in primary teeth and treatment outcome.
- Explain, in relation to the multi-disciplinary care, the management of patients with:
  - Special needs.
  - Complex dental trauma.
  - Multiple idiopathic external cervical root resorption.
  - Orofacial pain conditions.

## 12.2 Clinical Skills

Trainees should be able to:

- Co-ordinate and manage patients requiring the input of other dental and/or medical specialist colleagues in the planning and delivery of integrated care with a specific focus on care required before, during and after endodontic treatment.
- Assess the prosthodontic and periodontal status of teeth relevant to the endodontic management.
- Communicate clear care plans to colleagues, including other dental specialists and primary care practitioners, where appropriate.
- Demonstrate holistic planning and management skills in dealing with teeth that are unrestorable and/or with uncertain prognosis, including assessment of teeth for endodontic treatment and restoration or plan the extraction and appropriate prosthodontic replacement.
- Plan and provide follow-up and oversight of long-term management of patients who have received endodontic care, including appropriate liaison with primary care practitioners and the practice of monitoring and maintenance of the restored dentition.
- Communicate effectively with patients, including describing the advantages and disadvantages of interdisciplinary treatment options including the possible alternatives and potential complications, maintenance, and cost implications.
- Where applicable, demonstrate appropriate clinical techniques for the placement of single-unit dental implants to replace unrestorable teeth (please refer to Domain 8 of the prosthodontic syllabus).

## D. References

1. General Dental Council (2022). Specialty Training Curriculum in Endodontics. London, General Dental Council.
2. Membership in Endodontics Examination of the Royal College of Surgeons, UK (insert intercollegiate link)
3. General Dental Council (2019) Standards for Speciality Education: Standards and Requirements for training commissioners and examination providers. London, General Dental Council.
4. General Dental Council's Principles of Professionalism. <https://www.gdc-uk.org/standards-guidance/exploring-professionalism/exploring-new-ways/engagement-exercise-an-example-framework-for-professional-decision-making/principles-of-professionalism>