

Original Article

Oral and maxillofacial medicine curriculum and practice for undergraduate dental students: A comparative study of Iranian universities and other countries

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Abstract

Background & Objective: Educational promotion requires improved designing and enhancement of the quality of education. The present study aimed to compare the oral and maxillofacial medicine course in the undergraduate dental curriculum of Iran and some other countries.

Material & Methods: In this descriptive comparative study, some dental schools were selected from the United States, Canada, Australia, and Switzerland (one from each country) according to the Quacquarelli Symonds (QS) ranking. All topics related to oral tissue and systemic diseases with oral manifestations were extracted from the content of the courses offered in the respective dental schools. Additionally, all mentioned topics were gathered from nationwide curricula of dental schools in Iran and the UK. The collected data were analyzed based on Bereday's comparative method in the following four steps: description, interpretation, juxtaposition, and comparison.

Results: The collected data from each curriculum (description) were analyzed (interpretation), tabulated (juxtaposition), and compared (comparison) to find the similarities and differences. The highest similarity was found in sequence of offered courses between Iran and Pennsylvania dental schools. Differences were mainly related to the sequence of chapter titles in different courses and method of instruction. The Australia's Queensland dental school had the highest difference with Iran's curriculum since it does not offer an independent course on oral medicine. Additionally, Iran and Australia's Queensland dental schools do not have a free discussion course on clinical scenarios.

Conclusion: The method of instruction and diversity of the taught topics are responsible for the differences in educational curricula of different countries regarding the oral medicine course.

Keywords: comparative study, curriculum, oral medicine

Introduction

In the past decade, oral health as an integral part of general health has come under the spotlight (1). It is estimated that 90% of the world's population suffer from different forms of oral conditions throughout their life, and oral diseases impose a high burden on healthcare systems worldwide (2). Dental educational curricula should be able to comprehensively obviate the needs and meet the expectations of dentists and communities. Dental education is a complex field consisting of clinical and theoretical instructions offered in dental schools. It also emphasizes acquiring the essential skills to efficiently communicate with patients (3). Oral and

maxillofacial medicine is a field of dental science that concerns the oral soft tissue, salivary glands, and neurological and musculoskeletal tissues in this region (4). Dental clinicians learn the required medical and surgical skills and have an ideal position to provide primary preventive care. The primary manifestations of many diseases are first detected by dentists. Consequently, their knowledge in this respect can play a fundamental role in the early detection and diagnosis of many diseases (5). Moreover, oral manifestations of systemic diseases should not be overlooked. Many systemic conditions, such as diabetes mellitus have oral



presentations, and some other systemic diseases, such as hypertension may affect or contraindicate some dental procedures (6). Basirat et al. evaluated the diagnostic skills of senior dental students of Guilan University of Medical Sciences regarding common oral diseases and reported their poor diagnostic skills in this respect. Thus, the adoption and implementation of novel educational techniques and enhanced communication and cooperation of dental school and medical school instructors are recommended to achieve the educational goals (7). Borhan-Mojabi et al. evaluated the degree of knowledge on oral cancer among general practitioners and dentists in Qazvin province of Iran and reported that the level of knowledge in both groups was inadequate (8).

To promote the educational curricula, an assessment of educational programs was scheduled. Additionally, the quality of each designed and implemented program should be assessed. One ideal approach for globalization and promotion of dental education in different countries is the interaction of different dental schools to find the common challenges, share the experiences and brainstorm (9). Considering all the above, the present study aimed to compare the course of oral and maxillofacial medicine offered in the undergraduate dental curriculum in Iran and some selected countries worldwide.

Material & Methods

Design and setting(s)

This descriptive comparative study was conducted in 2020 after obtaining ethical approval from Guilan University of Medical Sciences.

Participants and sampling

For the selection of dental schools, of 10 dental schools with the highest ranking in QS ranking in 2021, high-ranked universities that met all the inclusion criteria were selected from countries that are more popular among Iranian dentists. Accordingly, the educational curricula of dental schools in Iran, dental schools of the United Kingdom (defined by the general dental council (GDC), the quality assurance agency (QAA) for higher education and ADEE), Pennsylvania University in the United States, Western University in Canada, Queensland University of Australia, and Zürich University of Switzerland were evaluated. The educational curriculum for a particular field of science may be the same nationwide and in all universities of a country or may be different according to the policies of each university. In

Iran and the UK, the dental curriculum is the same in all universities nationwide, and dental schools can only apply minor changes in the mode of offering the courses depending on their infrastructure.

Tools/Instruments

This study assessed the undergraduate dental curricula of dental schools by preparing checklists and tabulated data. Universities whose adequate information regarding their curriculum was not available were not included.

Data collection methods

Information on the curricula was obtained by visiting the website of the respective universities and also by using the relevant studies. The educational dental curriculum of Iran was obtained through the Education Department of Dental School, Guilan University of Medical Sciences. All topics related to the oral mucosa, salivary glands, nervous system, musculoskeletal tissues and their related diseases, and systemic conditions with oral manifestations were extracted from the curricula. For this purpose, the contents of all courses of dental curricula were evaluated.

Data analysis

The extracted data was analyzed according to Bereday's comparative method in education through the following four steps: description and data collection, interpretation, juxtaposition, and comparison (10). In the description and data collection step, the available information and evidence was collected and transcribed. In the interpretation step, the collected data from each curriculum was analyzed. The comparative approach was started by the juxtaposition step. In this step, the data extracted from the curricula was tabulated and the similarities and differences were classified and juxtapositioned. In the comparison step, the details of similarities and differences were evaluated and compared to respond to the question of the study.

Results

The main results of the present study are reported in Appendix 1 regarding practical courses, Appendix 2 concerning the topics about systemic diseases, and Appendix 3 regarding the topics related to oral diseases. These tables (Appendix) were designed based on educational, practical, and theoretical topics.

The educational curricula of Iran, Pennsylvania University of the United States, and Zürich University of Switzerland allocate some time for dental students to attend hospitals and closely observe the process of dental diagnosis, treatment planning, and dental treatment of hospitalized patients. In addition, the dental curricula of Queensland University of Australia and Zürich University of Switzerland practically instruct the treatment of patients with special needs, such as disabled individuals.

Interpretation of paraclinical tests is also included in the dental curricula of Iran, the United Kingdom, Canada (Western University), and the United States (Pennsylvania University). Furthermore, pains of the head and neck region, detection of their origin, and prescription of analgesic medications are included in all curricula. However, in Australia (Queensland University), greater emphasis is placed on medications, and a specific topic regarding pain does not exist.

A noteworthy issue is that all topics evaluated in this study are separately taught in practical and theoretical courses for pediatric patients in all selected countries, which emphasizes the significance of adequate knowledge and expertise in the field of pediatric dentistry.

The Temporomandibular Joint (TMJ) is an important part of the head and neck region, which can have a wide range of pathologies. Topics related to TMJ diseases and their treatment are comprehensively included in the dental curricula of Iran, the United Kingdom, Canada (Western University), the United States (Pennsylvania University), and Switzerland (Zürich University). It should be noted that among the evaluated curricula, Iran and Switzerland (Zürich University) more extensively addressed the topic of TMJ disorders.

Moreover, it should be mentioned that dental students in Iran, Canada (Western University), the United States (Pennsylvania University), and Australia (Queensland University) spend some time on comprehensive treatment of patients, which includes examination, diagnosis, and treatment planning for oral diseases as an important part of oral medicine course.

Discussion

This study aimed to compare the course of oral and maxillofacial medicine offered in the undergraduate educational curriculum in Iran and some selected countries worldwide.

A comparison of the content of the curricula revealed that all curricula covered topics related to oral soft tissue diseases, salivary gland diseases, and neurological, musculoskeletal, and systemic conditions with oral manifestations. Additionally, all curricula

contained theoretical and practical courses regarding the aforementioned topics. In other words, dental students had to acquire theoretical information regarding oral diseases and also had to acquire adequate experience and skills in the management of patients. However, it should be noted that some differences existed among the evaluated curricula as well. In the UK (4) and Western, Pennsylvania, and Zürich universities some time is allocated to free discussion regarding diagnosis and treatment planning of patients. In free discussion classes, the clinical photographs and radiographs of patients, the pathology report and paraclinical test results, and other information regarding the diagnosis of each lesion are provided to dental students, and the cases and clinical scenarios are discussed. Eventually, the final diagnosis is made, and the most appropriate treatment plan is designed. However, it appears that in Iran, dental students spend more time on clinical examination of patients. The drawback of this mode and the lack of free discussion classes is that dental students are less likely to encounter complicated or rare cases during their dental education and examination of patients in the university dental clinic. However, some complicated cases are discussed in the free discussion classes, and different clinical scenarios are presented and discussed by all students. In the Queensland University of Australia, unlike other dental schools evaluated in this study, the educational courses are not entirely focused on a specific topic, and dental education is problem-based. For example, diagnosis of oral diseases and periodontal diseases, tooth extraction, and restoration of caries are all performed simultaneously in theoretical and clinical courses. Accordingly, dental students are familiarized with patient management in private dental offices. For example, the difference between dental practice course IIIA and IVA is that dental students who take the course IIIA treat dental patients with simple general needs while those taking the course IVA treat patients with complex dental needs, medically compromised patients, and disabled individuals with dental needs. Furthermore, in Australia, the association of the teaching of gerodontology-related topics with restorative dentistry, oral medicine, special needs, and preventive dentistry is reported by Shigli et al. (17).

Other differences included the treatment of patients with special needs or disabled individuals since Queensland and Zürich Universities have included clinical management of such patients in their curricula. Also, these topics are included in theoretical courses in dental curricula of Western and Pennsylvania universities. It appears that these topics have been neglected in Iran, and they are only taught

professionally for managing pediatric patients. Moreover, it should be noted that some structural determinants (e.g., environmental, political, social, and economic issues), intermediate determinants (social position and conditions), and proximal determinants (behavioral and biological factors) may play a role in the development of oral and non-communicable diseases and their types, and instruction of these topics may be modified based on the existing priorities and current conditions in different geographical locations (18).

Conclusion

Considering the selected curricula, their contents, and the educational systems of the respective countries, it may be concluded that all the evaluated dental curricula covered topics related to oral soft tissue diseases, salivary gland diseases, and neurological, musculoskeletal, and systemic diseases with oral manifestations, and their significance has been well emphasized. What differentiates between the curricula is the method of instruction and the diversity of the topics covered in the curricula. It should be noted that the curricula cannot be judged only by their content. The practice and performance of dentists in the target population can also reflect the quality of dental education in the respective country. Accordingly, the curricula should be tailored and naturalized according to the specific requirements of each country. For example, since some diseases are more prevalent in the Iranian communities, further attention should be paid to their instruction, and such topics should be repeatedly discussed to be borne in mind.

Ethical considerations

This study was obtaining ethical approval from Guilan University of Medical Sciences (Approval ID: IR.GUMS.REC.1400.101).

Artificial intelligence utilization for article writing

No

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Conflict of interest statement

The authors have no conflicts of interest to disclose.

Author contributions

All authors participated in the process of planning and conducting the present study and approved the final manuscript.

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Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Appendix 1. Practical courses

Iran	Canada (western) (11)	United States (Pennsylvania) (12)	Australia (Queensland) (13)	United Kingdom (14-15)	Switzerland (Zürich) (16)
Ethics of communication with patients [1] †	-	Patient-clinician communication and departments [6] †	-	obtaining valid consent [18] † liaise with other healthcare professionals (verbally or in written form) [18] †	-
Provision of oral health instruction [1] † Independent provision of necessary instructions [2] †	-	-	-	educate patients concerning the aetiology and prevention of oral diseases [18] †	Oral hygiene instruction and personal measures to prevent caries [20,21] † Oral hygiene instruction [22,23] †
Creating patient profile and screening [1-3] †	-	Taking a history [6] † Primary assessment of patients [7,8] †	Creating a patient profile [9] † Taking a history [10,11] †	Patient assessment [10,11] † Assessment of oral and dental status [12] †	Assessing and recording patient history [18,19] † History [20] † Assessment of history and education [24-27] † Clinical and radiographic examination [20,21] † Assessment of questionnaire and pain history [28] † Obtaining a pain report from the person who refers the patient [28] †
Familiarity with normal indices [1] †	-	-	-	-	Diagnosis of normal conditions and normal variations [24] †
Intra- and extra-oral examination [1,3] † Complete examination of the TMJ [2] †	Intra- and extra-oral examination [4] †	Physical examination steps [6] † Physical dental and orofacial examination (head and neck and cranial nerves) [6] †	Comprehensive dental examination (clinical simulation) [9] †	General oral examination [13,14] †	Intra- and extra-oral examination [18,19] † Comprehensive intra- and extra-oral and dental examinations [20] † Clinical examination of salivary glands and analysis of saliva [20] † Emergency examinations [24-27] † Clinical examination of pain [28] †
-	Blood pressure measurement [5] †	-	-	-	Vital signs measurement [18] †
-	-	Reassessment of patients (except for ASA1) [7,8] †	-	-	Recall [21] †
-	-	-	-	-	Appropriate referrals [19] †
Oral and maxillofacial manifestations [2] †	-	-	-	-	Causes and effects of oral diseases (for prevention, diagnosis and management) [19] †
Dental considerations in systemic patients [2] †	-	-	General medications [11] † Medically compromised and disabled [11] †	General medications (moderate complexity) [15,16] † Medically compromised and disabled (moderate complexity) [15,16] †	Assessing the patient and providing life support [18] † Effects of systemic diseases and their treatment on dental care [18] †
Completing patient records with oral lesions [2] †	-	-	-	-	Preparation of correct documentation for treatment [28] †
Detection of some oral lesions [1] † Diagnostic workup for a patient with oral lesion [2] †	-	-	Detection and diagnosis of diseases [10,11,15,16] †	Detection and diagnosis of oral and dental conditions [12,13,14,17] †	Pathogenesis and classification of oral diseases [19] † Detection of pathological changes of the oral cavity [25] † Differential diagnosis of orofacial pain [28] †
Evidence-based treatment planning for patients with oral lesions [2,3] †	-	-	Treatment planning [10,11] † Treatment plan for simple general dental needs [13,14] †	Comprehensive treatment planning including referral (moderate complexity) [12] † Comprehensive treatment planning including referral to specialists (higher complexity) [15-17] †	Developing treatment plans [18] † Analysis of results and treatment planning [22,23] † Evidence-based treatment [22,23] † Simple treatment procedures for oral pain [28] †
-	-	-	-	-	Differentiate between odontogenic and non- odontogenic pains [18] †
Differentiating between malignant and premalignant lesions [3] †	-	-	-	-	Clinical features of potentially malignant and malignant lesions [18] †
Requesting a blood test and its interpretation [3] †	-	-	-	-	Using laboratory facilities [19] †
Writing a prescription [3] †	-	-	-	-	Prescribing intra and extra-oral radiographic examinations [18] † Prescribing prophylactic drugs [18] †
Differential diagnosis of xerostomia [3] †	-	-	-	-	-
Treatment of xerostomia [3] †	-	-	-	-	-
Inflammatory lesions [3] †	-	-	-	-	Management of bacterial, viral and fungal infections of oral tissues [18] †
Common soft tissue reactions [3] †	-	-	-	-	-
Common red and white lesions [3] †	-	-	-	-	-
-	-	-	-	-	Various techniques of biopsy [18] †

† Taught topics in the courses: (1) practical course of oral and maxillofacial diseases 1, (2) practical course of oral and maxillofacial diseases 2, (3) practical course of oral and maxillofacial diseases 3, (4) patient assessment 1, (5) introduction to clinics, (6) clinical practice 1, (7) admission and emergency care 1, (8) admission and emergency care 2, (9) dental practice 1, (10) dental discipline A, (11) dental discipline B, (12) dental practice IVA, (13) dental practice IIIA, (14) dental practice IIIB, (15) advanced dental discipline A, (16) advanced dental discipline B, (17) dental practice IVB, (18) Oral and Maxillofacial Surgery, (19) Oral medicine and pathology, (20) preventive dentistry, clinical findings, and diagnosis 1, (21) preventive dentistry, clinical findings and diagnosis 2, (22) clinical course of preventive dentistry, cardiovascular health and endodontics 1, (23) clinical course of preventive dentistry, cardiovascular health and endodontics 2, (24) oral and maxillofacial surgery 1, (25) oral surgery polyclinic, (26) oral and maxillofacial surgery 2, (27) MKG preclinical workshop, (28) oral pain

Appendix 2. Theoretical courses (systemic diseases)

Iran	Canada (western) (11)	United States (Pennsylvania) (12)	Australia (Queensland) (13)	United Kingdom (14-15)	Switzerland (16) Zürich
Patient history [1] †	-	-	Patient history [11-13] †	Patient assessment [11-13] †	Obtaining a relevant medical history [15] †
Vital signs and their monitoring [1] †	-	-	Medically compromised and disabled [11-13] †	Vital signs and behavioral aspects [15] †	-
-	-	-	-	Conditions which may require referral [15] †	-
-	-	-	-	Integration of human body systems, normal homeostasis and mechanisms of responses to insults: trauma and diseases [15] †	-
Cardiovascular diseases and their dental considerations [1] †	-	Anatomy, histology, physiology, and pathology of the cardiovascular system and related dental considerations [6] †	-	-	Cardiovascular diseases (hypertension, atherosclerosis, etc.) [16] †
Hematological and hemorrhagic conditions and their dental considerations [1] †	-	Anatomy, histology, physiology, and pathology of the hematological and lymphatic systems related dental considerations [7] †	-	-	Hematological and hemorrhagic conditions (anemia, thrombocytopenia, leukemia, etc.) [17] †
Hematological and lymphoid lesions [1] †	-	-	-	-	Hematological and lymphatic conditions (lymphadenopathy, lymphatic system neoplasms, etc.) [17] †
Hodgkin and non-Hodgkin lymphoma, Burkitt's lymphoma, and similar lesions [1] †	-	-	-	-	Hodgkin and non-Hodgkin lymphoma, and multiple myeloma [17] †
Gastrointestinal diseases and toxicity- oral manifestations and related medical considerations [1] †	Oral manifestations of metabolic diseases [3] †	Treatment of patients with metabolic diseases [4] †	Anatomy, histology, physiology, and pathology of the gastrointestinal system and related dental considerations [8] †	-	Gastrointestinal diseases (infectious and neoplastic diseases of the oral cavity, esophagus, stomach, duodenum, etc.) [18] †
Hepatic diseases and hepatitis and related dental considerations [1] †	-	-	Anatomy, histology, physiology, and pathology of the hepatic, and bile systems, and their related considerations [8] †	-	Hepatic and gall bladder diseases (hepatitis, cirrhosis, etc.) [18] †
Endocrine diseases, their oral manifestations, and their dental considerations [2] †	oral manifestations of endocrine diseases [3] †	-	Anatomy, histology, physiology, pathology, endocrine system, and their dental considerations [8] †	-	Endocrine gland diseases (thyroid, pituitary gland, diabetes mellitus, adrenal gland, etc.) [19] †
Renal diseases and their dental considerations [2] †	-	-	Anatomy, histology, physiology, and pathology of the renal system and their correlation with dental procedures [6] †	-	Renal diseases (glomerulonephritis, renal failure, neoplasm, kidney stone, etc.) [19] †
Allergy and immunological diseases, their oral manifestations and their dental considerations [2] †	-	-	-	-	Allergy [17] †
Infectious and sexually transmitted diseases, their oral manifestations, and their dental manifestations [2] †	-	-	Important infections in dentistry (oral and non-oral) [14] †	-	Rheumatic diseases (rheumatoid arthritis, etc.) [17,20] †
AIDS [2] †	-	-	-	-	Important infectious diseases and fever (meningitis, encephalitis, tuberculosis, influenza, etc.) [17] †
Neuromuscular diseases and their dental considerations [2] †	-	-	Anatomy, histology, physiology, and pathology of the nervous system and their correlation with dental procedures [7] †	-	HIV [17] †
Respiratory diseases, their manifestations, and their dental considerations [2] †	-	-	Anatomy, histology, physiology, and pathology of pulmonary diseases and their correlation with dental procedures [6] †	-	Neurodegenerative diseases I, II (epilepsy, Parkinson's, dementia) [21] †
Dental considerations in pregnancy and nursing [2] †	-	-	-	-	Neural-vascular diseases (CVA, syncope) [21] †
Nutritional diseases, their oral manifestations, and their dental considerations [2] †	-	-	-	-	Neural-immunological diseases (MS, myasthenia gravis, and Guillain barre syndrome) [21] †
-	-	-	-	-	Respiratory diseases (pneumonia, chronic obstructive pulmonary disease, bronchial cancer, etc.) [16] †
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	Pancreas diseases [18]
-	-	-	-	-	Psychological conditions in dentistry (anxiety disorders, emotional disorders, autism, substance abuse, etc.) [19] †
-	Systemic diseases and tooth destruction [5] †	Diseases that directly affect the oral and paraoral structures [9] †	-	Systemic conditions and associated treatments and their effects on oral health [15] †	Psychological conditions (sleep disorders, etc.) [21] †
-	-	Oral manifestations of systemic diseases with a focus on pathology [10] †	-	Oral manifestations of systemic diseases [15] †	-
-	-	-	-	Potential drug interactions [15] †	-

† Taught topics in the courses: (1) systemic diseases 1, (2) systemic diseases 2, (3) oral diseases 3, (4) oral medicine, (5) patient assessment 3, (6) biological systems 5, (7) biological systems 8, (8) biological systems 6, (9) oral medicine, (10) oral and maxillofacial complex 3 (diagnosis, radiology, and pathology), (11) dental discipline B, (12) advanced dental discipline A, (13) advanced dental discipline B, (14) immunology and microbiology for dentistry, (15) Oral and Maxillofacial Surgery, (16) general medical topics 1 (internal medicine), (17) general medical topics 3 (general surgery and internal medicine), (18) general medical topics 2 (internal medicine), (19) general medical topics 4 (internal medicine and psychology), (20) myoarthopathy and orofacial pains, (21) general medical topics 5

Appendix 3. Theoretical courses (oral and maxillofacial diseases)

Iran	Canada (western) (11)		United States (Pennsylvania) (12)		Australia (Queensland) (13)		United Kingdom (14-15)		Switzerland (16) Zürich				
Scientific workup of patient management (from history to treatment and follow-up [1] †	Patient management (including diagnosis, symptoms helping diagnosis, prognosis, treatment plan, systemic diseases, and contraindications of treatment plan [9] †		Clinical and radiographic findings and their interpretation, conditions affecting dental treatment, medical consultation [16] †		Detection of diseases and their treatment plans including referrals [22-25] †	Detection of common oral and dental conditions and their treatment plans including referrals (simple, moderate, and complicate general dental needs [26-29] †	Selection and interpretation of investigations for oral and head and neck diseases [32] †	Appreciation of the relative incidence of lesions and conditions [32] †	Developing treatment plans [33] †	-			
Comprehensive approach towards patients [1] †	-		-		-		-		-				
principles of examination and its different methods: subjective and objective symptoms [1] †	Intra-oral and extra-oral examinations [10] †		Physical examination [16] †	physical diagnosis [16] †	General oral examination [26,27] †	Intra-oral and extra-oral examinations [32] †		Clinical examination of orofacial pains [34] †					
Natural intraoral indices [1] †	Intraoral and extraoral indices [10] †	Developmental characteristics (tongue, torus, etc.) [11] †		-		natural intraoral structures [30] †	-		Mucosal membrane [35] †	Oral ecosystem and bacterial equilibrium [35] †	Oral and maxillofacial anatomy [36] †		
Cranial nerve examination [1] †	-		-		-		-		Innervated areas by cranial nerves I and II [37] †				
Examination of lymph nodes [1] †	-		-		-		-		-				
Examination of salivary glands [1] †	-		-		-		-		-				
Thyroid gland examination [1] †	-		-		-		-		-				
TMJ examination [1] †	-		-		-		-		Muscular facial disorders [37] †				
-	-		-		-		Prescribing and assessing intra and extra-oral radiographic examinations [33] †		-				
Different types of cervical masses and their differentiation principles [1] †	-		-		-		Differential diagnosis [32] †		Clinical treatment of malignant head and neck tumors [38] †				
Taking a history [1] †	-		Taking a history [16] †	Assessment of medical conditions [16] †	Taking a history [22] †	Patient assessment [22,28,29] †	Principles of history taking [32] †		-				
-	-		Allocation of ASA group to patients [16] †		-		-		-				
Classification of common oral and maxillofacial lesions [2] †	-		Detection of oral diseases and their management [17] †		Introducing common oral and dental diseases [30] †	Epidemiology, etiology, pathology and prevention of oral conditions [31] †	Understanding the range of diseases that may present in the oral cavity and associated tissues of head and neck [32] †	Clinical features associated with oral mucosal diseases [33] †	-				
-	-		-		-		Conditions which may require referral [33] †		-				
Common ulcerative oral lesions [2] †	Aphthous ulcers [11] †	Physical and chemical injuries [11] †	Acute and chronic ulcers [12] †	Recurrent ulcers [12] †	-		Ulcerative conditions of oral mucosa [33] †	Traumatic injuries (physical, chemical and thermal) [32] †	-				
Common mucocutaneous lesions (vesiculobullous, viral, immunologic) [2] †	Cutaneous lesions [11] †	Infections (bacterial, fungal, viral) [11] †		Oral manifestations of pathologic immunological and infective mechanisms [18] †	Bacterial, viral, and fungal diseases [19] †	-		Local and systemic infections, immunopathologic conditions and granulomatous conditions [32] †	Eukaryotic microorganisms: oral fungal infections [39] †	Viral diseases [39,40] †	General bacterial diseases [40] †	Oral infections [38] †	Bullous oral mucosal lesions [41] †
-	Connective tissue lesions [11] †	Connective tissue diseases (fibrotic, adipose, vascular) [12] †		-		-		-		Fibrotic lesions and keratinization disorders [40] †			
-	Diseases of the tongue [12] †		-		-		-		Chancre and changes in the tongue [40] †				
Developmental maxillofacial lesions [3] †	-		Oral manifestations due to developmental abnormalities and genetic mutations [18] †	Disorders related to developmental craniofacial mechanisms [20] †	Specific abnormalities [16] †	-		Developmental conditions (facial bones and jaw) [32] †	Developmental abnormalities [33] †	Oral and maxillofacial disorders [41,42] †			
-	-		-		-		Dermatological conditions affecting oral mucosa [33] †		Dermatoskin lesions [40] †				
Endogenous pigmented lesions: melanotic and non-melanotic [4] †	Pigmented lesions [11,12] †		-		-		Oral mucosal Pigmentation [32] †		Melanoma [40] †	Pigmented mucosal lesions [41] †			
-	-		-		-		Soft tissue cysts, dermoid, branchial and thyroglossal [32] †		-				

Appendix 3. Theoretical courses (oral and maxillofacial diseases) (continued)

Iran	Canada (western) (11)		United States (Pennsylvania) (12)	Australia (Queensland) (13)	United Kingdom (14-15)				Switzerland (16) Zürich		
White and red infectious, reactive, inflammatory, and immunological lesions [4] †	White lesions [12] †	Reactive lesions [12] †	Oral manifestations due to inflammation [18] †	-	White sponge naevus [32] †	Hyperplasia (like PGCG) [32] †	Keratosis and white lesions [32] †	Allergic reactions [40] †	Exanthematic and granulomatous lesions [40] †	Soft tissue inflammation [38] †	Autoimmune diseases [38,40] †
White and red premalignant and malignant epithelial lesions [4] †	Epithelial lesions [11] †	Metastatic lesions [11] †	Terminology of benign and malignant [12] †	-	Pre-malignancy, SCC, BCC, lymphoma, leukemia [32] †	Benign mucosal conditions [33] †			Oral carcinoma [43] †		Leukoplakia [38,41] †
Extra-bony exophytic lesions [4] †	-	-	-	-	-	-	-	-	-	-	-
Management of pathological lesions [4] †	-	-	-	-	-	-	-	-	-	-	-
Different types of biopsy [4] †	-	-	-	-	biopsy procedures for the mouth [32] †	biopsy techniques suitable for deep structures of the head and neck [32] †			Principles of biopsy [38] †		
-	Red and blue lesions [12] †	-	-	-	-	-	-	-	-	-	-
Odontogenic and non-odontogenic cysts [5] †	Odontogenic and non-odontogenic cysts [11] †	-	-	-	Odontogenic and non-odontogenic cysts [32] †			Dental cysts [38] †	Non-odontogenic cysts [38] †		Treatment of odontogenic cysts [38] †
Odontogenic tumors [5] †	Odontogenic tumors [13] †	-	-	-	Odontogenic tumors [32] †				Ameloblastoma [38] †		Odontogenic tumors [41] †
Tumors with ectodermal origin [5] †	Peripheral nerve tumors [13] †	-	-	-	-	-	-		Benign skin and oral mucosal tumors [40] †		Epithelial tumors [38] †
Mixed tumors [5] †	-	-	-	-	-	-	-	-	-	-	-
Ectomesenchymal tumors [5] †	Skeletal and cartilaginous neoplasms [13] †	Muscular tumors [13] †	Myeloma [13] †	-	-	-	-				Mesenchymal tumors of the jaw [41] †
Clinical manifestations of intraosseous lesions [5] †	-	-	-	-	Giant cell and other lesions of bone [32] †	Fibro-osseous lesions [32] †	Bone neoplasms [32] †	Primary or metastatic malignant bone diseases [33] †	-	-	-
-	Lymphoid tumors and lesions [13] †	-	-	-	-	-	-				Hematological tumors of the oral cavity [38] †
-	-	-	-	-	Facial pain of non-odontogenic origin [33] †				-	-	-
Practical anatomy of salivary glands and ducts [6] †	-	-	-	-	-	-	-	-	-	-	-
Saliva: composition and function [6] †	-	-	Physiology, anatomy, and function: saliva, mastication, speech, deglutition, smell, taste [21] †	-	-	-	-				Saliva and its secretion [35] †
Xerostomia and oral mucosal burning [6] †	Xerostomia [12] †	-	-	-	Disturbances of salivation (Xerostomia, sialorrhea) [32] †						Xerostomia and multiple caries [40,44] †
Halitosis [6] †	-	-	-	-	-	-	-				Halitosis [44] †
Salivary gland diseases [6] †	Salivary gland diseases with special emphasis on their pharmaceutical treatment [7] †	Neoplasms and diseases of salivary glands [13] †	-	-	Salivary gland diseases (Developmental, obstruction and infections) [32] †	Salivary neoplasms [32] †	Salivary gland diseases [41,42] †				Histological changes of salivary glands [41] †
Salivary cysts [6] †	-	-	-	-	Salivary gland cysts [33] †						-
Benign and malignant salivary tumors [6] †	-	-	-	-	Benign and malignant salivary tumors [33] †						-
Cytology and biopsy [6] †	Biopsy and cytology [13] †	-	-	-	-	-	-				-
Osteomyelitis of the jaw [8] †	Osteomyelitis [14] †	-	-	-	Osteomyelitis [32] †						Osteomyelitis [38] †
Osteoradionecrosis [8] †	Effects of radiotherapy on oral mucosa [13] †	-	-	-	Radiation exposure and its effects on tissues [32] †	Osteoradionecrosis [32] †					-
Management of osteoporotic patients under bisphosphonate therapy [8] †	Dental consequences of bisphosphonate intake [15] †	-	-	-	Bisphosphonate – associated osteochemonecrosis [33] †						Osteoporosis: diagnosis and treatments [36] †

† Taught topics in the courses: (1) diagnostic dentistry 1, (2) diagnostic dentistry 2, (3) oral and maxillofacial discrepancies, (4) diagnostic dentistry 3, (5) diagnostic dentistry 4, (6) diagnostic dentistry 5, (7) ear, nose and throat, (8) theoretical course of oral and maxillofacial surgery, (9) diagnosis and treatment planning, (10) patient assessment 1, (11) oral diseases 2, (12) patient assessment 3, (13) oral diseases 3, (14) oral diseases 1, (15) oral medicine, (16) oral diagnosis and emergency medical clerkship, (17) oral and maxillofacial complex 3 (diagnosis, radiology, and pathology), (18) foundation sciences 3, (19) foundation sciences 4, (20) biological systems 1, (21) oral and maxillofacial complex 4, (22) - dental discipline A, (23) - dental discipline B, (24) advanced dental discipline A, (25) advanced dental discipline B, (26) dental practice IIIA, (27) dental practice IIIB, (28) dental practice IVA, (29) dental practice IVB, (30) dental sciences 1, (31) dental sciences 2, (32) Oral medicine and pathology, (33) Oral and Maxillofacial Surgery, (34) myoarthropathy and orofacial pains, (35) oral histology and physiology, (36) general medical topics 3 (general surgery), (37) general medical topics 5 (neurological), (38) oral pathology, (39) general microbiology and principles of medical microbiology, (40) general medical topics 2 (principles of dentistry and skin), (41) oral and maxillofacial pathology, (42) scientific principles of medicine and dentistry, (43) general medical topics 4 (rhinopharyngeal), (44) preventive dentistry