European Academy of Paediatric Dentistry: Revised Curriculum Guidelines for Postgraduate Education and Training in Paediatric Dentistry

Education Committee Members 2019

We are pleased to present below the revised curriculum guidelines for postgraduate education in Paediatric Dentistry set up by the European Academy of Paediatric Dentistry. The guidelines were developed after widespread consultation and discussion among members of the Education Committee. They are intended as a basis for starting and developing Paediatric Dentistry programmes throughout Europe and as a basis for the accreditation of existing programmes.

Definition of the specialty Paediatric Dentistry
The specialty of Paediatric Dentistry is the practice, teaching of and research in the comprehensive preventive, diagnostic and therapeutic oral care of children from birth to adolescence.

1. Main goals

The overall goals of a programme in Paediatric Dentistry should be to graduate specialists in Paediatric Dentistry who:

1. Are competent and confident in all areas of Paediatric Dentistry for the growing and developing child.
2. Can meet the oral health needs of infants, children, adolescents and patients with special care needs, and who will continue to seek additional knowledge and skills throughout their careers.
3. Are capable of carrying out scientific investigations in both clinical and basic science aspects of the speciality.
4. Are able to collaborate in multidisciplinary teams concerned with the health and welfare of children.
5. Can develop inter-professional cooperation by utilizing the competence of the entire dental team as well as other health professions in an optimal way and to create conditions for efficient oral health care delivery.
6. Can communicate, teach and collaborate with groups and individuals on children's oral health issues.
7. Are competent in fundamental domains of child advocacy including knowledge about the disparities in the delivery of oral health care, issues around access to dental care and possible solutions.
8. Can advocate and advise public health policy legislation and regulations to protect and promote the oral health of children; can participate at the local, state and national level in organized dentistry to represent the oral health needs of children, particularly the underserved .
9. Are able to teach oral health care of children within the speciality as well as for general dentists and for other health-care workers.

2. Programme objectives

The objective of any current and future training programme in Paediatric Dentistry should be to produce specialized dentists who:

1. Are competent in all the skills of dentistry pertaining to the specialist care of infants, children, adolescents including children with special care needs.

2. Are competent to apply laws and regulations governing pediatric dentistry, both general and specialist, and to demonstrate knowledge of how pediatric dentistry is organized in the country.
3. Are competent and experienced in the design, implementation and completion of a preventive dental care programme for every type of paediatric dental patient.
4. Are competent to demonstrate knowledge of factors that affect health and the differences between different groups in society in terms of oral health and how action on a community level can affect the oral health of the population and how the interventions may be organized.
5. Are competent and experienced in behaviour management techniques, cognitive behaviour therapy (CBT) and collaboration with a psychologist, so that the majority of their patients can be treated without the use of adjunct medications.
6. Are fully trained in the theory and practice, where applicable, of sedation for use in hospital and dental office practice.
7. Are competent and experienced in all aspects of hospital and operating-room practice, the admitting and care of children as well as carrying out of full mouth restorative care and dento-alveolar surgery in the hospital setting.
8. Are competent and experienced in the provision of restorative, prosthetic and interceptive orthodontic care for infants, children, adolescents including children with special care needs.
9. Are competent and experienced in the management of orofacial trauma in infants, children and adolescents.
10. Have knowledge of craniofacial growth and development, are skilled in the diagnosis of problems of occlusion, facial growth and functional abnormalities.
11. Are experienced in the recognition of problems concerning the temporomandibular joint of children and adolescents, and are able to treat and/or refer such patients.
12. Are competent and experienced in the provision of oral health care for patients with special needs and are able to treat the majority of such patients in the dental office practice.
13. Are competent and have knowledge of child abuse and neglect, and conditions under which children may suffer, recognizing risk and protection factors in the event of children being mistreated as well as signs of mistreatment.
14. Are able to lead the development of pediatric dentistry by taking responsibility for implementing improvement measures based on systematic evaluations of workplace processes and procedures. In addition, they are able to take responsibility for the development of examination or treatment procedures, for the interaction between their own specialty and, for example, other specialties, professions and organizations and finally for continuous learning at the working organization.
15. Know the principles of research design and methodology. They should be able to conduct library research and literature searches and to design research studies. They should, on completion of the course, have participated in or carried out a research project under supervision, and have completed a Master's thesis or equivalent and prepared a paper or participated in a paper suitable for publication in an internationally recognized and refereed journal.

3. General conditions

1. The education of paediatric dentists must take place within universities or certified postgraduate centres.
2. Candidates must be qualified within EU rules; 2 years of full-time general dental experience is recommended before entering training programme.
3. The basic objective of the programme is to educate a Specialist in Paediatric Dentistry, cf. the main goals.
4. The programme requires full- or part-time (at least 60%) attendance providing that the required numbers of hours are achieved. If an institution and/or programme enrols part-time

students, the institution/programme must have clear guidelines regarding enrolment of part-time students. The director of a programme who enrols students/residents on a part-time basis must ensure that the educational experiences, including the clinical experiences and responsibilities, are the same as required for full-time students.

5. Future programmes should consist of a minimum of 3 years or 4800 hours. The content of such programmes should be distributed between clinical experience, including hospital practice, recommending of at least 50%, didactic study and academic courses (25%), participation in education (10%) and the carrying out and completion of a research project (15%) suitable for publication in an international journal. (See programme objectives 2.15)
6. The core programme should cover 75% of the specified training guidelines. The remaining time can be supplemented by additional (elective) activities.
7. The clinical staff-student ratio in supervising treatments should be 1: 4-6. Supervision by a specialist in paediatric dentistry is mandatory and should be under the program director supervision.
8. Students must treat patients under the supervision of paediatric dental specialist or specialist in other MDT team.
9. Students must gain experience in the treatment of patients who require a multidisciplinary approach (see also training guidelines).
10. Teaching of undergraduate dental students is optional and based on local needs. This can be part of the programme but desirable for not more than 10%.
11. The student's clinical performance should be assessed during the programme using Work-based assessment (see section VI).
12. At the end of the programme final exams have to take place. Type and evaluation procedures of these exams are dependent on the institutional requirements.
13. As part of the final examination an external examiner, being a teacher from a recognized PG Program in Paediatric dentistry from another university or institute (desirably from another country), is recommended.

4. Specific conditions

1. The director of the programme: must have proven credentials in paediatric dentistry and must be a specialist in paediatric dentistry; should have an academic appointment/university recognition (associate professor or above or equivalent); should be appointed full-time where applicable, or depending of the center, at least 3 days/week.
2. Besides the director, the equivalent of at least two half-time positions for a paediatric dentist (supervisors) must be available.
3. Adequate library (access to a virtual library from a distance), laboratory, clinical research, and administrative facilities must be available.
4. Non-academic staff should be sufficient to support the efficient conduct of the programme and patient care.
5. Evidence of other-discipline staff support and collaboration to fulfil the objectives of the programme is required.
6. Sufficient expertise (other teachers) must be available to realize the required subjects within the objectives of the programme.
7. Research opportunities, statistical assistance and computer facilities must be available.
8. Evidence of collaboration with paediatricians is required.
9. Any programme must address the issue of the care of medically compromised children and children with disabilities and special needs.

5. Objectives of obligatory courses for education and training of a paediatric dentist

Students should have an understanding at the following levels:

`Competent to': At this level students should have a sound theoretical knowledge and understanding of the subject together with an adequate clinical experience to be able to resolve clinical problems encountered, independently or without assistance.

`Knowledge of': The students should have a sound theoretical knowledge of the subject but may have only a limited clinical experience.

`Familiar with': Students should have a basic understanding of the subject but need not have direct clinical experience and are not expected to carry out clinical procedures independently.

The following subjects, presented in Table 1, are to be covered:

Table 1: Subjects to be covered in the curriculum	
I	**Basic sciences** I.1. Paediatrics I.2. Growth and development of the craniofacial skeleton I.3. Development of the dentition (normal and abnormal) I.4. Genetics I.5. Embryology of the head I.6. Cell biology I.7. Biostatistics-Research methodology I.8. Dental materials
II	**Aspects of management, administration and ethics** II.1. Office management (incl. ICT …) II.2. Ergonomy II.3 Legislation II.4. Professional ethics II.5.Personal management, safety issues, infection control practices
III	**Diagnosis and treatment planning** III.1. 0-6 year old children III.2. 6-12 year old children III.3. The over-12-year-old and adolescent
IV	**Behavioural sciences / patient management, sedation/general anaesthesia** IV.1. Patient management & non-pharmacological control IV.2. Pharmacological control of pain and anxiety IV.3. General anaesthesia
V	**Prevention and anticipatory guidance** V.1. Management of dental & oral diseases prevention V.2. Management of prevention of periodontal disease V.3. Management of prevention in multidisciplinary treatments
VI	**Restorative dentistry and juvenile prosthodontics** VI.1. Primary teeth VI.2. Mixed dentition VI.3. Permanent teeth

VII	**Orthodontics** VII.1. Cephalometrics VII.2. Dental age VII.3. Orthodontic biomechanics VII.4. Aetiology and treatment VII.5. Orthodontic techniques VII.6. Multidisciplinary treatment procedures VII.7. Clinical experience
VIII	**Dental traumatology** VIII.1. Primary teeth VIII.2. Permanent teeth
IX	**Oral surgery/oral medicine/oral pathology** IX.1. Pharmacology IX.2. Infectious diseases & cross-infection control
X	**Children with special needs/medically compromised**
XI	**Pulp management**
XII	**Children with tooth developmental disturbances**
XIII	**Children with periodontal diseases and conditions**
XIV	**Public dental health, Community dentistry and Advocacy**

I. Basic sciences

I.1. Paediatrics

Knowledge of: growth and development of the human body; psychological growth and development.

Familiar with: principles of classification of syndromes in relation to aetiology, prognosis and reaction to treatment; epidemiology, pathogenesis and management of diseases in children and adolescents; concept of biological age and determination of skeletal age and stages of sexual development

Competent to interpret commonly used blood and laboratory tests.

I.2. Growth and development of the craniofacial skeleton

Knowledge of: growth sites in the craniofacial skeleton; post-natal growth changes in the craniofacial region, including soft tissues; variation in the function of components within the craniofacial region relevant to facial growth; adolescent growth spurt and its relationship to growth of the craniofacial complex; individual variation in facial configuration; influence of environmental factors on facial growth.

Competent to: define anatomical features, tissue systems and functional anatomy essential for comprehension of: growth of the craniofacial skeleton; development of skeletal deformities; dentofacial orthopaedics; orthognathic surgical correction of facial dysmorphology and malocclusion.

I.3. Development of the dentition (normal and abnormal)

Competent to: recognize and identify a given situation of the dentition in terms of: normality or abnormality; developmental stage attained; future development; possibilities for interceptive measures to improve the ultimate situation.

I.4. Genetics

Knowledge of basic genetic principles.

Competent to refer patients for genetics evaluation.

I.5. Embryology of the head

Knowledge of: embryology of craniofacial structures for understanding of normal growth and development of face, jaws and teeth; teratogenesis and development of clefts and other congenital facial malformations.

I.6. Cell biology

Knowledge of: cytological and histochemical aspects essential for the understanding of: cell metabolism under normal and abnormal conditions; tissue formation and proliferation; development of bone, cartilage, teeth and muscles; facial growth; temporomandibular joint functioning; tooth movements and reactions in tooth-supporting tissues; dentofacial orthopaedics; soft tissue changes related to orthodontics; mechanisms of root resorption.

I.7. Biostatistics and research methodology

The postgraduate student should be competent to understand and evaluate statistical aspects in current literature; evaluate validity of statistical methodology and interpretation of findings in clinical and research papers relevant to paediatric dentistry and related subjects. In addition, the student must be familiar with commonly used statistical methods, data-processing procedures and principles of epidemiologic surveys, various methods of research design, sample composition and requirements for control groups, data analysis and critical interpretation of findings. The student must also be familiar with the philosophy of science and ethical aspects of research on animals and humans.

Furthermore, the student must be competent to perform an analytical review of biomedical research and clinical research papers; write a protocol for a research project; interpret own research findings; evaluate the validity of conclusions in research papers and present research findings in oral and written form.

I.8. Dental materials

Knowledge of properties and composition of materials used in paediatric dentistry; parameters for selection of correct materials for various procedures; proper handling and application of the materials.

II. Aspects of management, administration and ethics

II.1. Office management

Knowledge of: design of a practice in paediatric dentistry, in a private as well as in a hospital setting; equipment and instruments needed in such a practice; recruitment, selection and training of auxiliary personnel; financing and administration of a practice in paediatric dentistry; public relationships.

Familiar with utilization of computer programmes related to clinical paediatric dentistry and patient management.

II.2. Ergonomy

Competent to: optimal position of patient, practitioner, chair-side assistant and placement of instruments to conduct specific clinical tasks; most efficient sequence to perform specific clinical procedures.

II.3. Legislation

Knowledge of: rules and laws that apply to a practice in paediatric dentistry; responsibilities and services vulnerable to malpractice lawsuits; different insurance coverages required; procedures to follow when a lawsuit arises.

II.4. Professional ethics

Competent to: behaviour and conduct expected of a paediatric dentist as health-care provider; ethical standards that apply to relationships with patients and colleagues; quality assurance as a tool to define goals, analyse provided oral health care, and for continuous improvement. Furthermore, to demonstrate knowledge of how discrimination and social inequality arise and how discrimination and inequality within oral health care can be prevented and counteracted.

II.5.Personnel management, safety issues, infection control practices

Knowledge of how to apply personnel management skills; communication skills, time management, organizational skills, versatility and self-motivation.

Competent to: Universal precautions with regard to cross infection control should be routinely followed in dental clinics. An infection prevention checklist should be used, including infection prevention education and training, hand hygiene, personal protective equipment (PPE), sharps safety, safe injection practices, sterilisation and disinfection of used items and devices. Also, there should be an environmental infection prevention and control procedure.

III. Diagnosis and treatment planning

Knowledge of: digital radiographic, computer tomography (CBCT) and other imaging techniques.

Competent to: assess information by interviewing and counselling the parents and the child for children from the age of 0 to 18* years old.
Examination of this age group encompasses: behavioural assessment, extra-oral examination, intra-oral examination; consider any preventive measures; assess oral hygiene and risk for caries development; diagnose oral motor function; diagnose and manage early loss or displacement of primary and permanent teeth; diagnose early signs of malocclusion; diagnose pulpal conditions. Evaluate any signs and symptoms of potential child abuse and refer the patient to the appropriate services for management.

*the upper age limit may differ among European Countries.

III.1. 0-6 year old children

Assess information by interviewing and counselling the parents with respect to: prenatal, natal and neonatal history; development history; medical history; dental history and social history (i.e. child abuse); diagnose oral pathology and oral medicine in the neonate; diagnose, risk assess and treat Early Childhood Caries (ECC); manage emergencies (trauma related, as well as non-trauma related) and their complications; make intra- and extra-oral radiographs.

Competent to: diagnose the need for preventive measures related to oral hygiene, sealants, nutrition and use of fluoride for the prevention of caries.

III.2. 6-12 year old children

Knowledge of orthodontic diagnosis and treatment planning.

In addition to the guidelines for the 0-6-year-old, one has to be competent to: evaluate occlusal development; prevent and manage orofacial and dental trauma, also multidisciplinary; participate in interprofessional collaborations, patient management.

III.3. Over-12-year-old and adolescents

Knowledge of temporomandibular joint disorders; recognition of sexual abuse; illicit drug use; eating disorders.

In addition to the guidelines (III.1. & 2.), to be competent in diagnosing early signs of periodontitis; evaluate growth and development.

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IV. Behavioural science/patient management/sedation/general anaesthesia

IV.1. Patient management and non-pharmacological control

Knowledge of: principles of biological psychology, cognitive psychology and learning; developmental psychology and social psychology (theories of child development, age and stages, life-span development, person perception, attitudes and social influences on behaviour); principles of communication theory; psychological, ethical and philosophical aspects of the dentist-patient relationship; structure and content of conversations in the informed consent model; attitudes and types of response in professional conversations; the factors that increase motivation and cooperation in patients and their relatives regarding oral care.

Competent to: assess behaviour-management problems; apply behaviour-management techniques; approach multi-cultural ethically related problems; application of the informed-consent model; assess how oral diseases or conditions affect patients and their relatives; apply methods that aim to increase motivation and cooperation among patients and their relatives.

IV.2 Pharmacological control of pain and anxiety

1. Control of pain (painless dentistry)

Knowledge of: psychology of pain (types of pain, structure of pain perception, social and cultural influences of pain behaviour and measuring pain); interaction of local anaesthetics with drugs; using electronic devices for local anaesthesia; allergic reactions to local anaesthetics.

Competent to: administration of local anaesthetics to children; recognizing and treating local and general complications during and after administering local anaesthetics; applying reanimation techniques.

2. Procedural sedation*

Knowledge of: physiology of breathing, blood circulation and central nervous system; effects of nitrous oxide/oxygen on breathing, blood circulation, protective reflexes, consciousness, coping and patients' experience of pain and anxiety; indications and contraindications of inhalation sedation and sedation using drugs; drug pharmacology, effects, doses and use of current drugs; indications and contraindications of sedation by nitrous oxide; nitrous oxide hazards to the health of patients and personnel; scavenging and exhaust systems; back-up emergency services; legislation, rules and laws that apply to sedation.

Familiar with: financial considerations and quality assurance; basic conditions of nitrous oxide/oxygen delivery equipment; surveillance and maintenance of the nitrous oxide/oxygen delivery equipment.

Competent to: informed consent; instructions to parents or responsible individual(s); medical history and physical examination relevant for administration of conscious sedation; medical appraisal and risk assessment (ASA); consult appropriate medical staff members as indicated by the patient's condition; perform inhalation sedation and sedation by means of pharmacological approaches; operative, postoperative monitoring (oximetry, measuring heart and respiratory rates and blood pressure) and applying appropriate discharge criteria, with proper documentation; manage any reasonable foreseeable complications; apply supportive and resuscitation measures.

*When applicable according to the legislation in the various countries.

3. Deep sedation*

Knowledge of: all skills for procedural sedation including: intravenous access; preoperative dietary evaluation; performance of deep sedation.

*When applicable according to the legislation in the various countries. In most countries, deep sedation is not allowed without the presence of an anaesthesiologist.

IV.3. General anaesthesia

In addition to the guidelines previously recommended for procedural sedation, the graduate should be able to demonstrate knowledge of: paediatric dental service organization (outpatient, inpatient, emergency and ambulatory services); indications and contra-indications for the use of general anaesthesia; infection control measures in care setting areas; interpreting laboratory tests; drugs and equipment used in general anaesthesia performed by an anaesthesiologist.

V. Prevention and anticipatory guidance

V.1. Management and prevention of dental caries / dental erosion

1. Epidemiological and aetiological aspects and clinical characteristics of dental caries / dental erosion

Knowledge of: the disease process of dental caries in the primary dentition and in the permanent dentition; the role of the oral biofilm; the role of host-specific defence mechanisms; biochemical events in dental plaque; predilection sites; the acute and the chronic lesion; psycho-social aspects and risk assessment.

Knowledge of: the disease process of dental erosion in the primary dentition and in the permanent dentition; etiology, psycho-social aspects and risk assessment, prevention and treatment.

2. Scientific basis prevention of caries / erosion.

Competent to: give dental health education to the child and the parents; perform professional preventive care.

Knowledge of: possibilities for caries / erosion control by modification of diet; prevention by increasing the resistance of the tooth (eg use of fluoride); prevention of caries by mechanical plaque control; prevention of caries by antimicrobial plaque control; chlorhexidine and other antiseptics; prevention of caries by avoiding transmission of cariogenic micro-organisms; immunology and vaccination.

3. Evaluation of preventive methods

Competent to: initiate and cooperate in the organization and performance of preventive dental care; give dental health education to the child and the parents; provide consulting on the caries preventive dental care for children and adolescents; perform professional preventive care and evaluate the effect of preventive programmes and methods within dental care for children and adolescents; evaluate cost/value of preventive measures, and rehabilitation in severe cases.

Knowledge of: interpretation of data on prevention of dental deseases such as caries / erosion; interaction of factors in disease; estimation of single and combined measures; prediction of future desease development; cost/value of preventive measures.

V.2. Management of prevention of periodontal disease

See below in section XIII

V.3. Management of multidisciplinary treatment

Insight into preventive measures for caries and periodontal disease for specific patient groups.

Competent to: taking care that so-called risk groups among children, e.g. children with handicap, chronic diseases or complicated social background will have regular oral health care.

Knowledge of: social factors and preventive dentistry; prevention in mental and physically disabled children; preventive measures for orthodontic patients; prevention for hospitalized children; interprofessional collaboration.

Knowledge of short term and long term multidisciplinary approach for children with dental anomalies such as AI, DI, hypodontia and syndromic defects.

VI. Restorative dentistry

VI.1. Primary teeth

Competent to design cavities in relation to tooth anatomy, extent of disease and characteristics of the restorative material; analyse failures to minimize future complications; choose treatment and restorative material in relation to the child's disease activity and age; manage early lesions based on the concepts of minimally invasive dentistry; ART.

Knowledge of full coverage techniques of primary teeth; prosthetic replacement when indicated; methods to assess quality of restorations; the use of lasers for caries removal; chemical removal and preparing teeth to be restored; sonic preparation.

VI.2. Mixed dentition

In addition to the guidelines for the primary teeth: to be competent to prevent or treat pit and fissure caries using sealants and/or preventive restorations; manage early lesions based on the concepts of minimally invasive dentistry; juvenile prosthodontics.

VI.3. Permanent teeth

In addition to former guidelines, one should be competent to: perform aesthetic restorations using adhesive systems; perform aesthetic prosthodontic treatment.

VII. Orthodontics

VII.1. Cephalometrics and record taking

Competent to: identify relevant anatomical structures on cephalograms; perform several cephalometric diagnostic analyses on tracings and use appropriate digital software; formulate a summary on main cephalometric findings and apply the cephalometric data in interceptive treatment planning; understanding of normal facial growth and its timing.

Knowledge of: intraoral scanners for taking records; limitations of cephalograms and their analyses.

VII.2. Dental age

Competent to: age-group specific analysis of dental development clinically and from panoramic radiographs; dental age calculation; screen for abnormal timing of dental development; age-appropriate palpation of developing canines.

VII.3. Orthodontic biomechanics

Competent to: understand basic principles of statics and mechanics of materials; estimate forces produced by specific orthodontic appliances used for preventive and interceptive purposes.

Knowledge of: effect of different types of force application and force magnitude on cells and tissues.

Familiar with: the property and composition of orthodontic materials.

VII.4. Aetiology and treatment

1. Aetiology of malocclusion

Knowledge of: genetic and environmental factors that influence post-natal development of the dentition and facial growth; unfavourable influence of environmental factors and their interception; different modes of breathing, tongue rest position, sucking habits and lip trap.

Familiar with: normal and abnormal speech; various ways of swallowing; the process of mastication.

2. Diagnostic procedures

Competent to: perform a thorough clinical and radiographic examination including determination of habitual occlusion, evaluate functional occlusion and different jaw relationships of patients; evaluate influence of functional components of soft tissues on dentofacial morphology; predict the likely effect on growth and development of face and dentition if no therapy is implemented, identify vertical problems, sagittal problems, risk of dental trauma and psychological burden.

3. Iatrogenic effects of orthodontic treatment

Familiar with: possible influence of treatment on temporomandibular joints; effect of different types of treatment on dental caries risk and periodontal tissues in the long run; factors involved in root resorption; possible influence of treatment on dentofacial appearance and aesthetics.

VII.5 Orthodontic techniques

1. Removable and fixed appliances*

Knowledge of: indication, design and use of appliances; construct and repair appliances.

Knowledge of potential and limitation of appliances.

Knowledge of indication and application of potential and limitation of different approaches in partial fixed appliance therapy.

* Fixed appliances (e.g. lingual, palatal and vestibular arches, maxillary expansion devices and partially banded/bonded dental arches);

2. Functional appliances

Knowledge of: indication, design and use of functional appliances; potential and limitation of functional appliances.

3. Extra-oral appliances

Familiar with: indication, design and use of various types of headgears, facial masks, chin-caps and combined extra-oral/functional appliances; potential and limitation of these appliances.

4. Fixed appliances with brackets

Familiar with: indication and application of fixed appliances; different concepts and treatment approaches in design and biomechanical principles of fixed appliance therapy; potential and limitation of different appliance systems.

5. Digital planning and custom orthodontic treatment

Familiar with: the new treatment approach using digital technologies to record, diagnose and treat with computer fabricated positioners.

6. Retention appliances

Knowledge of: indication and contra-indication, design and use of retention appliances; potential and limitation of retention appliances; the most appropriate duration of retention.

VII.6. Multidisciplinary treatment procedures

1. Cleft palate treatment

Knowledge of: multidisciplinary approaches in the treatment of cleft palate patients and other orofacial syndromes; indication, timing and application of multidisciplinary treatment of cleft palate patients; specific aspects of orthodontic treatment in cleft palate patients.

2. Multiple aplasia

Knowledge of: multidisciplinary approaches in the treatment of children with multiple aplasia.

3. Physiology and pathophysiology of the stomatognathic system

Competent to: observe pathological tooth wear; differential diagnosis between erosive tooth wear and bruxism; interceptive treatment for occlusal height maintenance.

Familiar with: normal and abnormal functional occlusion of the dentition; normal and abnormal behaviour of soft tissue structures; normal and abnormal functioning of the temporomandibular joint; diagnostic procedures regarding the temporomandibular joint; treatment procedures of temporomandibular joint disorders.

VII.7. Clinical experience

Competent to: diagnose and treat or make appropriate referral of singular conditions in the primary and developing permanent dentition including, but not limited to: anterior and posterior space and tooth loss; transient or definitive crowding and irregularity of the teeth; potentially harmful oral habits; ectopic eruption; anterior/posterior crossbite; diastema closing by using simple fixed or removable appliances.

Knowledge of: the right timing to refer a patient to an orthodontist.

Familiar with: the techniques used for the orthodontic treatment of malocclusion.

VIII. Dental traumatology

Competent to: understand the classification, aetiology and epidemiology of dental injuries; understand the principles of the prevention of injuries including the use of mouthguards; carry out an examination and assessment of patients with dental injuries including appropriate imaging; formulate an appropriate treatment plan based on an understanding of the short-term as well as the long-term prognosis for teeth in the primary dentition (and their permanent successors) as well as in the permanent dentition; understand the psychological effects dental trauma has on the growing patient; educate the public, the medical profession as well as school personnel in emergency dental trauma management.

VIII.1. Primary teeth

Competent to: evaluate luxation and hard tissue injuries and the appropriate treatment; carry out appropriate treatment for minor soft tissue injuries; treat injuries to the supporting bone; understand the different complications of the primary teeth following dental trauma and carry out an appropriate plan for the follow-up examinations after dental trauma; recognizing child physical

abuse and be familiar with the correct treatment, notification procedures and follow-up; recognize and treat anomalies of the developing permanent teeth that may arise from injury to the primary dentition.

VIII.2. Permanent teeth

Competent to: evaluate pulp status including an understanding of different pulp-testing methods; understand the measures appropriate to prevent infection following injury; the appropriate use of splinting; carry out pulp treatment of traumatized teeth including pulpotomy, apexification for immature teeth including placing MTA apical barrier, regenerative endodontics and root canal therapy for the completed apex; restore crown and crown/root fractures, including the use of composite resins, acrylic and porcelain crowns and veneers; diagnose and treat root fractures; carry out treatment of luxation injuries including avulsion; understand the biological processes of hard tissue repair and different types of resorption that occur following dental trauma of teeth; carry out treatment of complications following dental trauma; clinical experience of the multidisciplinary treatment after severe dental trauma such as intrusive luxation and avulsion; carry out appropriate treatment for minor soft tissue injuries; treat injuries to the supporting bone.

Knowledge of: the orthodontic management of traumatized teeth; diagnosing maxillofacial injuries and arrange for appropriate treatment; the mechanism of the response of the oral tissues to injury and wound healing following injury; the principles of autotransplantation of teeth; the principles of osseointegrated implants; the signs and symptoms of neurological injury; the planning of space management following the loss of an anterior tooth including the orthodontic options available.

IX. Oral surgery/oral medicine/oral pathology/pharmacodynamics

IX.1 Oral surgery/oral medicine/oral pathology

Competent to: perform uncomplicated biopsies (excisional and incisional) of pathological oral lesions in children and adolescents as well as adjunctive diagnostic tests; examine, diagnose and treat teeth, oral tumours and cysts in the new born and neonate; examine, diagnose and treat oral manifestations of systemic disease in the soft and hard oral tissues, especially in children with: cardiac disease, renal disorders, endocrine disorders, immunologic disorders, bleeding disorders, malignant diseases, convulsive disorders, skeletal disease, chromosomal aberrations; examine, diagnose and treat bacterial, viral and fungal infections of the oral mucosa, especially in immuno-compromised children; examine, diagnose and treat soft tissue lesions and abnormalities such as frenuloplasty, including management with soft and hard laser; diagnose pathology using current imaging techniques such as CBT and MRI; examine, diagnose and treat impacted teeth using surgical techniques including surgical-orthodontic treatment; refer persistent lesions and/or extensive surgical management cases to appropriate specialists.
Knowledge of: examine, diagnose and treat bone lesions, cysts, tumours and tumour-like lesions in children and adolescents.
Familiar with: maxillofacial surgery in children.

IX.2. Pharmacokinetics and dynamics of common medicines

Knowledge of: most commonly used/prescribed medicines in paediatric dentistry: local anaesthetics, antibiotics, analgesics; pharmacodynamics and indications of other medicines also prescribed for children (e.g. antimycotics, antiviral drugs, glucocorticoids, fluorides in case of systemic intake); physiologic effects of medicines that require modifications of dental procedures in medically compromised patients (e.g., anticoagulant/ antifibrinolytic therapy, bisphosphonates).

IX.2.1 Local anaesthetics

Competent to: administer local anaesthetics in a safe, effective and least unpleasant manner, when indicated.

Knowledge of: commonly used local anaesthetics in paediatric dentistry; indications as well as special considerations/potential contra-indications on the application of local anaesthetics in paediatric dentistry; pharmacodynamics; potential adverse effects; techniques of application; types of delivery systems, including local anaesthetic electronic delivery systems; and doses for different chemical types of local anaesthetics according to the age/body mass of the child.

IX.2.2 Antibiotics

Knowledge of: the commonly used antibiotics in paediatric dentistry; indications as well as conditions in paediatric dentistry where the prescription of antibiotics is not recommended; pharmacodynamics; potential adverse effects; recommended time of application and daily doses according to the age/body mass of the child.

XIX.2.3 Analgesics

Knowledge of: the analgesics commonly used in paediatric dentistry; indications for administration of analgesics; pharmacodynamics; possible side effects; frequency and doses for individual types of analgesics taking into account the age/body mass of the child.

X. Children with special needs/medically compromised

Competent to: provide comprehensive dental care also to severely medically, physically, mentally or socially compromised children and adolescents; provide comprehensive dental care for hospitalized children and adolescents; participate in multidisciplinary and interprofessional management of oral disease in medically, physically, mentally or socially compromised children and adolescents; prevent and manage oral motor disturbances in emotionally, physically or medically compromised children.

Knowledge of: infections in the immunocompromised host; prophylaxis for bacterial endocarditis; CDC recommendations on infection control.

Familiar with: in-patient care of children admitted to paediatric, child rehabilitation, and child psychiatry departments.

XI. Pulp management

XI.1. Primary dentition

Competent to: diagnose pulp pathology in primary teeth; choose and perform treatment options (indirect and direct pulp treatment, pulpotomy, pulpectomy) in relation to the child's disease activity, behaviour and age; manage failures.

Knowledge of: anatomy of pulp morphology in primary teeth, bioactivity and evidence for clinical success rate of different pulp dressing materials used as well as national regulations for their use.

XI.2. Young permanent teeth

Competent to: diagnose pulp pathology in permanent teeth; discuss and select the most appropriate among different techniques for pulp therapy of young permanent teeth (indirect pulp treatment, pulp capping, pulpotomy, desensitising treatment, pulpectomy); choose treatment options in relation to the child's disease activity and age; perform the appropriate treatment; manage failures; perform non-vital bleaching.

Knowledge of: anatomy of pulp morphology in permanent teeth, techniques for pulp therapy of young permanent teeth and assess the evidence for success of above techniques, regenerative endodontics, regulations for different medicaments.

XII. Children with tooth developmental disturbances

XII.1. Aetiology and classification

Competent to examine and diagnose disturbances in tooth development

Knowledge of genetic and environmental factors that influence development of the dentition, unfavourable influence of environmental factors and their interception

XII.2. Anomalies of number and size

Competent to diagnose and treat disturbances in tooth number (oligodontia/hypodontia/hyperodontia) and tooth size (microdontia/macrodontia) and associations.

Knowledge of: syndromes associated with disturbances in tooth number, genotype/phenotype interactions.

XII.3. Anomalies of tooth shape

Competent to diagnose and treat disturbances in tooth shape (double teeth, accessory cusps, dens evaginatus, invaginated teeth, taurodontism).

Knowledge of: syndromes associated with disturbances in tooth shape, genotype/phenotype interactions.

XII.4. Anomalies of structure

Competent to diagnose and treat disturbances in tooth development induced by fluorosis, tetracyclines, amelogenesis imperfecta, dentinogenesis imperfecta, enamel hypoplasia, molar incisor hypomineralization and associations.

Knowledge of: syndromes associated with disturbances in tooth structure, genotype/phenotype interactions.

XII.5. Anomalies of eruption / exfoliation

Competent to diagnose and treat disturbances in eruption (early/late/position) and exfoliation (early/delayed/infra-occlusion).

Knowledge of: syndromes associated with disturbances in tooth structure, genotype/phenotype interactions.

XIII. Children with periodontal diseases and conditions

XIII.1. Epidemiology, aetiology and microbiology of periodontal diseases and conditions

Knowledge of: significance of dental plaque in dental biofilm-induced gingivitis and periodontitis, as well as knowledge of aetiology of non-dental biofilm-induced gingival conditions, periodontitis and other conditions affecting the periodontium; the development of plaque and calculus; plaque ecology and structure of plaque; host defences against microbial plaque; factors influencing plaque formation; factors modifying the immune system; specificity of bacterial composition in certain types of periodontal diseased as manifestation of systemic conditions

XIII.2. Prevention of gingivitis/periodontitis

Competent to: give oral health education to the child and the parents; deliver professional preventive care; initiate and coordinate in organization and performance of preventive dental care; consult on the preventive care for children and adolescents.

Knowledge of: mechanical plaque control; antimicrobial plaque control; preventive programs in children; home care; professional care; the implementation of measures for prevention of caries and periodontal disease in specific patient groups (e.g. patients with special needs).

XIII.3. Diagnosis and treatment of periodontitis.

Competent to: make diagnosis upon a relevant patient history and clinical examination according to the classification; recognize when periodontal disease may be related to systemic disease; take care that certain so-called risk groups among children will have regular dental care (e.g. children with handicap, chronic diseases or complicated social background); manage periodontal diseases and conditions: in children and adolescents; identify those children who may need consult or/and referral for treatment by a specialist periodontologist.

Knowledge of: types of periodontal diseases and conditions in children and teenagers: a) types of gingivitis and gingival conditions, b.) types of periodontitis, and c) types of other conditions affecting the periodontium; clinical examination of patients with periodontal diseases and conditions; the principles of adequate periodontal treatment in individual types of periodontal diseases and conditions affecting children and teenagers.

XIV. Dental public health, community dentistry and advocacy

XIV.1 Dental public Health

Knowledge of: global burden of oral diseases, population demographics, social and oral health regulations and consider the implications for oral diseases and conditions and the practice of dentistry.

Knowledge of: national policies and those advocated by the World Health Organisation (WHO) and United Nations (UN), including concepts of universal health coverage, human resources for health and integration of oral health with wider general health assessment, to meet sustainable development goals.

Familiar with healthcare systems, including human resources health, particularly dentistry and oral health workforce and how healthcare systems serve the population, particularly vulnerable groups.

XIV.2 Community dentistry

Competent to promoting health, monitoring interventions and implementing effective strategies of care at community and population levels; participate in inter-professional care across the child's lifespan from diverse communities and cultures.

Knowledge of population demography, health trends and the healthcare system within which the student works.

XIV.3 Advocacy

Competent to address social inequalities in oral health by advocating for oral and general health with patients and the community including policy makers; communicate and collaborate with relevant stakeholders to advocate for policies that impact oral and general health for individuals and populations.

6. Assessment methods

The students' clinical performance should be assessed during the programme, using Work-Based Assessment (WBA). These include Direct Observation of procedure (DOP), mini clinical evaluation exercise (miniCEX) and Case Based Discussion tool (CBD). Such portfolio will highlight any areas of weaknesses that PG students may have and provide the opportunity for feedback and thereby direct learning.

At the end of the programme, final exams have to take place, to assess clinical skills, didactics and research. Type and evaluation procedures of these exams are dependent on the institutional requirements. Evidence-based case presentations either in PowerPoint and/or Word format must be submitted by the postgraduate student.

As part of the final examination an external examiner, being a teacher from a recognized other university or institute (desirably from another country), should be consulted.

7. Teaching Methods

As well as the review of the *content* (curriculum), it is sensible to consider different approaches to the *delivery* of teaching. Postgraduate dental education differs from undergraduate education in the following ways: smaller group sizes, higher level / critical thinking, more complex patients, demands on time. In addition to classical teaching methods (both clinical and in the form of lectures and seminars), Technology Enhanced Learning (TEL) is also recommended. It can transform the way of delivering teaching and also provide access to online learning in communities with limited resources. There are a variety of techniques/ platforms / apps that can be applied across programmes. TEL can be used in:

- Delivery: Knowledge (flipped teaching), Clinical skills, Treatment planning (using scenarios, CBD)
- Critical thinking/research (online journal clubs)
- Assessment (ideal for formative assessment)
- Feedback (using online classroom response / polling)
- Virtual clinical methods

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