

# **Model Core Curriculum for Dental Education in Japan**

**AY 2022 Revision**

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**About notation, etc.**

- Numbering hierarchy of the “major domains”, “medium domains”, “minor domains” and “learning objectives” in Chapter 2 is as follows: ABC, 123, 123, 123, 123.
- Dental terminology is consistent with the contents of the Japanese Association for Dental Science, “Japan Dental Terminology”, 2nd edition (Japanese Association for Dental Science, ed.).
- Parentheses denote a synonym, explanation, or example of the preceding term.  
Ex: Scientific research (clinical research, epidemiological research, and life science research)
- In principle, persons’ names are written in their original languages.
- Group and organization names are to exclude portions indicating corporate status.
- The verb “being able to perform” used in the learning objectives for skills and attitudes indicates direct performance on patients in clinical practice. “Being able to demonstrate” indicates skills and attitudes in simulated environments such as simulation training and peer-clinical experience, which shows the preliminary step before moving to “being able to perform” with patients in postgraduate clinical training. “Experience” indicates items that deepen understanding through observation, assistance, etc.
- The verb “understanding” used in the learning objectives indicates “composing meanings from messages presented verbally, in writing, in charts, etc., in lectures, practical trainings etc.,” and encompasses the meaning of other verbs such as “interpret”, “illustrate”, “classify”, “summarize”, “infer”, “compare”, and “describe/explain”. (Referring to the categories of Anderson et al.’s “Revised taxonomy” as presented in Terumasa Ishii, “Development of theories of educational objectives and assessment in the United States: Designing standards-based curriculum” (Toshindo, 2011), with some modifications.)

## **Model core curriculum for dental education—Revision background**

### **1. Positioning in university education**

- **Structure of the model core curriculum**

The model core curriculum is an abstraction of the “core”, within the respective “curriculum” formulated by each university, which should be taught in common by all universities; and systematically organized as a “model” of what that core contains. Therefore, as has been noted previously, the specific dental education of each university will assign approximately 60% of learning hours based on the model core curriculum, with the remaining 40% devoted independently and autonomously to the respective university’s own admission policy, curriculum development and implementation policy, graduation approval, degree conferral policy, and so forth.

To raise the practicability of these efforts, revision committees have strived to streamline the model core curriculum. However, we also wish to emphasize that the knowledge and skills required for the advancement of dentistry and medical care are not to be gained entirely in undergraduate education; rather, it is necessary to show in detail what is to be gained at the undergraduate level, with the understanding that dentists will continue to learn throughout their lives. In addition, in the training of future dentists, who are expected to implement health care to solve various problems of patients, the general public, and societies in this difficult-to-predict era, including emerging and re-emerging infectious diseases, in addition to further advances in information and scientific technology, it is necessary to acquire the skills to think spontaneously and to develop leadership, however an over loaded curriculum is not necessarily desired.

The criteria for the examinations to be shared by universities to evaluate whether students have the knowledge and skills that they should acquire before starting clinical practice (hereinafter referred to as “common achievement tests”) are to be discussed by a Common Achievement Tests Organization. The significance of the model core curriculum will become even more important with officialization of common achievement tests, since they refer to the model core curriculum which publishes the common learning objectives for each university with carefully selected basic contents.

- **Further promotion of clinical practice and participation in care**

The “Law to Amend the Medical Care Law in Establishing a System that Provides High Quality Medical Care” \*\* (No. 49, 2021), enacted on May 21, 2021, revised the Dental Practitioners Act (No. 202, 1948). Undergraduate students majoring in dentistry at universities and who have passed common achievement tests are allowed to practice dental treatments under supervision of dentists during clinical practice to acquire the knowledge and skills required as dentists (effective from April 1, 2024). The legal status of dental students’ dental practice in this clinical training is expected to promote the enhancement of practical clinical practice and participation in care and further improvement of the

undergraduate education's quality. In clinical practice and participation in care, students are expected not only to acquire knowledge, skills, and proper attitudes, but also to cultivate thinking, response, and practical skills related to diagnoses and treatments in the clinical settings, as well as motivation to conduct research through clinical practice during the experience of treating actual patients.

Therefore, universities are required to guarantee the aptitude and quality of students participating in clinical practice, and to further promote clinical practice and participation in care, while giving due consideration to patient safety and protecting patient privacy. We hope that the model core curriculum, including the clinical training implementation guideline will help in this regard.

## **2. Basic principles and background**

- **Catchphrase: “Fostering healthcare professionals who can play an active role by connecting diverse situations and people, with a view toward future society and regions”**

The model core curriculums for medical, dental, and pharmaceutical education have been revised simultaneously also considering the new coronavirus infection pandemic, the advancement of medical technology utilizing information and scientific technology such as artificial intelligence, and changes in medical care due to the increase in patients with multiple coexisting diseases in a super-aged society. In this revision, we adopted a unified catchphrase for the three fields of medical, dental, and pharmaceutical education, aiming to nurture healthcare professionals who can play an active role by connecting diverse situations and people, with a view toward the ever-changing society and regions in the future.

Society is faced with various problems such as demographic changes, coexistence of multiple diseases, death-ridden society, health disparities, increasing medical costs, emerging and reemerging infectious diseases, and disaster risks, these social structural changes are expected to further intensify as years go by.

Students are required to nurture the qualities and skills that are fundamental to being healthcare professionals, to work in complex collaboration in multiple professions, and to play an active role in the diverse and evolving changes in society. In addition, perspectives that consider the values of patients and their families and an altruistic attitude are important. As the environment surrounding medical care is changing dramatically with the advancement of medical care and technology, and furthermore, the information handled in the medical field, including information and science technology such as artificial intelligence, is expanding in both quality and quantity, the professionals are also expected to contribute to society by making appropriate use of such information and technology.

This revision has been made with the above catchphrase in mind in order to foster healthcare professionals who can accurately grasp the situation in such a society, respond flexibly to changing times and difficult-to-predict matters in cooperation and collaboration with multiple professions, and also remain active throughout their lives.



- **Qualities and skills commonly required in medicine, dentistry, and pharmacology, with a view to the 2040 society and beyond**

In addition to the six-year undergraduate education, a certain period of time is required for the training of dentists, including postgraduate clinical training and specialized training. Therefore, it is necessary to revise the model core curriculum, assuming a society after 2040, when students will be active as healthcare professionals after completing this specialized education. Japan's elderly population is expected to peak around 2040, and the aging rate is projected to continue rising even after that. In line with this, the proportion of patients with underlying diseases and those with various social backgrounds are expected to increase, and healthcare professionals will be required to take a comprehensive view of these patients and the general public. Furthermore, coupled with the decline in the working-age population, their burden is expected to increase further in Japan in the future and geographically speaking, the population is expected to decrease by 50% in about half of all residential areas in Japan. In response to this rapid demographic change, it is socially important to train healthcare professionals who can handle the drastically changing demands regarding medical care. In addition, although there is a limit to the extent to which all of the new science and technology that may be utilized in the medical/clinical field in the future can be incorporated into the model core curriculum in undergraduate education, it is necessary for students to acquire the ability to utilize basic information, science and technology, including ethics. For these reasons, two new qualities and skills, a "Comprehensive stance toward patients and the general public" and the "Ability to utilize information, science and technology", were added to those of the AY 2016 revised model core curriculum for dental education (hereinafter "previous version/edition").

In addition, the basic qualities and skills required as healthcare professionals are common regardless of the field of specialty. Therefore, in this revision, the three fields of medicine, dentistry, and pharmacology have been standardized in principle regarding the "required basic qualities and skills". It is important to promote horizontal coordination of education in the undergraduate stage in multiple professions and to share common values as healthcare professionals.

- **Consistency before and after graduation**

The revision committees consulted with relevant institutions and agencies regarding consistency in undergraduate education (including common achievement tests), the national examination, postgraduate clinical training, and lifelong learning. The revision committees wish to state that they performed the revision with the aim of achieving a seamless education beginning before and continuing to after graduation. We also wish to express our gratitude to whom it may concern. Measures to ensure consistency with related systems for dentist training such as publicizing common achievement tests and clarifying the legal status of dental practice by dental students, standards for national

examinations, postgraduate clinical training attainment goals, have been made concrete to further promote consistent and seamless undergraduate and postgraduate training of dentists.

### **3. Requirements of dental students**

To achieve the main object of this revision—can play an active role by connecting diverse situations and people—students must approach the concepts of dentistry and dental care from a broad perspective.

For example, one of the roles required as dentists today is preventive medicine. In other words, in considering comprehensive medical care, it is necessary to consider not only diagnoses and treatments of diseases, but also disease backgrounds and to recognize the importance of the social determinants of health, sports, exercise, nutrition, and nutrition education. In terms of having a broad perspective, it is also important to recognize that each patient has their own social life and that what we see in the clinical setting including in-home healthcare is only one aspect of their life. If students approach their studies including clinical practice with these in mind, they will be able to achieve more meaningful results.

“Can play an active role by connecting diverse situations and people” means not only the passive aspect of responding to diverse demands and changes that will occur in the future, but also the ability to form diverse career paths as dentists and to have diverse chances. In fact, the majority of dentists today are engaged in clinical service/work, but there are also dentists who have advanced into diverse fields such as research, including basic dental science, legal and social dentistry, civil service such as health department work, administration including health centers, or education including school health or other fields. Even as a clinical dentist, one might not only perform regular care in a dental institution, but also make various social contributions including community education, policy reform, and participation in international health and medicine activities. In the age of people living to be centenarians, the revision committees wish to add that such activities are not only selected at the undergraduate stage, but can also be chosen in a variety of ways after graduation as well.

And even after one has selected the path that they wish to pursue from a variety of options, it is important to continually maintain a broad range of medical interests throughout one’s career. For example, although one might choose the clinical path, they need to maintain a research mindset and awareness while performing care; if one conversely chooses a research path, they need to always make efforts to keep in mind the current state of clinical settings as they pursue new medical discoveries in health care. It is also easy to imagine that they will be asked to be aware of different positions or situations and to collaborate with dentists who have chosen other options. Still further, it is imperative that one not only builds relationships with fellow dentists, but also with the many individuals who work in the fields of dentistry and dental care, and with others as a member of society maintaining various interests, to fulfill the purpose of “can play an active role by connecting diverse situations and people”.

Finally, the revision committees desire that newly enrolled students would sense from their very first lesson that

academic achievement stands upon the efforts of those who have gone before them—that academic knowledge is a noble pursuit. Let each student be aware that since the dawn of time, precious life has underpinned all aspects of our existence, and may they feel the sanctity of life as they approach clinical experience and practice, anatomy practice, and other learning. Dental students must also not forget that the cooperation of not only the university faculty, but also of the patients, and others involved outside the university in dental education, are what make their learning environment possible. For these reasons, a dental student should understand their self and maintain a sense of gratitude and respect at having obtained the opportunity to learn dentistry through the support of many others; and should give back to society what they have learned and assume a leadership role in the community, ever striving for self-improvement throughout life so that dentistry and dental care may continue to advance into subsequent generations. More than anything, a dental student must maintain high ethical standards, education and a cultivated mind as a member of society.

#### **4. Requests to all involved in dental education**

Collaboration of universities with related organizations including administration such as the Dental Association and hospital organizations is expected during implementation of clinical practice and participation in care and early clinical exposure as a motivation for students. In particular, community healthcare institutions are asked to provide cooperation in the clinical practice of each university in order to realize and enhance the education of qualities and skills related to a “comprehensive stance toward patients and the general public” which was newly added in this revision. Dental education and, above all, clinical training, is expected to have become aligned much more than before with regional healthcare-related dentistry and the community-based integrated care system.

Additionally, in postgraduate clinical settings, the perspectives of team-based health care and interprofessional collaboration require wide collaboration not only from dental or healthcare practitioners, or licensed professionals, but many others as well. The revision committees therefore request the kind cooperation of such healthcare providers and institutions from the undergraduate stage, to enable education that reflects these factors. Each university is asked to ensure that there is sufficient time for experiments and practice so that the required study contents can be adequately guaranteed.

We ask also for education to be conducted with consideration of the above “requirements of dental students”.

#### **5. Request for cooperation and communication to the patients and the public**

Under the revised Medical Care Act, etc., dental practice/treatments performed by dental students are now legally positioned. As expressed in the above “requirements of dental students”, the understanding of patients from among the public who participate in clinical practice and participation in care is indispensable for smooth and safe implementation. As shown in the “clinical training implementation guideline” in this model core curriculum, to

gain the cooperation of the public in the clinical practice and participation in care, it is desired that each university communicate to the public the necessity and importance of dental education. The following sample “request for patient and public cooperation” or similar format use is one of the ways it is possible.

In addition, the Ministry of Education, Culture, Sports, Science and Technology and the Ministry of Health, Labour and Welfare are required to inform and educate the public and patients visiting university hospitals about the role they play as educational institutions, to foster patients’ understanding, and to create environments to implement smooth clinical practice and participation in care. Similarly, it is necessary to promote appropriate consent acquisition and awareness-raising activities at hospitals and places other than university hospitals that accept students for clinical practice.

## **“Request for patient and public cooperation” Sample**

### **Request for patient and public cooperation**

To nurture healthcare professionals, the participation of patients and their families is indispensable. In 2021, the Dental Practitioners Act was revised, and students majoring in dentistry at universities and who pass a common university examination (hereinafter “common achievement tests”)\* to assess whether they have the knowledge and skills that they should acquire before starting their clinical practice may conduct dental practice/dental treatment under the guidance and supervision of dentists during their clinical training. Dental students acquire the necessary qualities and skills through various forms of direct contact with patients and people requiring nursing/long-term care mainly through clinical practice. Thanks to your cooperation, we will also be able to “give back” to the community in the form of provision of good dental care, and to further advancements in dentistry and dental care. We therefore request your kind assistance in contributing to the education of dental students in the university hospitals, and other areas.

\*A third-party institution, the Common Achievement Tests Organization (CATO), administers Computer-Based Testing (CBT) to confirm knowledge, and the Objective Structured Clinical Examination (OSCE) to confirm skills and professional attitude, utilizing the cooperation of mock patients.

## Model core curriculum for dental education - Revision overview

The model core curriculum was revised based on the following 5 basic policies.

1. Substantiation of “required qualities and skills for dentists”
2. Reorganization of basic learning objectives to be acquired/competent in, in light of the super-aged society
3. Addition of learning strategies and assessments
4. Partial communization of content between the medical/pharmaceutical and dental model core curricula
5. Verification of the appropriateness regarding the total number of learning objectives

### I. Revision policy

Six years have passed since the previous edition was established, and it is necessary to address issues such as the promotion of medical and dental collaboration/cooperation to practice patient-centered care in accordance with changes in social conditions. Also, the background of this revision is the need to keep up with ever-evolving medical care, such as the rapid development of Information and Communication Technology (ICT), which has led to the application of telemedicine and diagnostic medicine using Artificial Intelligence (AI), and the need to learn about information literacy and personal information protection as a healthcare professional and medical ethics that are changing with the times.

#### 1) Enhancement of outcome-based curriculum

In this revision, the “required qualities and skills for dentists” (hereinafter “qualities and skills”) are positioned as qualities and skills of healthcare professionals to be acquired through life-long learning, and the vision of future dentists is clearly outlined. Also, outcome-based curriculum was enhanced by listing competencies as milestones that dental students must have upon graduation in order to advance to postgraduate clinical training, which provides a guidepost for the first steps toward becoming dentists. For the convenience of students and educators, the description of learning objectives in Chapter 2 conforms to the structure of the previous version/edition.

#### 2) Changes to the model core curriculum’s structure

In the previous version/edition, only the learning objectives were presented in the 7 major domains: “A. Basic qualities and abilities required of a dentist”, “B. Society and dentistry”, “C. Life science”, “D. Dental devices (dental materials, equipment, and instruments)”, “E. Clinical dentistry”, “F. Simulation training (pre-clinical practice (model practice using mannequin) and peer-clinical experience)”, and “G. Clinical practicum”. This revision is composed of 3 chapters: “A. Basic qualities and abilities required of a dentist” of the previous version/edition is now an independent chapter (chapter 1) so as to clearly indicate the competencies, qualities and skills that healthcare professionals should prepare and be able to demonstrate by the time of graduation. In chapter 2, the learning objectives are presented in 5 major domains: “A. Life science”, “B. Dental materials and devices”, “C. Society and dentistry”, “D. Clinical dentistry”, and “E. Medical examination, diagnosis and clinical skills” and the placement of major and medium domains was reordered in consideration of the goals and the order of learning.

### **3) Revision of learning objectives based on the social needs**

According to the results of questionnaires administered in AYs 2020 and 2021 to clinical training supervising dentists, clinical trainee residents, prefectural dentists and other dental professionals by the revision committees, “flow of a sequence of dental treatments” (“skill to diagnose”, “clinical reasoning”, “skill to plan treatment”, and “basic clinical skills”), “responding to a super-aged society” (“interprofessional collaboration”, “geriatric dentistry”, and “systemic management”, “infection control measures”, and “information literacy”) were selected as learning objectives that should be reinforced in the next model core curriculum. To reflect these opinions, learning objectives related to these objectives were newly set up in the “D. Clinical dentistry” and “E. Medical examination, diagnosis and clinical skills”. In particular, “clinical reasoning” was newly added from this revision and its learning objectives were decided with the intention of leading up to postgraduate clinical training.

To respond to the super-aged society, fostering human resources who are able to offer comprehensive and successive community-based health care through cooperation with related organizations of medical care, social welfare, and nursing care, etc. in the local community was described in this revised edition. Also, the revision of the postgraduate clinical training system for dentists issued on March 31, 2020, included fostering dentists who would play a role in the community-based integrated care system and a new postgraduate clinical training program for dentists began from April 2022. Therefore, in this model core curriculum, learning objectives to cultivate the skill of responding to the super-aged society were listed in “C-1-3 Team-based health care” under “C. Society and dentistry”, “D-6 Interprofessional collaboration / Team-based health care / Regional health care” under “D. Clinical dentistry”, and “E-6 Interprofessional collaboration, team-based health care, regional health care” under “E. Medical examination, diagnosis and clinical skills”. In particular, learning objectives were described in “E-6 Interprofessional collaboration, team-based health care, regional health care” so that students would be aware of the role of dental care in the community-based integrated care system, leading up to their postgraduate clinical training based on their experience in medical care and welfare areas.

### **4) Advancement of qualities and skills by enrichment of clinical practice and participation in care**

The revised Dental Practitioners Act in 2021 clarified that “dental students who have passed the common achievement tests may perform dental practice in clinical training”, which is expected to increase the public’s understanding of dental students’ treatments during clinical practice and participation in care. The common achievement tests before clinical training have become official (legalized), and are scheduled to be implemented, based on the Dental Practitioners Act, from 2024. In this revision of the model core curriculum, we have reviewed the learning objectives and clinical training implementation guideline, taking the above into consideration.

In the previous version/edition, the major domains of “F. Simulation training (pre-clinical practice (model practice using mannequin) and peer-clinical experience)” and “G. Clinical practicum” were established to set learning objectives regarding skills education to be enhanced. In this revision, “simulation training” and “clinical practice” are considered as learning strategies and these two areas are summarized into a major category of “E. Medical examination, diagnosis and clinical skills” and the learning objectives are presented based on the prerequisites that students will learn practical methods through simulation practice and then experience them during clinical practice

and participation in care. Following the previous version/edition, cases that students should experience during clinical practice and participation in care are shown in the revised “Contents and categories of clinical practice and participation in care” at the end of the learning objectives of “E. Medical examination, diagnosis and clinical skills” to promote and enrich clinical training.

#### **5) Learning strategies and assessments**

In this revision, Chapter 3 summarizes learning objectives in the area of attitudes and skills, including explanations of learning strategies and assessments that can be used as references when planning curriculum at each university.

The previous version/edition presented a draft guideline for the implementation of clinical practice and participation in care in dental education as a separate volume; however, it has been difficult to fully utilize it in the educational setting. Therefore, in this revision, since the position of dental students in clinical practice changed significantly with the revision of the Dental Practitioners Act in 2021, along with the results of the Ministry of Health, Labour and Welfare’s study on the scope of dental students’ participation in clinical practice, a new “clinical training implementation guideline” was formulated.

#### **6) Partial standardization of content between the medical/pharmaceutical and dental model core curricula**

As health care for super-aged society advances, there has been an increased emphasis on the importance of team-based health care and interprofessional collaboration, and the model core curriculum for dentistry has evolved in the same direction as medicine. In this revision, the model core curriculum was also revised for pharmacology in addition to medicine and dentistry. “Required qualities and skills for dentists“ has been standardized across medicine, dentistry and pharmacology in principle, and the need of the skills and description of required behaviors were added to qualities and skills that meet the requirements of dental education. Further, the learning objectives of medical ethics, information science and information literacy were also standardized as much as possible.

#### **7) Verification of the appropriateness regarding the total number of learning objectives**

The model core curriculum shows the set of learning objectives that can be implemented within approximately 60% of the total curriculum hours drafted by each university. In the constantly advancing society, rapid advances in technologies in medicine and dentistry have forced an increase in the number of items to be learned year by year. In the previous edition, the learning objectives were drastically modified to reduce the entire volume in consideration of the critical opinion “the model core curriculum is too voluminous despite ideally including only the minimal requirements for dental education“. However, expressions of the learning objectives became abstract, and the scope of learning was not clear in some sections. In this revision, all learning objectives were reviewed with the aim of presenting more concrete objectives and to standardize the level of abstraction of the learning objectives as much as possible. Therefore, while the number of learning objectives has increased, the learning contents have become clearer and more appropriate.

#### **8) Organization of dental terminology**



Consistency of terminology is important for seamless undergraduate education, postgraduate clinical training, and lifelong learning. Therefore, terms in accordance with the Japanese Association for Dental Science “Japan Dental Terminology”, 2nd edition (Japanese Association for Dental Science, ed. 2018) were used in principle. Terms that were not included in the glossary were used by referring to the standard of AY 2023 National Dental Practitioners Examination and glossaries published by the dental/medical-related societies. The names of diseases, syndromes, examinations, etc. with peoples’ names are written in the original text to ensure consistency with the AY 2023 National Dental Practitioners Examination Standards.

## **9) Dissemination to the world**

To disseminate Japanese dental education to the world and gain recognition, this revision was translated into English (posted on the MEXT website).

## **II. Revision in specific subjects**

### **Chapter 1. Qualities and skills**

“A. Basic qualities and abilities required of a dentist” of the previous edition is now an independent chapter (chapter 1) and the expressions of the qualities and skills section was revised. Also, “Ability to utilize information, science and technology” and “Comprehensive stance toward patients and general public” were added and the number of qualities and skills to be acquired was set to 10 items. Furthermore, the purpose of acquiring each of the qualities and skills is explained. Since “Management of quality of care and patient safety” in the qualities and abilities of the previous edition is content that indicates behaviors in clinical setting/medical practice, it was purposely not included in Chapter 1 but was added to the learning items of Chapter 2 to specifically indicate the learning objectives.

The newly added “Ability to utilize information, science and technology“ is based on the opinion that in the medical field, same as other fields, information technology is rapidly advancing, and therefore it is necessary to acquire the skills to correspond with this trend. Thus, in response to the ever-developing information society, the learning objectives for the use of artificial intelligence and medical information data in the clinical setting/medical practice were examined.

“Comprehensive stance toward patients and general public“ is the skill to provide medical care that is attentive to patients, taking into account their psychological and social backgrounds, without being limited to the areas of expertise, and what is needed in terms of this skill were examined.

In the “Scientific inquiry“ section, the perspective of training dental researchers was taken into account.

In this revision, “Required qualities and skills for dentists“ are determined to be learned and improved throughout one’s life as a dentist. In addition, milestones (goals to be attained) by the time of graduation are presented in an assessable format in order to seamlessly connect to postgraduate clinical training and lifelong learning.

### **Chapter 2**

#### **A. Life science**

Since qualities and skills are in Chapter 1, “C. Life science“ of the previous edition was changed to “A. Life science“ in consideration of the learning order.

In “A. Life science“, the relevance to the learning of domain C-E: “master the basic knowledge of biological phenomena and knowledge necessary for the etiological and pathophysiological analysis, and acquire a way of thinking necessary for the provision and advancement of medical care“ is shown as a purpose of learning.

The objectives of “C-1 Basic natural science“ of the previous edition were moved to “A-1 Molecular basis of life“ and “B-1 Basic properties of materials“ so that learning may develop into the subsequent medium domains.

In all learning objectives, abstract degrees of the expressions were unified as much as possible to make learning contents clear and concrete.

Learning objectives for nosocomial infections were added to “A-4-1 Microorganisms and infection“.

Learning objectives for the oral and maxillofacial region of drugs and instructions for administration of drugs were added to “A-6-4 Basic principles of medication in consideration of adverse reactions and adverse events of drugs“.

The learning objectives of “E-2-1) Basic structure and function of the head and neck“, “E-2-2) Structure and function of the oral cavity“, “E-2-3) Development and age-related changes of the oral and maxillofacial region“ and “E-3-1) Development, structure, and function of the teeth and periodontium“, were integrated into “A. Life science“ so as to arrange the learning objectives.

## **B. Dental materials and devices**

As for the title, “D. Dental devices (dental materials, equipment, and instruments)” of the previous edition, it was changed to “B. Dental materials and devices“. The purpose of learning “master the knowledge of dental materials and devices, and acquire a way of thinking necessary for the provision and advancement of dental care” was added to the major domain as an explanation.

Medium domains were increased from two in the previous edition to three: “B-1 Basic properties of materials“, “B-2 Dental materials” and “B-3 Dental devices” to enrich the descriptions and learning objectives according to the spread of digital dentistry in recent years.

## **C. Society and dentistry**

Considering the learning order, “B. Society and dentistry” of the previous edition was revised to “C. Society and dentistry“. In “C. Society and dentistry“, the learning objective was changed to “acquire the ethical, legal, and social knowledge and attitudes required of dentists in order to provide appropriate dental care“. Objectives in “A. Basic qualities and abilities required of a dentist” of the previous edition were moved and rearranged to “C-1 Medical ethics, bioethics and patient-centered dental care“, “C-2 Problem seeking and solving skills“, “C-3 Ensuring quality of care and patient safety“, “C-4 Health, society and environment“, “C-5 Prevention and health care“, “C-6 Epidemiology and health statistics” and “C-7 Acquisition of global perspectives and contribution to international health care“. In correspondence with the information society, the minor domain of “C-6-3 Health and medical information literacy” was added, based on the discussion with educators in medicine, dentistry, and pharmacology

about learning objectives of mathematics and data science for the purpose of improving medical care quality, and learning objectives necessary for dental students were listed.

Law and system-related learning objectives of the previous edition's "E. Clinical dentistry" were moved to the item "C. Society and dentistry". "B-2-3) Personal identification by dentists" in the previous edition was revised to "C-4-4 Forensic odontology", and new learning objectives were added.

#### **D. Clinical dentistry**

In "D. Clinical dentistry", the learning objective: "Understand the normal and abnormal structure and function of the head and neck region in order to provide safe and secure dental care, and to acquire the basic knowledge and clinical skills necessary for daily examinations" was added as an explanation.

In "D. Clinical dentistry" and "E. Medical examination, diagnosis and clinical skills", in the results of the significant review of the learning objectives in "E. Clinical dentistry", "F. Simulation training (pre-clinical practice (model practice using mannequin) and peer-clinical experience)" and "G. Clinical practicum" in the previous edition, learning objectives were arranged as knowledge needed for treatment provision, examination and diagnosis, and treatment skills.

The order of items was set in accordance to the flow of treatment, making the order as "D-1 Basics of examinations", "D-2 Basic examination and diagnosis", "D-3 Characteristics and etiology of diseases of the head and neck regions", "D-4 Integration, analysis, and evaluation of medical information and treatment planning", "D-5 Basic clinical skills" and "D-6 Interprofessional collaboration / Team-based health care / Regional health care".

The medium domain of "D-2 Basic examination and diagnosis" was newly added and set the learning objective as "Acquire the process and knowledge of diagnosis through obtaining patients' symptoms and abnormalities, selecting appropriate medical examinations and tests", moving and rearranging the learning objectives for knowledge in "G. Clinical practicum".

For "D-3 Characteristics and etiology of diseases of the head and neck regions", we arranged the learning objectives of "E-2 Characteristics of the oral and maxillofacial region in health and disease" and "E-3 Characteristics of the teeth and periodontium in health and disease" in the previous edition and revised it by making additions and exclusions. Detailed exposition of treatment is summarized in "D-5 Basic clinical skills" in consideration of the convenience of learners and educators.

The medium domain of "D-4 Integration, analysis, and evaluation of medical information and treatment planning" was newly added while three minor domains of "D-4-1 Clinical records", "D-4-2 Diagnosis and treatment planning" and "D-4-3 Patient-centered care and informed consent" were set for learning objectives to acquire knowledge of appropriate medical record handling and basic knowledge to develop treatment plans where psychology and health promotion of the patient are considered.

“E-6 Medical knowledge necessary for coordinating with physicians” in the previous edition was changed to the title “D-6 Interprofessional collaboration / Team-based health care / Regional health care” in the light of the current healthcare situation, and learning objectives not only for coordination with physicians but also for team-based health care in dentistry with dental hygienists and dental technicians and cooperation with dental specialists and other specialists were added.

### **E. Medical examination, diagnosis and clinical skills**

“E. Medical examination, diagnosis and clinical skills” is the integration of “F. Simulation training (pre-clinical practice (model practice using mannequin) and peer-clinical experience) and “G. Clinical practicum” in the previous edition. The learning objectives in “E. Medical examination, diagnosis and clinical skills” was reviewed under the premise that the students experience the contents learned in “D. Clinical dentistry” in clinical practice and participation in care after simulation training mainly to acquire clinical techniques. The learning objectives related to the techniques of high-frequency treatments were set in consideration of continuity of clinical training and post-graduate clinical training, in reference to “Learning and evaluation goals for the skill and attitude that students participating in the clinical practice and participation in care are required to obtain (Common Achievement Tests Organization Dentistry OSCE Implementation Subcommittee)” and “Goals of the post-graduate clinical training (working group report about the revision of 2020 post-graduate clinical training system)”.

“E-1-1 Patient safety and infection control” contains hands-on learning with the addition of learning objectives for wearing personal protective equipment and disposal of medical waste.

In “E-2 Basic examination and diagnostic skills”, to respond to the super-aged society, learning objectives were enhanced in examination and tests, understanding of systemic condition, and basic diagnosis (clinical reasoning) and learning objectives on the preparation of medical information forms for coordination between medical and dental treatment have been newly added.

Further, “E-3 Clinical reasoning from symptoms and medical condition” have been added, and learning objectives for vertical and horizontal integration of the knowledge learned so far have been added with the purpose of “Acquire the basic skills to make a differential diagnosis of causative diseases based on major symptoms and medical conditions in the oral and maxillofacial region”.

“Contents and categories of clinical practice and participation in care” was changed from the four phases of the former edition to two phases “Practice subjects under an instructor’s guidance (direct patient care) [I]” and “Important subjects expected to be experienced [II]” based on the standard of the dental care practice by dental students. [I] is classified into [Ia]: Subjects to be practiced as direct patient care and [Ib]: Although subjects are expected to be practiced as direct patient care, simulations, etc. can be supplemented if difficult, and the description was changed from one part of a treatment to a series of treatments that are all self-experienced. For [II], learning objectives to deepen students’ understanding through experience by observation and assistance were set.

## **Chapter 1. Required qualities and skills for dentists**

Dentists are expected to study throughout their lives to improve the following qualities and skills in order to provide high quality dental care with a high sense of ethics as healthcare professionals, putting patient safety first and foremost, and to accumulate new knowledge in medicine and dentistry.

This chapter lists 10 common qualities and skills that should be acquired and improved throughout one's lifetime as a healthcare professional in the major domain, and for each item, specific skills that should be acquired by graduation are indicated.

### **PR: Professionalism (Professionalism)**

To protect people's lives and health, dentists pursue the career being fully aware of the professional responsibilities and altruistically engaging in medical care, while taking human diversity into consideration and respecting humanity.

- PR-01 Understand the responsibilities of a dentist and be able to act with ethics, accountability, dignity, and compassion.
- PR-02 Be able to act altruistically, with integrity, honesty, fairness and justice, respecting dignity and taking into consideration the psychological and social factors and social backgrounds of patients and the general public.
- PR-03 Be able to comply with the Dental Practitioners Act and related regulations, as well as the norms and ethics expected of dentists, as well as social norms.
- PR-04 Be able to constantly evaluate one's own knowledge, skills, and attitude; continuously striving to improve oneself through self-directed learning and self-assessment enhancement.
- PR-05 Be able to nurture self-management skills (resilience, stress-management) as a healthcare professional.
- PR-06 Understand the responsibilities of a dentist and be able to act with ethics, accountability, dignity, and compassion.

### **GE: Comprehensive stance toward patients and the general public (General Attitude)**

To realize the wellbeing of the individual and society, based on the psychological and socio-cultural backgrounds of patients and the general public, including their family and community relationships, dentists provide dental care that supports them comprehensively, while fulfilling accountability and providing care flexibly according to needs, not limited to one's own specialty.

- GE-01 Acquire the skills necessary to be accountable as a dentist and to properly obtain informed consent.
- GE-02 Be aware of the responsibilities of a primary care dentist/family dentist and be able to provide primary care, considering the actual situation in the community.
- GE-03 Be able to treat patients appropriately based on the growth, development, aging, and other processes of patients and the general public.
- GE-04 Be able to engage in the best clinical practice for the patient, considering the patient's multiple comorbidities and psychological and social perspectives.
- GE-05 Be able to implement interprofessional collaboration with other professions and disciplines based on an understanding of the socio-cultural background of patients and the general public, not limited to dental care.

### **LL: Attitude for lifelong and collaborative learning (Lifelong Learning)**

To implement safer and higher quality dental care, dentists will continue to learn with other dentists and healthcare professionals while continuously reflecting and self-directedly learning throughout their lives, and be actively involved in the education of healthcare professionals.

- LL-01 Be able to envision one's own future for lifelong learning and constantly improve oneself through self-directed learning.
- LL-02 Be able to reflect constantly on the quality of medical care and strive to improve it.
- LL-03 Be able to evaluate and verify medical care, reflect logically and critically on one's own actions based on such evaluation and verification, and engage in self-improvement for a lifetime.
- LL-04 Be able to continue to learn new knowledge and skills throughout one's life.
- LL-05 Be able to provide advice and guidance to classmates, juniors, colleagues, and team members.

### **RE: Scientific Inquiry (Research)**

To create medical science that adapts to society, dentists understand the importance of dental research for the development of medicine and medical care and to be involved in academic and research activities while acquiring scientific and critical thinking.

- RE-01 Be able to reflect logically and critically on one's own actions and engage in lifelong self-improvement.
- RE-02 Acquire scientific theory and methodology as the basis for research.
- RE-03 Be able to identify and work to solve unknown and unresolved clinical or scientific problems.
- RE-04 Acquire the desire to generate new knowledge/information, the basic theoretical background, and the ethical response required for research.
- RE-05 Be able to evaluate scientific information such as domestic and international articles, books, and reference information, and select useful information through logical and critical consideration, appraisal and examination.
- RE-06 Be able to present research based on scientific considerations.

### **PS: Problem-solving skills based on expertise (Problem Solving)**

To contribute to the development of medicine and medical care while addressing the problems faced by patients and their families, dentists acquire knowledge in medicine and related disciplines, and strive to solve problems based on evidence-based medicine, while also considering their own experience.

- PS-01 Understanding the molecular basis of life and the normal structure and function of the human body.
- PS-02 Understanding the development, growth, aging and death of each organ of the human body.
- PS-03 Understanding human psychology and behavior.
- PS-04 Understanding epidemiology and prevention.
- PS-05 Understanding etiology and pathophysiology abnormalities in the structure and function of the organism.
- PS-06 Understanding diagnosis and treatment.
- PS-07 Understanding the properties and uses of materials and equipment in dentistry/dental care.
- PS-08 Understanding the basics of dental treatments and the normal conditions and diseases of the oral, maxillofacial, and facial regions.
- PS-09 Understanding patient safety and infection control.
- PS-10 Understanding the systems related to medical care, health, welfare, and long-term/nursing care.
- PS-11 Understanding healthcare economics, healthcare policy, and the social insurance system.
- PS-12 Be able to apply the natural sciences and humanities sociology as the foundation of dental medicine.

### **IT: Ability to utilize information, science, and technology (Information Technology)**

To further develop medicine and medical research, dentists should understand the evolving information society and utilize advanced science and technology such as artificial intelligence (AI) and data applications.

- IT-01 Understanding the principles of information ethics (including AI ethics) and data protection.
- IT-02 Understanding information ethics relating to health, medical care, and long-term/nursing care.
- IT-03 Understanding the use of Internet of Things (IoT) technology, AI, and other data in the medical care, health, and long-term/nursing care fields based on personal information controllability.
- IT-04 Acquire basic information knowledge and practical application skills in mathematical and data science, AI, etc.
- IT-05 Show interest in creating innovations using data science and AI.
- IT-06 Understanding the use of Digital Dentistry in dental care.

### **CS: Clinical skills for patient care (Clinical Skills)**

To provide safe and high-quality dental care, dentists improve their clinical skills, demonstrate them to the fullest, and practice with consideration of the pain and anxiety of patients.

- CS-01 Understand patient-centered care and be able to gather necessary information from a variety of relevant resources, including the patient, family, medical staff, and others.
- CS-02 Be able to perform basic physical examinations beyond the oral and maxillofacial regions.
- CS-03 Be able to select necessary examinations/tests and diagnose diseases/disorders based on clinical reasoning.
- CS-04 Be able to plan comprehensive treatments for commonly occurring oral diseases.
- CS-05 Be able to propose necessary dental care or provide basic dental care for commonly occurring oral diseases in collaboration with patients, their families, and medical staff.
- CS-06 Be able to respond to patients who need special consideration, such as the older adults, medically compromised, and people with disability.
- CS-07 Be able to implement patient safety and infection control measures.
- CS-08 Be able to provide patient education and explanation of medical conditions.
- CS-09 Understand the specific characteristics of medical information and be able to properly record and manage it.
- CS-10 Acquire cardiopulmonary resuscitation and other lifesaving first-aid procedures.

### **CM: Communication skills (Communication)**

To support patient decision-making and implement safe and high-quality dental care, dentists build trusting relationships through good communication, considering the situation of the patient and everyone involved.

- CM-01 Be able to communicate appropriately with consideration for the patient's privacy, distress, etc.
- CM-02 Be able to provide a clear explanation of the necessary information.
- CM-03 Be able to develop sufficient communication skills to conduct appropriate dental care, understand the diversity of and establish appropriate relationships with patients and their families/significant others.
- CM-04 Be able to build trusting relationships with members of the healthcare team and communicate with them to ensure safe and smooth medical care.
- CM-05 Be able to communicate with multiple professionals in health, welfare, and long-term/nursing care surrounding patients.

### **IP: Interprofessional collaboration skills (Interprofessional Collaboration)**



To provide patient-centered dental care, dentists understand the roles of medical care, health, welfare, long-term/nursing care, and all people involved with the patient, and work together as a team while building equal relationships with one another.

- IP-01 Understanding the roles of the healthcare team and each member: dentists, physicians, pharmacists, nurses, dental hygienists, dental technicians, and other healthcare professionals, and the system of collaboration and responsibility.
- IP-02 Understanding the role of dentists in medical care, health, welfare, and long-term/nursing care.
- IP-03 Be able to collaborate with the multiple professionals surrounding patients in medical care, health, welfare, and long-term/nursing care, based on their respective roles.
- IP-04 Acquire the skill to play a leadership role in an interprofessional collaboration.

**SO: Understanding the role of medicine in society (Medicine in Society)**

To improve public health as a voice for health, dentists provide fair dental care with an awareness that medical care is part of society and with an economic perspective, a viewpoint that captures regional characteristics, and global perspectives.

- SO-01 Understanding social security (social insurance, social welfare, public assistance, and public health).
- SO-02 Understanding prevention and health promotion.
- SO-03 Understanding medical care, health, welfare, and long-term/nursing care and the social environment surrounding them.
- SO-04 Understand the current status of dental care in society and the community and be able to actively participate in activities to promote systemic health through oral health.
- SO-05 Be aware of the role that dentists play in regional health care based on various social systems and be able to act accordingly.
- SO-06 Understanding the role of dentists in disasters.
- SO-07 Understand diversity in the international community and be able to play an important role in regional health care.

## **Chapter 2. Learning objectives**

## A. Life science

Master the basic knowledge of biological phenomena and knowledge necessary for the etiological and pathophysiological analysis, and acquire a way of thinking necessary for the provision and advancement of medical care.

### A-1 Molecular basis of life

Understand the principles of biological phenomena at the molecular, cellular, tissue and individual levels.

#### A-1-1 Chemical basis of biological substances

Understand the chemical basis of substances necessary to learn life and medical sciences.

Learning objectives:

- A-1-1-1 Understanding atoms and elements that comprise the human body.
- A-1-1-2 Understanding the formation of molecules and chemical properties of biological constituents.
- A-1-1-3 Understanding the interactions between substances, and those between substance and energy.

#### A-1-2 Structure, function and metabolism of basic biological substances

Understand the molecular structure, function and metabolism (normal and abnormal) of basic biological substances.

Learning objectives:

- A-1-2-1 Understanding the structure, function, and metabolism of amino acids and proteins.
- A-1-2-2 Understanding the structure, function, and metabolism of carbohydrates.
- A-1-2-3 Understanding the structure, function, and metabolism of lipids.
- A-1-2-4 Understanding the electron transfer system and oxidative phosphorylation.
- A-1-2-5 Understanding the function and regulation of enzymes, and the major metabolic disorders.
- A-1-2-6 Understanding the types of vitamins and minerals and their actions.
- A-1-2-7 Understanding the generation and action of oxidative stress (free radical and radical oxygen).
- A-1-2-8 Understanding the mutual conversion of nutrients and energy metabolism (definition of energy, energy value in food, energy consumption, and estimated energy requirement).
- A-1-2-9 Understanding the metabolism during fasting, starvation, after meals, overeating, and exercise.

#### A-1-3 Genomes, Chromosomes, Genes

Study the life phenomena from genes to protein synthesis and understand the methods and applications of genetic engineering as well as the analysis of human genomes. Understand the diversity of genomes, chromosomes and genes and their associations with disease.

Learning objectives:

- A-1-3-1 Understanding the Mendelian Laws and the relationship between genotype and phenotype.
- A-1-3-2 Understanding the structure and function of nucleic acids, genes, and chromosomes.
- A-1-3-3 Understanding the expression and regulation of genetic information including transcription from deoxyribonucleic acid (DNA) to ribonucleic acid (RNA) and translation into protein synthesis.
- A-1-3-4 Understanding the etiology of hereditary diseases.
- A-1-3-5 Understanding genetic analysis and engineering technology.
- A-1-3-6 Understanding genomic analysis technology including chromosome analysis and DNA sequencing.
- A-1-3-7 Understanding the relationship between drug effectiveness and safety, and genomic diversity.

#### A-1-4 Cell structure and function

Understand the basic structure and function of cells, and their proliferation and differentiation mechanisms.

Learning objectives:

- A-1-4-1 Understanding the overall structure and cell membrane of eukaryotic cells, and the structure and function of the nucleus, cell organelle, and cytoskeleton.
- A-1-4-2 Understanding the movement of substances across the cell membrane.
- A-1-4-3 Understanding the ionic composition of intracellular and extracellular fluids, osmotic pressure, and resting membrane potential.
- A-1-4-4 Understanding the cell cycle, cell division and the mechanisms of cell differentiation.
- A-1-4-5 Understanding the types and basic mechanism of cell death.

#### A-1-5 Cell signaling

Understand the mechanism of cell-cell and cell-matrix adhesion, and cellular signaling.

Learning objectives:

- A-1-5-1 Understanding the cell adhesion mechanism.
- A-1-5-2 Understanding the receptor-mediated cell-cell signaling and intracellular signaling by hormones, growth factors, and cytokines.
- A-1-5-3 Understanding the types, structure and function of extracellular matrix.
- A-1-5-4 Understanding the mechanisms of extracellular matrix production and destruction.

## **A-2 Development, growth, aging and death of each organ in the human body**

Understand the developmental processes of individuals and organs.

### A-2-1 Individual genesis and development

Understand the developmental processes of individuals and organs.

Learning objectives:

- A-2-1-1 Understanding the overall process of embryogenesis before birth.
- A-2-1-2 Understanding the process of branchial arch formation.
- A-2-1-3 Understanding the formation of the skeleton and muscles of the trunk and limbs.
- A-2-1-4 Understanding the formation of the digestive, respiratory, genitourinary, endocrine, circulatory and nervous systems.
- A-2-1-5 Understanding the pluripotent stem cells and basic embryological techniques.
- A-2-1-6 Understanding the developmental stages and congenital anomalies in humans.
- A-2-1-7 Understanding the mechanisms affecting morphogenetic anomalies of the human body.

### A-2-2 Individual growth and development

Understand the growth process of individuals and organs.

Learning objectives:

- A-2-2-1 Understanding the morphological growth and functional development of the human body.
- A-2-2-2 Understanding the characteristics and methods to evaluate physical and mental development in children.

### A-2-3 Aging and death of individuals

Understand age-related changes (aging and death) after maturity of individuals and organs.

Learning objectives:

- A-2-3-1 Understanding the morphological growth and functional development of the human body, and the human lifespan.
- A-2-3-2 Understanding the morphological and functional changes in cells, tissues, organs and individuals due to aging.
- A-2-3-3 Understanding the mental and psychological changes associated with aging.
- A-2-3-4 Understanding the etiology and pathophysiology of human death.

### A-2-4 Development and age-related changes of the oral and maxillofacial region

Understand the developmental process involved in the formation of the oral cavity and the maxillofacial region, age-related changes (growth/development and aging), and their associated abnormalities.

Learning objectives:

- A-2-4-1 Understanding the development of oral and maxillofacial region.
- A-2-4-2 Understanding the structure and organs originating from the branchial arch.
- A-2-4-3 Understanding the protrusions and areas involved in maxillofacial development.
- A-2-4-4 Understanding the mechanisms affecting head and neck dysplasia.
- A-2-4-5 Understanding the growth and development of oral and maxillofacial region.
- A-2-4-6 Understanding the defects of oral and maxillofacial growth and development, and their association to malocclusion.
- A-2-4-7 Understanding the morphological changes in jawbone and temporomandibular joint due to aging and tooth loss.
- A-2-4-8 Understanding the age-related changes in teeth, periodontal tissue, masticatory and swallowing functions.

### **A-3 Structure and function of the human body**

Acquire basic knowledge of the normal structure and function of human organs.

#### A-3-1 Tissues and organs of the human body

Understand the normal structure, physiological function and mechanism of human organs.

Learning objectives:

##### A-3-1-1 Epithelial tissue and the integumentary (skin/mucosa) system

- A-3-1-1-1 Understanding the structure, function, and distribution of epithelial tissue.
- A-3-1-1-2 Understanding the basic structure and function of the skin and mucosa.
- A-3-1-1-3 Understanding the structure and distribution of glands and their secretory mechanisms.

##### A-3-1-2 Connective tissue and skeletal system

- A-3-1-2-1 Understanding the basic skeletal system and bony joints.
- A-3-1-2-2 Understanding the classification, cell types, and intercellular substances of connective (supporting) tissue.
- A-3-1-2-3 Understanding the tissue structure and cell types in bone and cartilage.
- A-3-1-2-4 Understanding the process and regulatory mechanism of osteogenesis (endochondral and membranous ossification), bone growth, and remodeling.
- A-3-1-2-5 Understanding the components and calcification mechanisms of hard tissues.

##### A-3-1-3 Muscular tissues and system

- A-3-1-3-1 Understanding the classification and distribution of muscular tissue.
- A-3-1-3-2 Understanding the cell structure and excitation-contraction coupling mechanism of muscles.
- A-3-1-3-3 Understanding the macroscopic structure, function and innervation of major muscles.

##### A-3-1-4 Blood, lymph, and circulatory system

- A-3-1-4-1 Understanding the structure, development and function of the heart, and electrocardiogram.
- A-3-1-4-2 Understanding blood circulation (pulmonary, systemic and fetal circulation) pathways and the nomenclature of the major arteries and veins of the human body.
- A-3-1-4-3 Understanding the structure of blood vessels and their neural innervation.
- A-3-1-4-4 Understanding the mechanism of circulatory regulation.
- A-3-1-4-5 Understanding blood components and their roles.
- A-3-1-4-6 Understanding the structure and function of lymphatic ducts, tissues, and organs.
- A-3-1-4-7 Understanding hematopoietic organs and their mechanism.
- A-3-1-4-8 Understanding hemostasis, coagulation, and fibrinolytic system.

##### A-3-1-5 Nervous system

- A-3-1-5-1 Understanding types, routes, and innervation of the peripheral nervous system.
- A-3-1-5-2 Understanding the structure and function of the somatic nervous system.
- A-3-1-5-3 Understanding the structure and function of the autonomic nervous system (sympathetic and parasympathetic nervous systems).
- A-3-1-5-4 Understanding the structure and function (motor, sensory, higher brain, and autonomic functions) of the central nervous system (higher brain, brain stem, and spinal cord).
- A-3-1-5-5 Understanding the expression and regulatory mechanism of reflex, semiautonomous movement, and voluntary movement.
- A-3-1-5-6 Understanding the structure and function of neurons and glial cells.
- A-3-1-5-7 Understanding the generation and conduction mechanisms of nerve action potential.
- A-3-1-5-8 Understanding the mechanism for synaptic transmission and neurotransmitters.

##### A-3-1-6 Sensory system

- A-3-1-6-1 Understanding the structure and function of special sensory organs.
- A-3-1-6-2 Understanding the structure and function of somatic sensory receptors.
- A-3-1-6-3 Understanding visceral sensation.

A-3-1-6-4 Understanding the types, triggers and regulatory mechanism of pain.

#### A-3-1-7 Digestive system

A-3-1-7-1 Understanding the structure, function and regulatory mechanism of the digestive tract.

A-3-1-7-2 Understanding the structure and function of the liver, gall bladder and pancreas.

#### A-3-1-8 Respiratory system

A-3-1-8-1 Understanding the structure and function of the airway system.

A-3-1-8-2 Understanding the structure and function of the lungs, respiratory movement, and the mechanism of gas transfer.

#### A-3-1-9 Endocrine system and homeostasis

A-3-1-9-1 Understanding the structure and function of the endocrine system.

A-3-1-9-2 Understanding the types of hormones, functions and disorders.

A-3-1-9-3 Understanding the homeostasis, and functional interaction between the endocrine and nervous systems.

A-3-1-9-4 Understanding the regulatory mechanism of body temperature.

A-3-1-9-5 Understanding the mechanism of feeding regulation.

#### A-3-1-10 Urinary system and body fluid/electrolyte regulation

A-3-1-10-1 Understanding the structure and function of the renal/urinary tract systems.

A-3-1-10-2 Understanding the regulation mechanism of body fluid volume, components and osmotic pressure.

A-3-1-10-3 Understanding cellular water metabolism and intake/output and imbalance of the major electrolytes.

#### A-3-1-11 Reproductive system

A-3-1-11-1 Understanding the structures and functions of the male and female reproductive organs.

### A-3-2 Basic structure and function of the head and neck

Understand the basic structure and function of the head and neck.

#### Learning objectives:

A-3-2-1 Understanding the regions of the surfaces and viscera of the head and neck and their characteristics.

A-3-2-2 Understanding the bones and joints of the neck.

A-3-2-3 Understanding the muscles of the head and neck.

A-3-2-4 Understanding the structure and function of muscles responsible for sucking, mastication, and swallowing functions, and their innervating nerves.

A-3-2-5 Understanding the vascular system and its distribution in the head and neck.

A-3-2-6 Understanding the pathways, distribution, location of the nucleus, fiber component, and the ganglion of the cranial nerves.

A-3-2-7 Understanding the autonomic nerve system and its distribution in the head and neck.

A-3-2-8 Understanding the structure and function of the temporomandibular joint.

A-3-2-9 Understanding the voluntary movement and reflexes of the mandible.

A-3-2-10 Understanding the significance and control mechanism of sucking, mastication, and swallowing.

A-3-2-11 Understanding the vomiting and the pharyngeal reflexes.

A-3-2-12 Understanding the basic structure of the pharynx, the constrictor, the pharyngeal elevators, and the distributed nerves.

A-3-2-13 Understanding the basic structure of the larynx, the muscles of the larynx and the distributed nerves.

A-3-2-14 Understanding the structure and function of organs involved in vocalization and articulation.

- A-3-2-15 Understanding the vascular system and distribution in the pharynx and the larynx.
- A-3-2-16 Understanding the structure, distribution, and function of the tonsils.

#### A-3-3 Structure and function of the oral cavity

Understand the basic structure and function of the oral cavity and adjacent regions.

Learning objectives:

- A-3-3-1 Understanding the divisions and elements comprising the oral cavity.
  - A-3-3-2 Understanding the classification and characteristics of the lips and oral mucosa.
  - A-3-3-3 Understanding the structure and function of the tongue.
  - A-3-3-4 Understanding the structure and function of the soft palate.
  - A-3-3-5 Understanding dentition and occlusion.
  - A-3-3-6 Understanding the properties, components, and function of saliva.
  - A-3-3-7 Understanding the structure, function, and secretory regulation mechanism of the salivary glands.
  - A-3-3-8 Understanding the structure, function of sinuses, and connection with the nasal cavity.
  - A-3-3-9 Understanding the developmental mechanism and regulation of somatic sensation and pain in the oral and maxillofacial region.
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#### A-3-4 Structure and function of the teeth and periodontium

Understand the normal structure and function of teeth and periodontium.

Learning objectives:

- A-3-4-1 Understanding the developmental and replacement processes of the teeth.
- A-3-4-2 Understanding the anatomy and characteristics of all types of teeth.
- A-3-4-3 Understanding the hereditary dysplasia of teeth.
- A-3-4-4 Understanding the constituents, structure, and function of the hard tissue of fully formed permanent teeth, deciduous teeth, non-fully formed permanent teeth, and immature permanent teeth.
- A-3-4-5 Understanding the structure and function of dental pulp.
- A-3-4-6 Understanding the abnormal morphology of teeth.
- A-3-4-7 Understanding the development, structure, and function of periodontium.

### **A-4 Infection and immunity**

Understand the mechanisms of microorganism infection in humans and biological defense of the host.

#### A-4-1 Microorganisms and infection

Understand the basic properties of microorganisms, pathogenicity and pathophysiology caused by infection.

Learning objectives:

- A-4-1-1 Understanding the basic structure and characteristics of bacteria, viruses, fungi, and protozoa.
- A-4-1-2 Understanding the infection mechanism and pathogenicity of bacteria, viruses, fungi, and protozoa in humans.
- A-4-1-3 Understanding the types, prevention, diagnosis, and treatment of infectious diseases caused by bacteria, viruses, fungi and protozoa.
- A-4-1-4 Understanding the emerging and re-emerging infectious diseases.
- A-4-1-5 Understanding the characteristics of the indigenous microbial flora and the mechanism of infection in humans.
- A-4-1-6 Understanding the purpose and principle of chemotherapy for infectious diseases and the mechanism of action of chemotherapeutic agents.
- A-4-1-7 Understanding the drug resistance mechanism of bacteria.
- A-4-1-8 Understanding the significance, methods and principles of sterilization and disinfection.
- A-4-1-9 Understanding the infection mechanism and important microorganisms in nosocomial infections.

#### A-4-2 Immunity

Understand immune response, infectious immunity, tumor immunity, allergies, immunodeficiency, and autoimmune diseases as biological defense mechanisms.

Learning objectives:

- A-4-2-1 Understanding the types and functions of cells responsible for innate immunity.
- A-4-2-2 Understanding the types and functions of cells responsible for acquired immunity.
- A-4-2-3 Understanding the antigen-presenting function.
- A-4-2-4 Understanding mucosal immunity.
- A-4-2-5 Understanding immune tolerance and transplant immunity.
- A-4-2-6 Understanding the types of allergic diseases, autoimmune diseases, and immunodeficiencies, as well as their pathogenic mechanisms and pathophysiology.
- A-4-2-7 Understanding the significance, type, characteristics, inoculation method and side reactions of vaccines.

### **A-5 Etiology and pathophysiology**

Understand the morphological and functional changes in diseases, and their etiology and pathology.

#### A-5-1 Etiology and congenital anomaly

Understand the etiology and congenital anomalies.

Learning objectives:

- A-5-1-1 Understanding abnormalities of chromosomes, genes and ontogeny.
- A-5-1-2 Understanding the relationship between the environment and diseases.

#### A-5-2 Cell injury, tissue damage, and atrophy

Understand the causes and morphological changes of cell injury, tissue damage and atrophy.

Learning objectives:

- A-5-2-1 Understanding cell injury and tissue damage.
- A-5-2-2 Understanding degeneration and the pathophysiology of related diseases.
- A-5-2-3 Understanding necrosis and apoptosis in diseases.
- A-5-2-4 Understanding atrophy and pseudohypertrophy.
- A-5-2-5 Understanding metabolic disorders and the pathophysiology of related diseases.

#### A-5-3 Repair and regeneration

Understand the significance of repair and regeneration, and their morphological findings.

Learning objectives:

- A-5-3-1 Understanding the mechanism of repair and regeneration and the role of stem cells.
- A-5-3-2 Understanding hypertrophy and hyperplasia.
- A-5-3-3 Understanding metaplasia.
- A-5-3-4 Understanding the wound healing process and the role of related cells.
- A-5-3-5 Understanding the organization.

#### A-5-4 Circulatory disturbance

Understand the causes, morphological characteristics, and outcomes of circulatory disturbance.

Learning objectives:

- A-5-4-1 Understanding the signs, causes and outcomes of ischemia, hyperemia and hemostasis, and the pathophysiology of related diseases.
- A-5-4-2 Understanding the causes, types, and outcomes of hemorrhage.
- A-5-4-3 Understanding the formation mechanism, morphological characteristics and outcomes of thrombus and embolus, and the pathophysiology of related diseases.
- A-5-4-4 Understanding the types, morphological characteristics and outcomes of infarction, and the pathophysiology of related diseases.
- A-5-4-5 Understanding the causes and outcomes of edema.
- A-5-4-6 Understanding the causes and types of shock.

#### A-5-5 Inflammation



Understand the concept, pathogenesis, and morphological characteristics of inflammation.

Learning objectives:

- A-5-5-1 Understanding the definition and mechanism of inflammation.
- A-5-5-2 Understanding the cell types and functions related to inflammation.
- A-5-5-3 Understanding the types, morphological characteristics, and changes over time regarding exudative inflammation.
- A-5-5-4 Understanding the types, morphological characteristics, and changes over time regarding granulomatous inflammation.
- A-5-5-5 Understanding the systemic response to inflammation.

A-5-6 Tumor

Understand the etiology and pathophysiology of tumors.

Learning objectives:

- A-5-6-1 Understanding the definition of a tumor, and the etiology and mechanism of tumorigenesis
- A-5-6-2 Understanding proliferation, invasion, recurrence, and metastasis of tumors.
- A-5-6-3 Understanding the cellular and structural atypia, degree of histological differentiation of tumors, and the related terms (precancerous lesion, carcinoma in situ, early-stage cancer, etc.).
- A-5-6-4 Understanding differences between benign and malignant tumors.
- A-5-6-5 Understanding the histological classification of tumors, and histological characteristics.
- A-5-6-6 Understanding epithelial dysplasia.

## **A-6 Drug and host response**

Understand the interaction between a living body and drugs at the individual, cellular, and molecular levels, and acquire the basic concepts for safe and appropriate drug therapy in consideration of adverse events.

A-6-1 Drugs and pharmaceutical products

Understand the basics of pharmaceutical products (categories, development and evaluation).

Learning objectives:

- A-6-1-1 Understanding the categories of pharmaceutical products (including poisonous drugs, powerful drugs, narcotics, psychotropic drugs, poisonous substances, and deleterious substances).
  - A-6-1-2 Understanding the drug development process and the evaluation of pharmaceutical products in clinical trials.
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A-6-2 Basics of pharmacological action

Understand the basic concepts of drug actions (including Kampo medicines)

Learning objectives:

- A-6-2-1 Understanding the types of drug therapies and the basic forms and categories of pharmacological effects.
- A-6-2-2 Understanding the effects of drugs and the mechanisms of action.
- A-6-2-3 Understanding the factors affecting pharmacological effects.
- A-6-2-4 Understanding the therapeutic index and the relationship between effective, toxic, and lethal doses on drug dose-response curves.
- A-6-2-5 Understanding the pharmacodynamic interactions (synergism, antagonism, agonist, antagonist).

A-6-3 Drug administration method and pharmacokinetics

Understand the fate of administered drugs in the body.

Learning objectives:

- A-6-3-1 Understanding types and characteristics of routes of drug administration.
- A-6-3-2 Understanding the pharmacokinetics (absorption, distribution, metabolism, excretion).

- A-6-3-3 Understanding the pharmacokinetic characteristics affected by age, pregnancy, diseases, concomitant drugs, and genetic predisposition.

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A-6-4 Basic principles of medication in consideration of adverse reactions and adverse events of drugs  
Understand the basics of medication in consideration of the types of adverse reaction and adverse events of drugs (including Kampo medicines) and the effects of continuous and concomitant use.

Learning objectives:

- A-6-4-1 Understanding the general adverse reactions and adverse events of drugs.
- A-6-4-2 Understanding the adverse reactions and events of drugs in the oral and maxillofacial region.
- A-6-4-3 Understanding the effects of continuous drug use (tolerance, accumulation, and dependence).
- A-6-4-4 Understanding the pharmacokinetic interactions.
- A-6-4-5 Understanding the precautions for administration of major drugs in consideration of pharmacokinetic characteristics and adverse events.
- A-6-4-6 Understanding the appropriate use of antibacterial drugs in consideration of antimicrobial resistance (AMR).

## **B. Dental materials and devices**

Master the knowledge of dental materials and devices, and acquire a way of thinking necessary for the provision and advancement of dental care.

### **B-1 Basic properties of materials**

Understand the physical (including optical and mechanical), chemical and biological (including bioactivity and biosafety) properties of materials

Learning objectives:

- B-1-1 Understanding the physical (including optical and mechanical) properties of materials including biological tissues.
  - B-1-2 Understanding the chemical properties of materials.
  - B-1-3 Understanding the biological (including bioactivity and biosafety) properties of materials.
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### **B-2 Dental materials**

Understand the types, components, properties, applications and operating methods of dental materials used in dental care and the dental laboratory.

Learning objectives:

- B-2-1 Understanding the types, components, properties, applications and operating methods of restorative materials.
- B-2-2 Understanding the types, components, properties, applications and operating methods of denture materials.
- B-2-3 Understanding the types, components, properties, applications and operating methods of adhesive materials.
- B-2-4 Understanding the types, components, properties, applications and operating methods of orthodontic materials.
- B-2-5 Understanding the types, components, properties, applications and operating methods of endodontic materials.
- B-2-6 Understanding the types, components, properties, applications and operating methods of dental implants, oral surgery and periodontal treatment materials.

### **B-3 Dental devices**

Understand the molding techniques used in dental care and the dental laboratory, as well as the composition, principles, properties and operating methods of dental devices.

Learning objectives:

- B-3-1 Understanding the principles of molding (milling, sintering, polymerization, casting, welding, etc.) of dental materials.
- B-3-2 Understanding the types, configurations, principles, properties and operating methods of dental devices.
- B-3-3 Understanding the types, configurations, principles, properties and operating methods of dental inspection equipment.
- B-3-4 Understanding the types, configurations, principles, properties and operating methods of molding devices including digital molding.

## **C. Society and dentistry**

Acquire the ethical, legal, and social knowledge and attitudes required of dentists in order to provide appropriate dental care.

### **C-1 Medical ethics, bioethics, and patient-centered dental care**

Acquire professionalism to provide patient-centered dental care.

#### **C-1-1 Medical ethics and patient-centered perspectives**

To encourage patients' proactive participation in treatment, to always take a patient-centered position while putting patient safety as the highest priority, and to acquire knowledge and attitudes regarding ethics in life science and medical research that must be observed.

Learning objectives:

- C-1-1-1 Understanding the historical background and issues of medical ethics, bioethics, norms regarding patients' rights, and international norms.
- C-1-1-2 Understanding ethical issues related to clinical practice (including issues related to life and death).
- C-1-1-3 Understanding the patient's right of self-determination and what to do if the patient is unable to self-determine.
- C-1-1-4 Understanding the significance and importance of informed consent and necessary explanations.
- C-1-1-5 Understanding ethical issues related to medical research.
- C-1-1-6 Have the ability to carefully conduct research for the purpose of advancing medical science, medical care, and promoting the interests of patients.

#### **C-1-2 Responsibilities and discretionary authority as a dentist**

Possess a rich sense of humanity and a deep awareness of the dignity of life, staying aware of the duties and responsibilities as a dentist to protect human life and health.

Learning objectives:

- C-1-2-1 Understanding a dentist's professionalism.
- C-1-2-2 Observe compliance.
- C-1-2-3 Understanding the importance of building trusting relationships with patients.
- C-1-2-4 Understanding the peculiarities of medical services (information asymmetry, uncertainty in medicine) and limitations of treatment.
- C-1-2-5 Understanding legal and social responsibilities imposed on dentists (Administrative Dispositions under Penal Code, Civil Code, Dental Practitioners Act and Health Insurance Act).

#### **C-1-3 Team-based health care**

Understand the importance of patient-centered team health care and acquire collaboration with other healthcare professionals.

Learning objectives:

- C-1-3-1 Understanding the significance of patient-centered team-based health care.
- C-1-3-2 Understanding the role-sharing, cooperation and responsibility of the healthcare team and each member (dentist, physician, pharmacist, nurse, dental hygienist, dental technician, speech-language-hearing therapist, clinical laboratory technician, medical radiology technician, and other healthcare professionals).
- C-1-3-3 Understanding interprofessional cooperation and the role of dentists in medical care, health, welfare, and long-term care.
- C-1-3-4 Understanding the procedures and communication (including appropriate abbreviations, etc.) when collaborating with other professions such as medical, nursing, other business sectors, and other medical institutions.
- C-1-3-5 Understanding the importance of privacy and confidentiality of patient information, the importance of providing information and accountability to patients and others.
- C-1-3-6 Understanding dental involvement in the final stages of life (including end-of-life and grief care), decision-making and manifestation of the patient.

### **C-2 Problem seeking and solving skills**

Acquire the necessary knowledge in the ever-developing field of dentistry to deal with a wide range of symptoms, conditions, and diseases based on epidemiology and evidence-based medicine (EBM).

Learning objectives:

- C-2-1 Be able to extract and integrate important issues and problems from lectures, national and international textbooks and literature, and search for information, in order to express one's own ideas clearly after organizing this information objectively and critically.
- C-2-2 Be able to acquire sufficient English skills to obtain and select scientific information.
- C-2-3 Be able to identify necessary issues on one's own and rank them in light of their importance and necessity.
- C-2-4 Be able to find better solutions in cooperation with other students and faculty members, as well as solve problems on one's own.
- C-2-5 Be able to use appropriate Information and Communication Technology: ICT (i.e., e-learning and mobile technology) for self-learning and cooperative study.
- C-2-6 Be able to conduct appropriate self-assessment and develop specific methods for improvement.
- C-2-7 Be able to participate actively in scientific research according to one's own interests.

### **C-3 Ensuring quality of care and patient safety**

Acquire the necessary knowledge to provide good quality dental care while ensuring patient safety as the highest priority.

#### **C-3-1 Ensuring patient safety in medical care**

To provide reliable, safe and secure dental care, be aware that medical incidents (including accidents, near-miss and healthcare-associated infections) can occur on a daily basis, as well as acquire the knowledge necessary to place the highest priority on ensuring patient safety.

Learning objectives:

- C-3-1-1 Understanding the causes of medical accidents (human error, system error, etc.) and preventive measures.
- C-3-1-2 Understanding the importance of reporting, communication, consultation and medical record keeping in the medical field.
- C-3-1-3 Understanding the importance of sharing and analyzing information regarding medical safety.
- C-3-1-4 Understanding the patient safety management system required of healthcare institutions.

#### **C-3-2 Handling and prevention of medical accidents**

Learn how to respond to and prevent medical accidents and plan preventive measures.

Learning objectives:

- C-3-2-1 Understanding the difference between medical accidents (including medical practice-related deaths) and medical malpractice.
- C-3-2-2 Understanding the Medical Accident Investigation System under the Medical Care Act.
- C-3-2-3 Understanding the significance of reporting adverse drug reactions (e.g., Pharmaceuticals and Medical Devices Safety Information Reporting System).
- C-3-2-4 Understanding emergency procedures, recording items, and reporting systems in the event of medical incidents and accidents.
- C-3-2-5 Be able to analyze the causes of medical incidents and accidents (including hepatitis B and viral infection damage caused by drugs and continuous use of syringes, etc.), and plan preventive measures.
- C-3-2-6 Understanding the relief services for adverse health effects (e.g., Relief System for Adverse Drug Reactions).

#### **C-3-3 Ensure the health and safety of healthcare professionals**

Acquire basic methods of preventing, dealing with, and remedying medical accidents and other problems encountered by healthcare professionals.

Learning objectives:

- C-3-3-1 Understanding the importance of health care for healthcare professionals (including immunization and radiation dose control).

- C-3-3-2 Understanding what to do in the event of a needlestick injury, etc.
- C-3-3-3 Understanding waste disposal in accordance with the Waste Management and Public Cleansing Act.
- C-3-3-4 Understanding the need to refine the working environment in the healthcare field.

#### **C-4 Health, society and environment**

Acquire the broad knowledge necessary to continuously provide high quality medical care in the future and cultivate the ability to adapt to change.

##### C-4-1 Concept of health and definition of death

Understand the concepts of health and disease and the definition of death in order to contribute to health through dental medicine and practice.

Learning objectives:

- C-4-1-1 Understanding the concepts of health, disability, disease and death.
- C-4-1-2 Understanding the relationship between oral and systemic health.

##### C-4-2 Dental Practitioners Act and medical and health laws

Understand the provisions of the Dental Practitioners Act and healthcare-related regulations in order to provide dental care in compliance with laws and regulations.

Learning objectives:

- C-4-2-1 Understanding the Dental Practitioners Act, the Medical Care Act, and other laws and regulations related to the dental profession.
- C-4-2-2 Understanding the duties and obligations of the dentist.
- C-4-2-3 Understanding the Dental Hygienists Act, the Dental Technicians Act, and the Act on the Promotion of Dental and Oral Health.
- C-4-2-4 Understanding the outline of pharmaceutical laws and regulations (including the Japanese Pharmacopoeia, handling of pharmaceuticals and medical devices, etc.).
- C-4-2-5 Understanding the overview of health laws and regulations.
- C-4-2-6 Understanding the overview of preventive healthcare laws and regulations.
- C-4-2-7 Understanding the outline of the Medical Practitioners' Act, the Pharmacists Act, the Act on Public Health Nurses, Midwives, and Nurses and other relevant laws for dental healthcare professions.

##### C-4-3 Medical care, health, welfare and long-term care systems

Understand related social systems, regional health care and the social environment in order to appropriately provide medical care, health, welfare and long-term care based on the perspective of effective utilization of limited medical resources.

Learning objectives:

- C-4-3-1 Understanding the background and overview of healthcare policies in the community, workplace and at each life stage.
- C-4-3-2 Understanding the social security system (each system of social insurance, social welfare, public assistance, and public health).
- C-4-3-3 Understanding the cost of social security and healthcare economics (the National Medical Care Expenditure, medical expenses and benefits).
- C-4-3-4 Understanding the social environment in which children, older adults, people with disabilities, and others are placed and their concepts (universal design, barrier-free, quality of life (QOL)).
- C-4-3-5 Understanding the system of abuse and the dentist's responsibilities regarding the prevention of such.
- C-4-3-6 Understanding the coordination of medical care, health, welfare, and long-term care in the community, including the Community-based Integrated Care System.
- C-4-3-7 Understanding disaster medical care, in-home health care, and remote area medical care systems.
- C-4-3-8 Understanding the need for dental care in times of disaster.

##### C-4-4 Forensic odontology

Understand the forensic based methods of odontology to contribute to the maintenance of public order in society from the standpoint of dentistry.

Learning objectives:

- C-4-4-1 Understanding the procedures and methods of forensic odontological examinations of victims of incidents, accidents, and disasters and related laws and regulations.
- C-4-4-2 Understanding the examination and appraisal of injuries related to the dental field.
- C-4-4-3 Understanding forensic autopsies (judicial autopsies, administrative autopsies, autopsies by the Act for Investigations into the Cause of Death or Identity of Corpses Handled by the Police and the Coast Guard Agency, and consent autopsies).

#### C-4-5 Environment and health

Understand the importance of finding environmental conditions that contribute to disease prevention and health maintenance and promotion in order to explore the relationship between human health and the environment to build a better world for both.

Learning objectives:

- C-4-5-1 Understanding the interrelationship between humans and the environment and the importance of the environment.
- C-4-5-2 Understanding the assessment and remediation of environmental pollution.
- C-4-5-3 Understanding the health hazards caused by pollution and how to prevent them.
- C-4-5-4 Understanding the current state of environmental destruction and climate change occurring on a global scale and international efforts to address these issues.

### C-5 Prevention and health care

Improve public health through disease prevention and health management to ensure a healthy lifestyle.

Learning objectives:

- C-5-1 Understanding the natural history of disease, and primary, secondary and tertiary prevention.
- C-5-2 Understanding professional care, self-care and community care.
- C-5-3 Understanding primary health care and health promotion.
- C-5-4 Understanding the prevention of communicable and non-communicable diseases.
- C-5-5 Understanding an overview of public dental health.
- C-5-6 Understanding an overview of behavioral science and health education.
- C-5-7 Understanding trauma prevention with sports mouthguards.

### C-6 Epidemiology and health statistics

Acquire the required skills to provide appropriate medical and health services using epidemiology and statistics.

#### C-6-1 Epidemiology of dental diseases

Understand the concepts and applications of epidemiology and evidence-based medicine (EBM) in dental practice.

Learning objectives:

- C-6-1-1 Understanding the concepts of epidemiology and evidence-based medicine (EBM), and clinical practice guidelines.
- C-6-1-2 Understanding screening tests.
- C-6-1-3 Understanding epidemiological indicators of dental diseases.

#### C-6-2 Health statistics

Understand the usefulness and limitations of statistics and their application to identify health and medical issues.

Learning objectives:

- C-6-2-1 Understanding random variables and their distributions, and the principles and methods of statistical inference (estimation and testing).
- C-6-2-2 Understanding the major health statistical surveys (Survey of Dental Diseases, National Health and Nutrition Survey, Population Census, Vital Statistics, Patient Survey, Survey of Medical Institutions, Statistics of Physicians, Dentists and Pharmacists, School Health Survey, etc.)
- C-6-2-3 Understanding the main health indicators (life expectancy at birth, life expectancy, neonatal and infant mortality rates, etc.).

C-6-2-4 Understanding survey methodology and statistical analysis methods.

### C-6-3 Health and medical information literacy

Understand how to use the Internet of Things (IoT), artificial intelligence (AI), and mathematical data science to appropriately use and manage healthcare information using Information and Communication Technology (ICT) in order to improve the quality of medical care.

Learning objectives:

- C-6-3-1 Understanding information security and compliance for safe use of ICT.
- C-6-3-2 Understanding how to handle healthcare information (including medical records, Personal Health Records, etc.) in compliance with the Act on the Protection of Personal Information.
- C-6-3-3 Understanding the principles of information ethics (including AI ethics) and data protection in an AI-Ready Society under the "Social Principles of Human-Centric AI".
- C-6-3-4 Understanding the basic concepts and methods of IoT technology, AI, data utilization, etc., and their applications in the medical, health, and long-term care fields.
- C-6-3-5 Understanding the ever-developing information society and having the flexibility to apply it to one's own learning and medical care.

### C-7 Acquisition of global perspectives and contribution to international health care

Acquire the basic skills required for international contribution and cooperation in order to grasp the diversity of regional health care as a member of the global community and to contribute to international health care.

Learning objectives:

- C-7-1 Respect the diversity of patients and be able to communicate in different languages especially in English.
- C-7-2 Be able to give consideration to medical practice that respects a diversity of cultures and values different from those of our country in regional health care.
- C-7-3 Understanding the characteristics of health care in Japan, and the importance of contribution and cooperation in the international community.
- C-7-4 Understanding the overview of global health and medical practice issues.
- C-7-5 Understanding nosocomial infection control, international infectious disease countermeasures and Japanese quarantine measures in a pandemic/epidemic.



## **D. Clinical dentistry**

Understand the normal and abnormal structure and function of the head and neck region in order to provide safe and secure dental care, and to acquire the basic knowledge and clinical skills necessary for daily examinations.

### **D-1 Basics of examinations**

Acquire the basic knowledge of examinations necessary to provide reliable, safe and secure dental care.

#### **D-1-1 First aid**

Acquire the basic knowledge of first aid.

Learning objectives:

- D-1-1-1 Understanding the systemic complications that can occur during dental treatment.
  - D-1-1-2 Understanding basic life support (BLS).
  - D-1-1-3 Be able to list the drugs used in first aid, understanding their mechanisms of action and indications.
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#### **D-1-2 Anesthesia and analgesia**

Understand the basics of local anesthesia, psychosedation, and general anesthesia as the methods of pain relief and sedation in dental procedures.

##### **D-1-2-1 Local anesthesia**

Learning objectives:

- D-1-2-1-1 Understanding the characteristics, purpose, and types of local anesthesia.
- D-1-2-1-2 Understanding the classification of local anesthetics and their mechanisms of action.
- D-1-2-1-3 Understanding the factors that influence local anesthetic action.
- D-1-2-1-4 Understanding the intended use and type, characteristics and precautions in clinical use of vasoconstrictors.
- D-1-2-1-5 Understanding the methods and potential complications (procedural accidents) of performing local anesthesia.

##### **D-1-2-2 Psychosedation**

Learning objectives:

- D-1-2-2-1 Understanding the characteristics, purpose, and types of psychosedation.
- D-1-2-2-2 Understanding the drugs used in inhalation sedation, their applications, contraindications, and complications (procedural accidents).
- D-1-2-2-3 Understanding the drugs used in intravenous sedation, their applications, contraindications, and complications (procedural accidents).
- D-1-2-2-4 Understanding the perioperative management of psychosedation.

##### **D-1-2-3 General anesthesia**

Learning objectives:

- D-1-2-3-1 Understanding the concepts and types of general anesthesia, as well as the biological responses during general anesthesia.
- D-1-2-3-2 Understanding the drugs used in general anesthesia, their basic pharmacological effects, and the devices and instruments for administration.
- D-1-2-3-3 Understanding the indications and contraindications, complications (procedural accidents) and perioperative management of general anesthesia.

### **D-2 Basic examination and diagnosis**

Acquire the process and knowledge of diagnosis through obtaining patients' symptoms and abnormalities, selecting appropriate medical examinations and tests.

#### **D-2-1 Medical interview (medical history taking and medical communication)**

Understand the importance of establishing a good doctor-patient relationship and acquire the basic knowledge required for medical interviews.

##### **D-2-1-1 Medical interview for general adults**

Learning objectives:

- D-2-1-1-1 Understanding the significance, purpose, and techniques of (verbal, semi-verbal, and non-verbal) communication.
- D-2-1-1-2 Understanding the psychology and behavior of patients in the clinic.
- D-2-1-1-3 Understanding medical history taking (chief complaint, present illness, past medical history, family history, homelife history, social history, occupational history, etc.).
- D-2-1-1-4 Understanding the outline of an orderly and smooth interview that flows well.

D-2-1-2 Medical interviews for children and other patients with special needs

Learning objectives:

- D-2-1-2-1 Understanding the psychology and behavior of pediatric patients in the healthcare setting.
- D-2-1-2-2 Understanding the questions required for medical interviews with pediatric patients.
- D-2-1-2-3 Understanding how to build good relationships of trust with patients and their families, taking the patient's psychological and social background into consideration.

D-2-2 Physical examinations and clinical tests of oral and maxillofacial region

Acquire the basic knowledge of physical examinations and clinical tests necessary for diagnosing diseases of the oral and maxillofacial region.

Learning objectives:

- D-2-2-1 Understanding the necessary items and equipment for physical examinations and clinical tests
- D-2-2-2 Understanding how to acquire present symptoms (inspection, palpation, percussion, thermal test, etc.).

D-2-3 Understand the patient's general condition through systemic examinations and tests

Acquire the basic knowledge of clinical tests necessary to recognize the general condition.

Learning objectives:

- D-2-3-1 Understanding the purpose and application of clinical tests
- D-2-3-2 Understanding the significance and monitoring methods of vital signs.
- D-2-3-3 Understanding measurement methods for blood pressure, pulse, respiratory rate, and body temperature, and their abnormal findings.
- D-2-3-4 Understanding state of consciousness confirmation methods and abnormal findings.
- D-2-3-5 Understanding the purpose and application of electrocardiography and arterial oxygen saturation (SpO<sub>2</sub>) measurement (pulse oximetry).
- D-2-3-6 Understanding the relationship between clinical examination results and diseases.
- D-2-3-7 Understanding the effects of patient's medications (including Kampo medications) on dental treatment (including local anesthetics, dosed drugs) and the handling thereof during dental treatment.
- D-2-3-8 Understanding the evaluation of a patient's general condition (including children, pregnant women, and older adults).

D-2-4 Medical-dental collaboration

Understand the necessity of medical-dental collaboration and how dentists should be involved, and understand how to prepare patient referral document.

Learning objectives:

- D-2-4-1 Understanding the relationship between oral and medical diseases.
- D-2-4-2 Understanding how to write prepare a patient referral document.
- D-2-4-3 Understanding the necessity of medical-dental collaboration and how dentists should be involved.

D-2-5 Diagnosis using imaging examinations

Understand the characteristics and applications of diagnosis using radiation, etc., and the interpretation of images, and understand the effects of radiation on the human body and methods of radiation protection.

Learning objectives:

- D-2-5-1 Understanding the types, properties, measurement methods, and units of radiation.
- D-2-5-2 Understanding the characteristics of radiation effects (including acute- and late-onset effects) on the human body (including the fetus).
- D-2-5-3 Understanding the standards and methods of radiation protection (including the content of the medical radiation safety manager).
- D-2-5-4 Understanding the principles of X-ray image formation (including causes of image defects).
- D-2-5-5 Understanding the principles and management of X-ray apparatus and accessories.

- D-2-5-6 Understanding the types and applications for intraoral radiography and application of panoramic radiography.
- D-2-5-7 Understanding normal images in intraoral and panoramic radiographs.
- D-2-5-8 Understanding the types and applications for craniofacial radiography.
- D-2-5-9 Understanding the principles and basic characteristics of contrast-enhanced radiography, ultrasonography, computed tomography (CT), dental cone-beam CT (CBCT), magnetic resonance imaging (MRI), and nuclear medicine examination methods.

#### D-2-6 Diagnosis using histopathological examinations

Understand the purpose and indications of histopathological examinations (histological and cytological diagnosis).

##### Learning objectives:

- D-2-6-1 Understanding the types and indications of histopathological examinations.
- D-2-6-2 Understanding how to prepare a request form for histopathological examinations.

### **D-3 Characteristics and etiology of diseases of the head and neck regions**

Acquire the abilities to recognize abnormalities and symptoms of diseases of the head and neck regions, as well as their causes, diagnostic methods, and treatments.

#### D-3-1 Characteristics, etiology, diagnosis and treatment of diseases of the oral and maxillofacial region

Understand the characteristics and etiology of diseases of the oral and maxillofacial region, as well as the basic concepts of diagnosis and treatment.

##### D-3-1-1 Congenital and acquired anomalies

###### Learning objectives:

- D-3-1-1-1 Understanding congenital anomalies that cause symptoms in the oral and maxillofacial region.
- D-3-1-1-2 Understanding the pathophysiology of cleft lip and cleft palate, their treatment plans and methods.
- D-3-1-1-3 Understanding the pathophysiology of jaw deformities, their treatment plans and methods.
- D-3-1-1-4 Understanding soft tissue abnormalities.

##### D-3-1-2 Trauma

###### Learning objectives:

- D-3-1-2-1 Understanding the types, characteristics, and healing processes of trauma.
- D-3-1-2-2 Understanding treatment plans for traumatic injuries.
- D-3-1-2-3 Understanding the causes, types, symptoms, diagnosis and treatments of traumatic injury of tooth and alveolar bone fractures.
- D-3-1-2-4 Understanding the causes, types, symptoms, diagnosis and treatment of maxillofacial fractures.
- D-3-1-2-5 Understanding the classification, symptoms, diagnosis and treatment of soft tissue injuries.

##### D-3-1-3 Inflammation

###### Learning objectives:

- D-3-1-3-1 Understanding the causative bacteria of odontogenic infections and the routes of infection.
- D-3-1-3-2 Understanding the distinction between acute and chronic inflammation.
- D-3-1-3-3 Understanding the laboratory tests necessary to diagnose inflammation.
- D-3-1-3-4 Understanding the pathogenesis, symptoms, examinations and treatments of bacteremia and odontogenic infections.
- D-3-1-3-5 Understanding the significance and characteristics of anti-inflammatory therapy.
- D-3-1-3-6 Understanding the symptoms and treatments of the major types of inflammation (glossitis, cheilitis, stomatitis, pericoronitis, alveolar osteitis, osteitis of the jaw, periostitis of the jaw, osteomyelitis of the jaw, osteonecrosis, cellulitis, and odontogenic maxillary sinusitis).
- D-3-1-3-7 Understanding the types and characteristics of granulomatous inflammation of the oral and maxillofacial region.

##### D-3-1-4 Oral mucosal diseases

###### Learning objectives:

- D-3-1-4-1 Understanding the types and characteristics of oral mucosal diseases.

D-3-1-4-2 Understanding the causes, symptoms, and treatments of oral mucosal diseases characterized by bulla, erythema, erosion, ulcer, leukoderma and pigmentation.

#### D-3-1-5 Cysts

##### Learning objectives:

D-3-1-5-1 Understanding the types and characteristics of cysts that occur in the oral and maxillofacial region.

D-3-1-5-2 Understanding the symptoms, diagnosis, and treatments of cysts that occur in the oral and maxillofacial region.

#### D-3-1-6 Tumors and tumor-like diseases

##### Learning objectives:

D-3-1-6-1 Understanding the types and characteristics of tumors that occur in the oral and maxillofacial regions.

D-3-1-6-2 Understanding the common symptoms, diagnosis, and treatments of benign tumors that occur in the oral and maxillofacial region.

D-3-1-6-3 Understanding the common symptoms, diagnosis, and treatments of malignant tumors in the oral and maxillofacial region.

D-3-1-6-4 Understanding the types and characteristics of tumor-like diseases.

D-3-1-6-5 Understand the concepts and characteristics of oral potentially malignant diseases (OPMDs).

D-3-1-6-6 Understanding the characteristics, symptoms, and treatments of leukoplakia, erythroderma, and oral lichen planus.

#### D-3-1-7 Temporomandibular joint diseases

##### Learning objectives:

D-3-1-7-1 Understanding the classification and characteristics of temporomandibular joint diseases.

D-3-1-7-2 Understanding the symptoms, diagnosis, and treatments of temporomandibular joint diseases.

#### D-3-1-8 Salivary gland diseases

##### Learning objectives:

D-3-1-8-1 Understanding an overview of developmental abnormalities of the salivary glands.

D-3-1-8-2 Understanding the characteristics, symptoms, diagnosis and treatments of salivary lithiasis.

D-3-1-8-3 Understanding the types, characteristics, symptoms, diagnostic methods, and treatments of salivary gland inflammation.

D-3-1-8-4 Understanding the types, characteristics, symptoms, diagnosis and treatments of salivary gland tumors.

D-3-1-8-5 Understanding an overview of tumor-like diseases of the salivary gland.

D-3-1-8-6 Understanding the types, characteristics, symptoms, diagnostic methods and treatments of viral sialadenitis.

D-3-1-8-7 Understanding the characteristics, symptoms, diagnostic methods, and treatments of Sjögren's syndrome (SS).

#### D-3-1-9 Neural disorders

##### Learning objectives:

D-3-1-9-1 Understanding orofacial pain.

D-3-1-9-2 Understanding the causes, symptoms, and treatments for neuropathic pain.

D-3-1-9-3 Understanding the causes, symptoms, and treatments for facial paralysis.

D-3-1-9-4 Understanding the causes, symptoms, and treatments for trigeminal paralysis (sensory paralysis, motor paralysis).

D-3-1-9-5 Understanding the causes, symptoms, and treatments for convulsion in the orofacial area.

#### D-3-1-10 Diseases manifesting symptoms in the oral and maxillofacial region

##### Learning objectives:

D-3-1-10-1 Understanding hematologic diseases (anemia, hemorrhagic factors, and leukemia) that manifest in the oral and maxillofacial region and how to screen for them.

D-3-1-10-2 Understanding the types and symptoms of infectious diseases that manifest in the oral and maxillofacial region.

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- D-3-1-10-3 Understanding the symptoms of allergic diseases, collagen diseases, and immune disorders that manifest in the oral and maxillofacial region.
- D-3-1-10-4 Understanding systemic tumors and tumor-like diseases that manifest in the oral and maxillofacial region and their symptoms.
- D-3-1-10-5 Understanding the types and symptoms of syndromes that manifest in the oral and maxillofacial region.
- D-3-1-10-6 Understanding the symptoms, diagnosis, and treatments of systemic bone diseases that manifest in the oral and maxillofacial region.
- D-3-1-10-7 Understanding the side effects of medications that cause symptoms in the oral and maxillofacial region.
- D-3-1-10-8 Understanding the metabolic disorders that manifest in the oral and maxillofacial region and their symptoms.
- D-3-1-10-9 Understanding vitamin deficiencies that manifest in the oral and maxillofacial region and their symptoms.
- D-3-1-10-10 Understanding oral symptoms and examinations for human immunodeficiency virus (HIV) infection and acquired immunodeficiency syndrome (AIDS).
- D-3-1-10-11 Understanding the causes, symptoms, and treatments of chronic pain in the oral and maxillofacial region.

#### D-3-1-11 Functional disorders of the oral and maxillofacial region

Learning objectives:

- D-3-1-11-1 Understanding the causes, examinations, tests, diagnoses, and treatments for disorders due to malocclusion and mastication disorders.
- D-3-1-11-2 Understanding the causes, examinations, tests, diagnoses, and treatments for dysphagia.
- D-3-1-11-3 Understanding the causes, examinations, tests, diagnoses, and treatments for speech disorders.
- D-3-1-11-4 Understanding the causes, examinations, tests, diagnoses, and treatments for dysgeusia.
- D-3-1-11-5 Understanding the causes, examinations, tests, diagnoses, and treatments for xerostomia.
- D-3-1-11-6 Understanding the causes, examinations, tests, diagnoses, and treatments for sleep apnea.

#### D-3-2 Characteristics and etiology of diseases of teeth and periodontal tissues

Understand the overview of diseases that affect teeth and periodontium.

Learning objectives:

- D-3-2-1 Understanding the causes and clinical/pathological conditions of dental caries and other diseases of dental hard tissue (including tooth wear, discoloration of vital teeth, dentin hypersensitivity, cracks and fractures, tooth dysplasia, and tooth morphological defect).
- D-3-2-2 Understanding the causes and clinical/pathological conditions of pulpal diseases and apical periodontitis.
- D-3-2-3 Understanding the causes and clinical /pathological conditions of periodontal diseases.
- D-3-2-4 Understanding oral bacteria, plaque (oral biofilm), and calculus.
- D-3-2-5 Understanding the mechanism of toothache.

### **D-4 Integration, analysis, and evaluation of medical information and treatment planning**

Acquire knowledge to appropriately handle and evaluate patients' medical information and to develop treatment plans that take the patients' mentality, and health promotion, into consideration.

#### D-4-1 Clinical records

Understanding the standard methods of writing clinical records, prescriptions and dental laboratory order forms

Learning objectives:

- D-4-1-1 Understanding problem-oriented medical records (POMR).
- D-4-1-2 Understanding how to write prescriptions.
- D-4-1-3 Understanding how to write dental laboratory order forms.

#### **D-4-2 Diagnosis and treatment planning**

Acquire the process and knowledge of treatment planning, while taking the patient's social issues as well as dental and medical diseases into account.

Learning objectives:

- D-4-2-1 Be able to produce a problem list of health problems related to preexisting dental, medical conditions and systemic conditions, as well as psychological background and socioeconomic problems.
- D-4-2-2 Be able to explain the treatment plan based on the problem list.
- D-4-2-3 Be able to formulate a treatment plan, taking the treatment strategy and treatment priorities into account, based on the patient's background and intent.

#### D-4-3 Patient-Centered care and informed consent

Understand patient-centered care and acquire methods that respect the patient's right to choose.

##### Learning objectives:

- D-4-3-1 Be able to describe technical terms for typical diseases in terms that are easy for patients to understand in informed consent and informed assent.
- D-4-3-2 Understanding the common ground on which physicians and patients should agree.
- D-4-3-3 Understanding how to strengthen the physician-patient relationship.
- D-4-3-4 Understanding the significance of Narrative-Based Medicine (NBM) in patient-centered care.

### D-5 Basic clinical skills

Acquire the knowledge on various dental treatments to provide safe and secure dental care.

#### D-5-1 Dental health instruction

Understand prevention of dental diseases and oral healthcare management.

##### Learning objectives:

- D-5-1-1 Understanding the prevention of major dental diseases (dental caries, periodontal diseases, malocclusion).
- D-5-1-2 Understanding pit and fissure sealing and fluoride application methods in dental caries prevention.
- D-5-1-3 Understanding the significance and methods of plaque control.
- D-5-1-4 Understanding dental disease prevention based on life stages.
- D-5-1-5 Understanding the risk factors for dental diseases.
- D-5-1-6 Understanding the medications used for oral healthcare management.
- D-5-1-7 Understanding the need for mouth guards in contact sports.

#### D-5-2 Treatments of tooth and periodontal disease

Understand the treatment methods of diseases that occur in the teeth and periodontium.

##### D-5-2-1 Diagnosis and treatment of dental caries and other diseases of dental hard tissue

##### Learning objectives:

- D-5-2-1-1 Understanding the symptoms, examination methods, diagnoses, and treatment methods of dental caries and other hard tissue diseases (tooth wear, discoloration of vital teeth, dentin hypersensitivity, cracks and fractures, tooth dysplasia, and tooth morphological defects).
- D-5-2-1-2 Understanding the significance of dental treatments and clinical procedures based on Minimal Intervention Dentistry (MID).
- D-5-2-1-3 Understanding the handling, restoration methods and application of restorative materials.
- D-5-2-1-4 Understanding the purpose and significance of pretreatment necessary for restoration.
- D-5-2-1-5 Understanding the significance, types and methods of dentin and pulp protection.
- D-5-2-1-6 Understanding the significance and methods of cavity preparation.
- D-5-2-1-7 Understanding the significance, types and characteristics of temporary fillings.
- D-5-2-1-8 Understanding the purposes and methods of post-restoration management.

##### D-5-2-2 Diagnosis and treatment of pulpal diseases and apical periodontitis

##### Learning objectives:

- D-5-2-2-1 Understanding the symptoms, examinations, diagnoses, and treatment methods of pulpal diseases and apical periodontitis.
- D-5-2-2-2 Understanding the purpose and methods of root canal filling.
- D-5-2-2-3 Understanding the types, treatments, and prevention of complications (procedural accidents) in treatments for pulpal diseases and apical periodontitis.
- D-5-2-2-4 Understanding the post-treatment healing and prognosis of pulpal diseases and apical periodontitis.

- D-5-2-2-5 Understanding types and applications of surgical endodontics (including the use of dental operating microscopes).
- D-5-2-2-6 Understanding the causes, types, and treatment of discoloration of nonvital teeth.
- D-5-2-2-7 Understanding the causes, symptoms, diagnosis and treatment of root resorption.
- D-5-2-2-8 Understanding the causes, symptoms, diagnosis and treatment of root fracture of nonvital teeth.

#### D-5-2-3 Diagnosis and treatment of periodontal disease

##### Learning objectives:

- D-5-2-3-1 Understanding the relationship between periodontal disease symptoms and systemic diseases.
- D-5-2-3-2 Understanding the examination methods, diagnosis and treatment strategies (including maintenance methods) for periodontal diseases.
- D-5-2-3-3 Understanding the procedure and indications for periodontal treatment.
- D-5-2-3-4 Understanding the types and indications for periodontal surgery.
- D-5-2-3-5 Understanding the tissue healing process and prognosis of periodontium following periodontal treatment.

### **D-5-3 Treatments of dental structure and tooth defect/loss**

Understanding the clinical significance and treatment procedures of crown restoration for dental defects and prosthetic treatment for partial or total dental defects

#### D-5-3-1 Treatments by fixed prosthesis (crown and bridge)

##### Learning objectives:

- D-5-3-1-1 Understanding the significance and requisite conditions for fixed prostheses.
- D-5-3-1-2 Understanding the types, characteristics, and fabrication methods (including CAD/CAM) of fixed prostheses.
- D-5-3-1-3 Understanding the significance, types and characteristics of abutment build up.
- D-5-3-1-4 Understanding the significance and methods of preparation for abutment teeth.
- D-5-3-1-5 Understanding materials and methods used to perform impression taking (including optical impressions) for the fabrication of fixed prostheses.
- D-5-3-1-6 Understanding the materials and methods used to perform maxillomandibular registration for the fabrication of fixed prostheses.
- D-5-3-1-7 Understanding shade selection (shade-taking) for fixed prostheses.
- D-5-3-1-8 Understanding the significance of provisional restorations and their fabrication methods.
- D-5-3-1-9 Understanding the materials and basic handling methods (including CAD/CAM) necessary to fabricate fixed prostheses.
- D-5-3-1-10 Understanding methods of fabricating study casts and working casts.
- D-5-3-1-11 Understanding the types and characteristics of average value articulator and adjustable articulators.
- D-5-3-1-12 Understanding the materials and methods used for cementation fixed prostheses.
- D-5-3-1-13 Understanding the significance and methods of maintenance after the cementation of fixed prostheses.

#### D-5-3-2 Treatment with removable prosthesis (removable partial denture, complete denture)

##### Learning objectives:

- D-5-3-2-1 Understanding the types and clinical conditions of disabilities due to tooth loss and edentulous jaw.
- D-5-3-2-2 Understanding the types, purposes, significance and indications of removable prostheses.
- D-5-3-2-3 Understanding the component and design principles (including system of support, retention, bracing, and occlusal balance) of removable prostheses.
- D-5-3-2-4 Understanding the impression taking for removable prostheses fabrication.
- D-5-3-2-5 Understanding the maxillomandibular registration for removable prostheses fabrication.
- D-5-3-2-6 Understanding the types and characteristics of average value articulator and adjustable articulators.
- D-5-3-2-7 Understanding artificial tooth selection.
- D-5-3-2-8 Understanding the artificial teeth arrangement with occlusal scheme.
- D-5-3-2-9 Understanding the characteristics and basic methods of necessary materials in order to fabricate removable prostheses.
- D-5-3-2-10 Understanding the wax denture trial fitting, setting and adjustment of removable prostheses.

- D-5-3-2-11 Understanding the significance and methods of maintenance for removable prostheses.
- D-5-3-2-12 Understanding the relining and repair of removable prostheses.
- D-5-3-2-13 Understanding the types and pathology of disabilities due to facial or jaw defects.

#### D-5-3-3 Treatment by dental implants

##### Learning objectives:

- D-5-3-3-1 Understanding the types, characteristics, purpose and significance of dental implants.
- D-5-3-3-2 Understanding the indications and complications of dental implants.
- D-5-3-3-3 Understanding the examination, tests and treatment procedures necessary for dental implants.
- D-5-3-3-4 Understanding the surgical methods for placement of dental implants.
- D-5-3-3-5 Understanding impression taking for dental implant superstructures.
- D-5-3-3-6 Understanding maxillomandibular registration for dental implant superstructures.
- D-5-3-3-7 Understanding fabrication procedures and attachment methods for dental implant superstructure.
- D-5-3-3-8 Understanding the significance and methods of dental implant maintenance.

#### D-5-4 Basic oral surgical treatments

Acquire the basic knowledge necessary to properly perform minor oral surgery.

##### Learning objectives:

- D-5-4-1 Understanding indications and contraindications for tooth extraction (including handling of relative contraindications, and the indications and contraindications of minor oral surgery) and the basic procedures.
- D-5-4-2 Understanding complications (procedural accidents) of minor oral surgery.
- D-5-4-3 Understanding the basic procedures and use of instruments necessary for basic oral surgery.
- D-5-4-4 Understanding disinfection of hands and surgical field.
- D-5-4-5 Understanding the extraction of impacted teeth (including wisdom teeth).
- D-5-4-6 Understanding the purpose and significance of perioperative management.

#### D-5-5 Treatment for malocclusion

Understand the necessity and significance of diagnosis and treatment for malocclusion.

##### Learning objectives:

- D-5-5-1 Understanding the purpose and significance of orthodontic treatments.
- D-5-5-2 Understanding the concept of normal occlusion, and conditions to achieve and maintain it.
- D-5-5-3 Understanding the causes, types, disorders, examination, tests, diagnosis, treatment, and prevention methods for malocclusion.
- D-5-5-4 Understanding the types and names, purpose and methods of use of orthodontic appliances and devices.
- D-5-5-5 Understanding the systemic and local biological reactions caused by orthodontic treatment.
- D-5-5-6 Understanding the complications (procedural accidents) that can result from orthodontic treatment and how to prevent them.

#### D-5-6 Pediatric dental treatment

Understand the peculiarities of pediatric dental care.

##### Learning objectives:

- D-5-6-1 Understanding the characteristics and prevention methods of dental caries in deciduous and immature permanent teeth.
- D-5-6-2 Understanding the examination, testing and diagnosis of dental caries in deciduous and immature permanent teeth.
- D-5-6-3 Understanding the purposes, types, indications, procedures and points of caution for tooth crown restoration in deciduous and immature permanent teeth.
- D-5-6-4 Understanding the examinations, tests, diagnosis, and treatments of pulpal disease and apical periodontal diseases in deciduous and non-fully formed (immature) permanent teeth.
- D-5-6-5 Understanding the characteristics and handling of pediatric periodontal diseases.
- D-5-6-6 Understanding the examination, testing, diagnosis, treatment methods and prognosis of pediatric tooth trauma.
- D-5-6-7 Understanding the examination, testing, diagnosis, and treatment methods of pediatric mucosal disorders.



- D-5-6-8 Understanding the concepts of static (passive) and dynamic (active) occlusal guidance and the factors that inhibit the normal development of dentition and occlusion.
- D-5-6-9 Understanding the purposes, types, indications and points of caution of space maintenance treatment, and the design and fabrication methods of space maintainer appliances.
- D-5-6-10 Understanding the signs and physical findings of child abuse.

#### D-5-7 Dental treatments of older adults

Understand the physical, mental and psychological characteristics and points of caution for dental treatment of older adults.

Learning objectives:

- D-5-7-1 Understanding physiological, psychological, and behavioral characteristics of older adults (including dementia).
- D-5-7-2 Understanding common diseases and medications in older adults.
- D-5-7-3 Understanding tests and prevention management of oral function in older adults.
- D-5-7-4 Understanding oral hypofunction in older adults.
- D-5-7-5 Understanding tools and treatment used in oral health management of older adults (including preventive nursing care).
- D-5-7-6 Understanding the systemic management practiced when performing dental treatment on older adults.
- D-5-7-7 Understanding the important points of caution for performing dental treatment on older adults requiring nursing/long-term care (including in-home health care recipients).
- D-5-7-8 Understanding the background and disorders that cause dysphagia (including midlife disorders in adults), and dysphagia rehabilitation (including dietary type adjustment) on older adults.
- D-5-7-9 Understanding the examination of nutritional status, nutritional instruction in older adults.
- D-5-7-10 Understanding signs and responses to elder abuse.

#### D-5-8 Dental treatments of children and persons with disabilities

Understand the physical, mental and psychological characteristics of children and persons with disabilities, and the important points to consider in performing their dental treatment.

Learning objectives:

- D-5-8-1 Understanding the physical, mental, and psychological characteristics of children and persons with disabilities.
- D-5-8-2 Understanding the behavior management and important points in performing dental treatment for children and persons with disabilities.
- D-5-8-3 Understanding the specific characteristics of dental treatment on children and persons with disabilities.
- D-5-8-4 Understanding the oral hygiene management of children and persons with disabilities.
- D-5-8-5 Understanding dysphagia rehabilitation for children and persons with disabilities.

#### D-5-9 Dental treatments of mental and psychosomatic diseases

Understand that the mind and body have a close relationship, and acquire basic knowledge of mental and psychosomatic diseases.

Learning objectives:

- D-5-9-1 Understanding the psychosomatic correlation.
- D-5-9-2 Understanding psychiatric medical conditions (primarily psychiatric disorders) and psychosomatic conditions (dental psychosomatic disorders or oral psychosomatic disorders) that appear in relation to the orofacial region.
- D-5-9-3 Understanding the symptoms, diagnosis and treatment of psychiatric medical conditions (primarily psychiatric disorders) and psychosomatic conditions (dental psychosomatic disorders or oral psychosomatic disorders) that appear in the orofacial region.
- D-5-9-4 Understanding the purposes and significance of psychological tests.
- D-5-9-5 Understanding burning mouth syndrome (glossodynia).
- D-5-9-6 Understanding dental phobia.
- D-5-9-7 Understanding psychosomatic treatment.

### **D-6 Interprofessional collaboration / Team-based health care / Regional health care**

Understand the need for interprofessional collaboration and the role of dentists in regional health care in order to practice patient-centered dental health care.

D-6-1 Medical knowledge necessary to collaborate with physicians.

Acquire the medical knowledge necessary to share medical information with the patient's family physician and to understand the patient's general condition.

Learning objectives:

- D-6-1-1 Understanding common systemic diseases (Table 1) that are problematic for dental treatments.
- D-6-1-2 Understanding the medications taken for common systemic diseases.
- D-6-1-3 Understanding the precautions for dental treatment on patients with medical complications.

D-6-2 Collaboration between dental professionals, interprofessional collaboration, team-based health care and regional health care

Understand how to collaborate and cooperate among dental professionals and interprofessionals, respecting the expertise of other professions in order to practice patient-centered health care.

Learning objectives:

- D-6-2-1 Understanding the overview of oral health care management methods collaborating with dental hygienists.
- D-6-2-2 Understanding an overview of dental laboratory methods collaborating with dental technicians.
- D-6-2-3 Understanding the basic terminology required for interprofessional collaboration.
- D-6-2-4 Understanding the overview of oral health management within an interprofessional team (e.g., nutrition support team, dysphagia rehabilitation team, oral healthcare team).
- D-6-2-5 Understanding dental examinations and health education methods for community residents.

\*Learning objectives detailed in this domain E begin with “By the time of graduation, all students will be able to...”

## **E. Medical examination, diagnosis and clinical skills**

Acquire the basic clinical skills to select appropriate examinations and tests, and diagnose based on the symptoms and pathology of the head and neck region, develop a treatment plan, and practice safe and secure treatment, in order to provide appropriate dental care.

### **E-1 Basics of care**

Acquire emergency procedures in order to provide reliable, safe, and secure dental care and practice medical care that takes patient safety measures into consideration, and practice appropriate pain management (pain relief methods) during procedures.

#### **E-1-1 Patient safety and infection control**

Acquire knowledge, skills, and attitudes regarding medical safety and infection control necessary to practice dentistry.

Learning objectives:

- |         |  |      |
|---------|--|------|
| E-1-1-1 | Perform medical safety measures (including standard precautions (SP), infection prevention, operation of medical equipment, and accidental exposure to radiation). | (Ia) |
| E-1-1-2 | Wash hands and wear sterile gloves.  | (Ia) |
| E-1-1-3 | Select and wear appropriate personal protective equipment (PPE).   | (Ia) |
| E-1-1-4 | Perform cleanliness-conscious operations.  | (Ia) |
| E-1-1-5 | Perform proper separation and disposal of medical waste.   | (Ia) |
| E-1-1-6 | Perform measures to prevent needlestick wounds.  | (Ia) |
| E-1-1-7 | Prepare incident reports (including radiation mishaps).  | (Ib) |
| E-1-1-8 | Select appropriate antimicrobial agents with consideration for drug resistance (AMR).  | (II) |

#### **E-1-2 Emergency first aid**

Acquire the basics of emergency first aid.

Learning objectives:

- |         |  |      |
|---------|--|------|
| E-1-2-1 | Check and evaluate state of consciousness. |      |
| E-1-2-2 | Demonstrate basic life support (BLS).      | (Ib) |

#### **E-1-3 Anesthesia and analgesia**

Acquire pain management and local anesthesia techniques necessary to perform dental treatment.

Learning objectives:

- |         |  |      |
|---------|--|------|
| E-1-3-1 | Perform local anesthesia (topical anesthesia and infiltration anesthesia). | (Ia) |
| E-1-3-2 | Assist with psychosedation.  | (II) |
| E-1-3-3 | Manage pain with pharmacotherapy.  |      |

### **E-2 Basic examination and diagnostic skills**

Acquire clinical skills to inquire about patient’s symptoms and disorders, to select appropriate medical examinations and tests, and make a diagnosis.

#### **E-2-1 New patient medical interview**

Understand the importance of communication in order to build a good doctor-patient relationship, acquiring the knowledge, skills, and attitude necessary for medical interviews.

##### **E-2-1-1 Medical interview of general adult patient**

Learning objectives:

- |           |  |      |
|-----------|--|------|
| E-2-1-1-1 | Maintain appropriate appearance, language, and professional attitude for patient contact.  |      |
| E-2-1-1-2 | Perform basic communication in medical interviews.   | (Ia) |
| E-2-1-1-3 | Collect and analyze patient information.   | (II) |
| E-2-1-1-4 | Take the patient’s medical history (chief complaint, present illness, past medical history, family history, homelife history, social history, occupational history, etc.). | (Ia) |

- E-2-1-1-5 Select and organize the patient's problems, taking into account their physical, mental, and social difficulties. (Ia)
- E-2-1-1-6 Adapt appropriately to the patient's anxieties, dissatisfaction, facial expressions, and changes in behavior. (Ia)
- E-2-1-1-7 Protect the patient's privacy. (Ia)
- E-2-1-1-8 Report about patient to the supervising dentist. (Ia)

E-2-1-2 Medical interviews for children and other patients with special needs

Learning objectives:

- E-2-1-2-1 Perform basic communication in a medical interview for children. (Ia)
- E-2-1-2-2 Perform basic behavior control of pediatric patients (verbal and nonverbal communication, use of substitute words). (Ia)
- E-2-1-2-3 Receive patient information through medical interviews with people with disabilities, their families or their nursing caregiver. (II)

E-2-2 Examination and testing of oral and maxillofacial diseases

Acquire knowledge, skills, and attitudes related to the medical examination and testing necessary to diagnose diseases of the oral and maxillofacial region

Learning objectives:

- E-2-2-1 Select the necessary medical examinations and testing based on patient information. (Ia)
- E-2-2-2 Perform a medical examination (visual examination, palpation, etc.) of the head and neck's condition. (Ia)
- E-2-2-3 Perform oral and dental examinations (visual, palpation, percussion, thermal, pulp electrodiagnosis, translucency (Ia), caries risk test (Ib), and laser fluorescence intensity measurement (II))
- E-2-2-4 Perform examination of teeth, dentition, and occlusion. (Ia)
- E-2-2-5 Perform periodontal tissue examination (tooth mobility, periodontal pocket examination, probing examination, root bifurcation lesion examination, plaque examination). (Ia)
- E-2-2-6 Perform oral function examination (mandibular movement, temporomandibular joint, muscle function, masticatory function, saliva and salivary glands, swallowing function, pronunciation and articulation, nasopharyngeal closure function, sensory (taste, somatosensory) examination, tongue pressure test). (II)
- E-2-2-7 Perform a precision tactile function test. (II)

E-2-3 Assessing the general condition of the patient through a systemic examination and testing

Acquire the necessary examination methods to understand the general condition

Learning objectives:

- E-2-3-1 Understanding the relationship between the oral cavity and medical disorders.
- E-2-3-2 Measure and evaluate vital signs (temperature, blood pressure, pulse rate, respiratory rate, transcutaneous arterial oxygen saturation). (Ia)
- E-2-3-3 Inquire about the patient's systemic condition and medications. (Ia)
- E-2-3-4 Evaluate systemic condition and examine the maxillofacial and oral cavity areas. (Ia)
- E-2-3-5 Evaluate children's physical development (Kaup index, Rohrer index), motor function (gait, etc.), physiological parameters (temperature, blood pressure, pulse rate, respiratory rate), skin, fingers, and nails. (II)
- E-2-3-6 Understanding the significance and differences between basic tests to infer pathology and examination for definitive diagnosis.
- E-2-3-7 Explain the purpose and indications of hematological examinations (blood cell, coagulation/fibrinolysis/platelet function), biochemical examinations, immunoserology examinations, biological function examinations, and nutritional examinations, and interpret the results. (Ia)

E-2-4 Medical-dental collaboration

Understand the necessity of medical-dental collaboration, how dentists should be involved, and learn how to prepare patient referral documents.

Learning objectives:

E-2-4-1 Draft a patient referral document according to medical and dental collaboration. (Ib)

#### E-2-5 Diagnosis using imaging examinations

Acquire the ability to perform examinations and interpret images after explaining the necessity of radiological examinations and their effects on the human body to patients.

Learning objectives:

- E-2-5-1 Select and perform appropriate imaging and clinical examinations for performing diagnosis and treatments.
- E-2-5-2 Explain the necessity of intraoral and panoramic radiographic examinations to patients and perform them. (Ia)
- E-2-5-3 Explain the necessity of CT and MRI to patients and give instructions for imaging.
- E-2-5-4 Interpret images obtained from intraoral or panoramic radiographic examinations. (Ia)

#### E-2-6 Diagnosis using histopathology

Acquire the ability to understand histopathology (histology, cytology, etc.).

Learning objectives:

- E-2-6-1 Interpret the contents of the request forms and reports for histopathology (histology, cytology, etc.). (II)

### **E-3 Clinical reasoning from symptoms and pathological conditions**

Acquire the basic skills to make a differential diagnosis of causative diseases based on major symptoms and pathological conditions in the oral and maxillofacial region.

#### E-3-1 Basic diagnosis

Acquire the thinking process to derive diseases from symptoms and medical condition.

Learning objectives:

- E-3-1-1 Clarify the symptoms and medical condition from the data obtained through the selection and the performance of the necessary physical examinations (oral, maxillofacial, and general) based on the symptoms of the disease.
- E-3-1-2 Explain possible differential diseases based on the inference of the cause and pathophysiology from the main symptoms and medical condition.
- E-3-1-3 Increase diagnosis accuracy in pathophysiological or epidemiological probability based on data obtained through the selection and performance of various appropriate examinations for differential diagnosis.

#### E-3-2 Clinical reasoning

Acquire the basic ability to infer the pathophysiological causes of major oral and maxillofacial syndromes, classify them, and make a differential diagnosis.

Learning objectives:

- E-3-2-1 Understand the causes and pathophysiology of major syndromes (Table 2).
- E-3-2-2 Discuss differential diagnosis and explain the main points of diagnosis for major syndromes (Table 2).
- E-3-2-3 Construct diagnostic reasoning from chief complaints in the clinical practice.
- E-3-2-4 Understand the pathophysiology and epidemiology of diseases in clinical practice.

### **E-4 Organize medical records and formulate treatment plans**

Understand how to handle medical information obtained from patients and acquire patient-centered treatment plans based on this information.

#### E-4-1 Creation of medical records

Record medical information obtained from patients according to standard formats and properly draft prescriptions and dental laboratory order forms

Learning objectives:

- E-4-1-1 Draft a Problem Oriented Medical Record (POMR). (Ib)
- E-4-1-2 Draft prescriptions. (Ib)
- E-4-1-3 Draft dental laboratory order forms. (Ib)

#### E-4-2 Diagnosis and treatment plan

Acquire the knowledge, skills and attitude to collect, analyze and diagnose from patient information and formulate treatment plans to provide comprehensive one-oral one-unit dental treatment.

Learning objectives:

- |         |   |      |
|---------|---|------|
| E-4-2-1 | Collect and organize patient health problems, determine treatment plan and treatment priorities.  | (Ia) |
| E-4-2-2 | Formulate a comprehensive treatment plan considering the patient's background and wishes in addition to the treatment policy for the disease. | (Ia) |

#### E-4-3 Informed consent

Acquire knowledge and attitude about medical ethics and patients' rights necessary for dentists through clinical practice and carrying out patient-centered medical care.

Learning objectives:

- |         |  |      |
|---------|--|------|
| E-4-3-1 | Explain the diagnosis, treatment strategy, and treatment plan in a way patients can easily understand.                           | (Ia) |
| E-4-3-2 | Obtain informed consent and informed assent.   | (Ib) |
| E-4-3-3 | Assess treatment results appropriately with reference to patient complaints as well as suggestions from the supervising dentist. | (Ia) |
| E-4-3-4 | Perform patient-centered medical care based on epidemiology, evidence-based medicine (EBM) and narrative-based medicine (NBM)    |      |
- 

#### E-5 Basic clinical skills

Acquire basic clinical skills to provide safe and secure dental care.

##### E-5-1 Common matters

Be able to prepare the environment for safe dental practice.

Learning objectives:

- |         |  |      |
|---------|--|------|
| E-5-1-1 | Prepare and put away the instruments necessary for dental treatment. | (Ia) |
| E-5-1-2 | Take positions of patient and surgeon appropriately.                 | (Ia) |

##### E-5-2 Dental health guidance

Implement dental disease prevention and oral health management.

Learning objectives:

- |         |   |      |
|---------|---|------|
| E-5-2-1 | Evaluate oral health status and the presence or absence of risks and explain them to the persons concerned. | (Ia) |
| E-5-2-2 | Provide oral hygiene instruction.   | (Ia) |
| E-5-2-3 | Perform PMTC.   | (Ia) |
| E-5-2-4 | Provide nutrition education guidance.   | (Ib) |
| E-5-2-5 | Provide guidance on lifestyle habits.   | (Ib) |
| E-5-2-6 | Provide guidance and support for smoking cessation to prevent periodontal disease, oral cancer, etc.        | (Ib) |
| E-5-2-7 | Provide guidance on nutrition according to life stages.   | (Ib) |
| E-5-2-8 | Perform dental and perioral health and safety measures in sports.   |      |

##### E-5-3 High frequency treatment

Perform treatment of dental and periodontal diseases that are encountered frequently.

##### E-5-3-1 Treatment of dental caries and other diseases of dental hard tissue

Learning objectives:

- |           |   |      |
|-----------|---|------|
| E-5-3-1-1 | Perform composite resin restoration (simple cavity).  | (Ia) |
| E-5-3-1-2 | Perform composite resin restoration (complex cavity). | (Ib) |
| E-5-3-1-3 | Perform glass ionomer cement restoration.             | (Ib) |
| E-5-3-1-4 | Perform metal inlay restoration.                      | (Ib) |
| E-5-3-1-5 | Perform composite resin inlay restoration.            | (Ib) |

- E-5-3-1-6 Perform repair restoration. (Ia)
- E-5-3-1-7 Perform dentin hypersensitivity treatment. (Ia)
- E-5-3-1-8 Perform postoperative management of dental restoration. (Ia)

E-5-3-2 Treatment of pulpal and apical periodontal diseases.

Learning objectives:

- E-5-3-2-1 Perform root canal treatment (single rooted tooth). (Ia)
- E-5-3-2-2 Perform root canal treatment (multiple rooted tooth). (Ib)
- E-5-3-2-3 Perform direct and indirect pulp capping. (Ib)
- E-5-3-2-4 Perform temporary indirect pulp capping. (Ib)
- E-5-3-2-5 Perform pulp sedative treatment. (Ib)
- E-5-3-2-6 Perform pulpectomy (single rooted tooth). (Ib)
- E-5-3-2-7 Perform follow-up observation of tooth after treatment of pulpal and apical periodontal diseases. (Ib)

E-5-3-3 Periodontal treatment

Learning objectives:

- E-5-3-3-1 Perform plaque control instruction as a part of initial periodontal treatment. (Ia)
- E-5-3-3-2 Perform scaling as a part of initial periodontal treatment. (Ia)
- E-5-3-3-3 Perform scaling and root planing as a part of initial periodontal treatment. (Ia)
- E-5-3-3-4 Perform occlusal adjustment as a part of initial periodontal treatment. (Ib)
- E-5-3-3-5 Perform simple temporary splint as a part of initial periodontal treatment. (Ib)
- E-5-3-3-6 Perform maintenance after initial periodontal treatment. (Ia)

E-5-3-4 Treatment of dental structure and tooth defect/loss

Perform crown restoration for dentinal defects and prosthetic treatment for partial or edentulous jaw.

E-5-3-4-1 Treatment by fixed protheses (crown and bridge)

Learning objectives:

- E-5-3-4-1-1 Collect the necessary information for fixed prosthodontic treatment, make a treatment plan and design a prosthesis. (Ia)
- E-5-3-4-1-2 Perform abutment build up. (Ia)
- E-5-3-4-1-3 Perform preparation of abutment tooth. (Ia)
- E-5-3-4-1-4 Perform precise impression taking for fixed prosthesis. (Ia)
- E-5-3-4-1-5 Perform procedures for maxillomandibular registration for fixed prosthesis. (Ia)
- E-5-3-4-1-6 Perform shade selection (shade-taking) for fixed prosthesis. (Ia)
- E-5-3-4-1-7 Fabricate provisional restorations. (Ia)
- E-5-3-4-1-8 Perform cementation of fixed prosthesis and patient instruction (Ia)
- E-5-3-4-1-9 Perform of postoperative management for fixed prosthesis. (Ia)

E-5-3-4-2 Treatment with removable protheses (removable partial denture, complete denture)

Learning objectives:

- E-5-3-4-2-1 Collect necessary diagnostic information for treatment with removable protheses, make a treatment plan and prosthesis design (including surveying). (Ia)
- E-5-3-4-2-2 Perform prosthetic pretreatment for removable protheses. (Ia)
- E-5-3-4-2-3 Take primary impressions and fabricate study casts for removable protheses. (Ia)
- E-5-3-4-2-4 Take precise impressions and fabricate working casts for removable protheses. (Ia)
- E-5-3-4-2-5 Perform procedures for maxillomandibular registration and artificial tooth selection. (Ia)
- E-5-3-4-2-6 Mount working casts to the average value articulator. (Ia)
- E-5-3-4-2-7 Perform setting of removable protheses and patient instruction. (Ia)
- E-5-3-4-2-8 Perform follow-up observation after setting removable protheses. (Ia)

E-5-3-5 Basic oral surgery

Acquire basic skills in basic oral surgery

Learning objectives:

- E-5-3-5-1 Perform simple extraction of permanent teeth. (Ia)
- E-5-3-5-2 Perform surgical incision of small abscesses. (Ib)
- E-5-3-5-3 Perform basic suturing. (Ib)
- E-5-3-5-4 Perform basic suture removal. (Ia)

E-5-4 Examination, testing and diagnosis for the patient with malocclusion

Acquire the examination and testing skills necessary to diagnose malocclusion.

Learning objectives:

- E-5-4-1 Analyze, diagnose, and make a treatment plan based on models and cephalograms, etc. (Ib)
- E-5-4-2 Perform oral hygiene instruction for orthodontic treatment. (Ia)

E-5-5 Pediatric dental treatment

Perform prevention and treatment methods for oral diseases in children.

Learning objectives:

- E-5-5-1 Give oral hygiene instruction for plaque control to children and their parents/guardians. (Ia)
- E-5-5-2 Give tooth brushing instruction to children and their parents/guardians. (Ia)
- E-5-5-3 Perform PMTC on children. (Ia)
- E-5-5-4 Assess nutrition and intermediate meals guidance by age. (Ib)
- E-5-5-5 Perform application of topical fluoride. (Ia)
- E-5-5-6 Perform pit and fissure sealant. (Ib)
- E-5-5-7 Perform behavior modification and restraint methods as a response to pediatric patients.

E-5-6 Dental treatment of older adults

Perform dental treatment on older adults with attention to their physical, mental and psychological characteristics.

Learning objectives:

- E-5-6-1 Assist in transferring patients requiring assistance (e.g., from wheelchair to dental chair). (II)
- E-5-6-2 Perform basic handling of instruments of oral hygiene management for older adults.
- E-5-6-3 Perform oral hygiene management for older adults.
- E-5-6-4 Perform the screening test of dysphagia. (Ib)
- E-5-6-5 Communicate with older adults and their nursing caregivers.
- E-5-6-6 Experience dental treatments for dementia patients. (II)

E-5-7 Treatment of children and persons with disabilities

Perform dental treatment on children and persons with disabilities with attention to their physical, mental and psychological characteristics.

Learning objectives:

- E-5-7-1 Perform basic handling of instruments of oral hygiene management for children and persons with disabilities.
- E-5-7-2 Communicate with children and persons with disabilities and their nursing caregivers.

**E-6 Interprofessional cooperation, team-based health care, regional health care**

Participate in regional medical care as a member of the healthcare team.

E-6-1 Cooperation between dental professionals and interprofessional cooperation, team-based health care

Participate in team-based health care.

Learning objectives:

- E-6-1-1 Experience team-based health care by dentists, dental hygienists, dental technicians and interprofessional (physicians, pharmacists, nurses, registered dietitians, radiological technicians, medical technicians, speech-language-hearing therapists and other related professions including nursing care professions). (II)
- E-6-1-2 Experience coordination between hospitals and dental clinics and coordination between hospitals. (II)



E-6-2 Regional health care

Participate in health, medical care, and nursing care in regional settings, not only in the dental clinic.

Learning objectives:

- |         |   |      |
|---------|---|------|
| E-6-2-1 | Perform operation of required equipment at in-home dentistry. | (Ib) |
| E-6-2-2 | Experience in-home dentistry.                                 | (II) |
| E-6-2-3 | Experience the community-based integrated care system         | (II) |

## Contents and Categories of Clinical Practice and Participation in Care

Items in E		I. Practice subjects under an instructor's guidance (direct patient care)	
		I a. Subjects to be practiced as direct patient care	
E-1: Basics of dental treatment	E-1-1: Patient safety and infection control	Standard precautions [hand washing for hygiene and personal protective equipment <PPE>] Gowning techniques [wearing sterilized gloves and sterilized gowns] Patient safety Segregation of medical waste	
	E-1-2: First aid		
	E-1-3: Anesthesia & analgesia	Local anesthesia [topical anesthesia, infiltration anesthesia]	
E-2: Basic examination methods and diagnostic skills	E-2-1: Medical interview at the first visit	General adult patient	Medical interviews for initial and repeat patients
		Children, etc.	General care for pediatric patient
	E-2-2: Examinations and tests of oral and maxillofacial diseases	General adult patients	Head and neck inspection [visual, palpation, percussion] Oral inspection [visual, palpation] Tooth inspection [percussion test, thermal pulp test, electric pulp test, and transillumination test] Periodontal tissue examination [tooth mobility test, periodontal pocket depth test, bleeding on probing, furcation involvement test, plaque (detection) test] Occlusion contact test using occluding paper Study model observation and examination
		Children, etc.	Intraoral examination of pediatric patient [number of teeth, morphology and eruption of teeth, state of dentition, developmental space, occlusion status]
	E-2-3: Assessing the general condition of the patient through systemic examinations and tests	General adult patients	Blood pressure, pulse, respiration, body temperature and transcutaneous oxygen saturation <SpO2> measurements Interpretation of laboratory data (blood biochemical examination, immunological test, coagulation and fibrinolysis tests, respiratory function test, etc.)
		Children, etc.	
	E-2-4: Medical-dental collaboration		
	E-2-5: Diagnosis using imaging examinations		Imaging and interpreting intraoral radiographs Imaging and interpreting panoramic radiographs
E-2-6: Diagnosis using histopathology			
E-3: Clinical reasoning from symptoms and pathological conditions	E-3-1: Basic diagnosis	Preparation of conference presentation or case reports	
	E-3-2: Clinical reasoning		
E-4: Organize medical records and formulate treatment plans.	E-4-1: Writing a medical record		
	E-4-2: Diagnosis and treatment planning	Preparation of treatment direction, prognostic prediction and treatment planning	
	E-4-3: Informed consent	Explain treatment direction and treatment planning to patients	

I. Practice subject under an instructor's guidance (direct patient care)	II. Important subjects expected to be experienced
I b. Although subjects are expected to be practiced as direct patient care, simulations, etc. can be supplemented if difficult (*: subject to be demonstrated on a simulator or a mock-up form)	Advanced or specialist subjects which are recommended to be experienced through assistance and observation
Writing an incident report	Selection of antimicrobials with consideration of antimicrobial resistance <AMR>. Analyzing incident reports
Basic life support <BLS>*	
Local anesthesia (conduction anesthesia) Systemic management of patients with systemic diseases	Psychosedation General anesthesia General management for inpatient [perioperative management]
Psychological management for pediatric patient	Special care for pediatric patients (physical restraint method and inhalation sedation with nitrous oxide) Medical interviewing for disabled patients (including patient's family)
Caries risk test  Masticatory function tests (subjective evaluation, objective evaluation [masticatory ability test, occlusal force test, etc.] )	Precision tactile function testing Wedge stress testing, Laser fluorescence intensity measurement Stereomicroscopic test  Halitosis test Salivary secretion test (including test with an oral moisture meter)  Tongue pressure measurement
Screening test for dysphagia (repetitive saliva swallowing test <RSST>, modified water swallowing test <MWST>, etc.)	Swallowing videofluorography <VF>, Video endoscopy <VE>
	Systemic examination (visual inspection, palpation, auscultation)  Injections (intradermal, subcutaneous, muscular, intravenous) Venous blood sampling, vascularization of peripheral veins Electrocardiogram <ECG> test Bacterial test Psychological examination
	Systemic examination of pediatric patient (physical developmental status, motility function, speech and physiological features)
Writing a medical information form*.	
Interpreting extra-oral radiographs	Imaging and interpreting extraoral radiographs and dental CBCT  Imaging and interpreting CT and MRI Practice and interpreting ultrasonography Interpreting contrast-enhanced radiographs
	Writing a cytological and histopathological examination request form  Diagnosis by cytological and histopathological examination
Writing a medical record using Problem Oriented Medical Record <POMR>* Writing a medical certificate* Writing a prescription* Writing a dental laboratory order*	Writing surgical and anesthesia records
Acquiring informed consent	

Products through dental technical work\*1: If the products made by student are applied to a patient, they must be used only for clinical care by so-called Student Dentist.

\*Definition of direct patient care: Practical training in which the student actually experiences dental care practices under the supervision and management of a supervising dentist.

(Excerpt from "Summary of the Third Follow-up Survey Based on the First Report of the Survey and Research Collaborators' Meeting on Improvement and Enhancement of Dental Education (March 31, 2016)")

Items in E		I. Practice subject under an instructor's guidance (direct patient care)	
		I a. Subjects to be practiced as direct patient care	
E-5: Basic clinical skills	E-5-1: Common	Examination room	Position and posture of patient and operator
		Products through dental technical work*1	Preparing of study models, personal trays, and occlusion recording base
	E-5-2: Dental health instruction	General adult patients	Oral hygiene instruction Oral cleaning (PMTC, brushing instruction, flossing instruction)
		Children etc.	Oral hygiene instruction for pediatric patients and their guardians Oral hygiene instruction during orthodontic treatment (during orthodontic device placement, dynamic treatment, and retainer period)
	E-5-3: High frequency treatment	Restorative dentistry	Composite resin restoration (simple cavity) Dentin hypersensitivity treatment Repair of defective restorations
		Endodontics	Infected root canal treatment (single-rooted tooth)
		Periodontics	Initial periodontal treatment (scaling, scaling and root planing) Maintenance
		Fixed prosthodontics (crown and bridge)	Treatment planning with fixed prosthesis (including fixed prosthesis design) Prosthodontic treatment with fixed prosthesis (abutment build up, preparation of abutment teeth, provisional restoration, impression taking, bite taking, color selection, trial fitting, setting) Postoperative management of fixed prosthesis
		Removable prosthodontics	Treatment planning with removable prosthesis (including study model preparation and removable prosthetic device design) Prosthodontic treatment with removable prosthesis (impression taking, bite taking, trial fitting, setting, patient instruction) Repair of removable prosthesis Postoperative management of removable prosthesis
		Dental implant	
		Maxillofacial prosthodontics	
		Oral surgery	Disinfection and clean operation of the operative field (extraoral and intraoral) Simple tooth extraction of permanent tooth Suture removal
		E-5-4: Examination, testing and diagnosis for patients with malocclusion	
	E-5-5: Pediatric dental treatment	Application of topical fluoride to tooth surface	
	E-5-6: Dental care for older adults		
E-5-7: Dental care for patients with disabilities			
E-6: Interprofessional collaboration, Team-based health care, Regional health care	E-6-1 Collaboration between dental professionals and interprofessional collaboration, team-based health care Participate in team-based health care		



I. Practice subject under an instructor's guidance (direct patient care) I b. Although subjects are expected to be practiced as direct patient care, simulations, etc. can be supplemented if difficult (*: subject to be demonstrated on a simulator or a mock-up form)	II. Important subjects expected to be experienced Advanced or specialist subjects which are recommended to be experienced through assistance and observation
	CAD/CAM crown design and manufacturing
Dietary instruction and nutritional education Guidance on lifestyle habits Guidance and support for smoking cessation	Instruction on the implementation of fluoride mouthwashes, etc.
Nutrition guidance and intermediate meals advice for pediatric patients and their guardians  Dietary instruction and nutrition education for older adults	Health instruction at school dental checkups, etc.  Dental health guidance for pediatric patients Fluoride application for early root surface caries
Composite resin restoration (complex cavity) Composite resin inlay restoration Metal inlay restoration Glass ionomer cement restoration	Ceramic inlay restoration Laminate veneer restoration Vital tooth bleaching Restorative treatment using lasers
Direct pulp capping / Indirect pulp capping Indirect pulp capping (Stepwise excavation) Pulp sedative treatment Pulpectomy  Infected root canal treatment (multi-rooted tooth)	Traumatized tooth treatment Nonvital tooth bleaching Endodontic-periodontic therapy Vital pulp amputation, Apexification Surgical endodontics (apicoectomy, etc.), Hemi-section / Tooth replantation and transplantation
Initial periodontal treatment (occlusal adjustment, temporary fixation (simple))	Initial periodontal treatment (temporary fixation (complex))  Permanent fixation Periodontal surgery (flap operation, other)
	Prosthetic treatment with dental implant
	Prosthetic treatment with maxillofacial prosthesis
Small abscess incision (intraoral anti-inflammatory surgery) Suturing of oral mucosa	Outpatient oral basic surgery (impacted tooth extraction, etc.) Oral and maxillofacial surgery under general anesthesia
Organizing results of examinations (physical examination, morphological examination and functional examination) Diagnosis and treatment planning for orthodontic treatment (on permanent and mixed dentition period)	Orthodontic treatment of permanent dentition (multi-bracket device) Orthodontic treatment of mixed dentition Orthodontic treatment of cleft lip and cleft palate Orthodontic treatment of jaw deformities
Pit and fissure sealant	Crown restoration and endodontic treatment in deciduous and non-fully formed (immature) permanent teeth, traumatized tooth treatment Surgical procedures (tooth extraction, supernumerary tooth, odontoma, frenum) Space maintainer appliance, dynamic occlusal guidance Treatment of oral habits, Oral myofunctional therapy <MFT>
Applying biological monitor Management of oral function for older adults	Dental treatment of dementia patients Assistance with transfer Dysphagia rehabilitation Oral hygiene management for older adult patients requiring nursing care
	Dental care of disabled patients Oral hygiene management of people requiring nursing care Dental care under pharmacotherapy for behavior management
	Interprofessional collaboration Coordination between hospital and clinic, between hospitals
Equipment operation necessary for in-home dental care	In-home dental care Community-based integrated care system

Appendix

Table 1. Typical medical diseases and conditions (as representative diseases shown in D-6-1-1)

internal organs	disease	
respiratory system:	respiratory failure	
	bronchial asthma	
	chronic obstructive pulmonary disease <COPD>	
	restrictive pulmonary disease	interstitial pneumonia
	aspiration pneumonia	
circulatory system:	ischemic heart disease	myocardial infarction
		angina pectoris
		acute coronary syndrome
	arrhythmia	
	hypertension	
	deep vein thrombosis	
	pulmonary thromboembolism	
	heart failure	
	infective endocarditis	
	valvular heart disease	
	cardiomyopathy	
congenital heart disease		
digestive system:	peptic ulcer	
	acute/chronic hepatitis	
	virus hepatitis	
	cirrhosis	
blood hematopoietic lymphatic systems:	anemia	
	leukemia	
	bleeding tendency	
endocrine / metabolism system:	diabetes	type I diabetes mellitus
		type II diabetes mellitus
	dyslipidemia	
	thyroid disorders	hyperthyroidism
		hypothyroidism
	osteoporosis	
immunity allergies:	immunodeficiency	acquired immunodeficiency syndrome <AIDS>
	connective tissue disease	systemic lupus erythematosus <SLE>
		rheumatoid arthritis
	allergic disorders	anaphylaxis
		metal allergy
		graft versus host disease <GVHD>
		IgA vasculitis
muscle / bone system	myasthenia gravis	
	muscular dystrophy	
integumentary system:	dermal viral infections (including measles, hand-foot-and-mouth disease)	
renal urinary systems:	chronic kidney disease <CKD>	
	acute renal disorder	
	renal failure	
infections:	viral infections	
	bacterial infections	
	fungal infections	
nervous system:	dementia	Alzheimer's disease
		vascular dementia
		Lewy body dementia
	cerebrovascular accident	cerebral hemorrhage
		subarachnoid hemorrhage
		cerebral infarction
		lacunar infarction

		cerebral thrombosis
		cerebral embolism
	Parkinson's disease	
	epilepsy	
	cerebral palsy	
psychological:	schizophrenia	
	depression	
	anxiety disorder	panic disorder
		Post-traumatic stress disorder
pediatric:	developmental disabilities	autism spectrum disorder <ASD>
		attention deficit hyperactivity disorder <ADHD>
		specific learning disorder <SLD>
others:	disuse syndrome	
	alcohol / drug dependency	



Table 2. Major causative diseases to be differentiated from symptoms (E-3-2)

\*Although examples of typical causative diseases, etc., that should be assumed from the symptoms are listed, this is not an exhaustive list of diseases that correspond to the symptoms.

Clinical reasoning emphasizes the process of differential diagnosis of causative diseases from possible syndromes and conditions, and does not expect the patient to simply memorize all causative diseases.

local symptoms	category	subcategory	differential diseases, etc. to consider
pain in oral and maxillofacial region	toothache		dentin hypersensitivity, dental caries, pulp disease, apical periodontitis, marginal periodontitis, tooth trauma (tooth dislocation, tooth crown fracture, root fracture, etc.)
	gingival pain		periodontal disease (pericoronitis of wisdom tooth, etc.), apical periodontitis, oral mucosa disease (aphthous stomatitis, viral stomatitis, autoimmune bullous dermatosis, decubital ulcer, necrotizing ulcerative gingivostomatitis, oral lichen planus, etc.), malignant tumor
	jawbone pain		osteitis of jaw (osteitis of jaw, periostitis, osteomyelitis, peri-mandibular (peri-maxillary) inflammation, pericoronitis of wisdom tooth, radio-osteonecrosis, medication-related osteonecrosis of the jaw, etc.), TMJ disease (temporo-mandibular joint <TMJ> disorders, TMJ arthritis, etc., jaw fracture, malignant tumor, specific inflammation, mycosis, viral disease, bacterial infection, sarcoidosis, etc.)
	tongue pain		oral mucosa disease (aphthous stomatitis, viral stomatitis, autoimmune bullous dermatosis, oral candidiasis, decubital ulcer, xerostomia, etc.), malignant tumor
	facial pain		osteitis of jaw (osteitis of jaw, periostitis, osteomyelitis, peri-mandibular (peri-maxillary) inflammation, pericoronitis of wisdom tooth, radio-osteonecrosis, medication-related osteonecrosis of the jaw, etc.), maxillary sinusitis
	pain of the submandibular region		osteitis of jaw (osteitis of jaw, periostitis, osteomyelitis, peri-mandibular (peri-maxillary) inflammation, pericoronitis of wisdom tooth, radio-osteonecrosis, medication-related osteonecrosis of the jaw, etc.), lymphadenitis, salivary gland disease (submandibular gland sialolithiasis, submandibular adenitis, etc.), lymph node metastasis of malignant tumor
	facial and oral pain other than mentioned above	referred pain	myofascial oral and facial pain, origin of disposable headache (migraine, cluster headache, etc.), ischemic heart disease
neuropathic pain		trigeminal neuralgia, glossopharyngeal neuralgia, traumatic neuropathy	
idiopathic oral and facial pain		burning mouth syndrome	
swelling of the oral and maxillofacial region	swelling of the lips		stomatitis (granulomatous cheilitis, allergic cheilitis, etc.), edema (Quincke's edema, hereditary angioedema, etc.), cysts (dermoid cysts, epidermoid cyst, etc.), salivary gland disease (mucous cyst, etc.), benign tumor (hemangioma, pleomorphic adenoma, etc.), malignant tumor
	swelling of the cheek region		osteitis of jaw, salivary gland disease (parotid gland tumors, parotid sialolithiasis, epidemic parotitis, etc.), benign tumor, malignant tumor
	swelling of gingiva		marginal periodontitis (pericoronitis of wisdom tooth, etc.), apical periodontitis, benign tumor, malignant tumor, gingival hyperplasia
	swelling of the tongue		osteitis of jaw (osteitis of jaw, periostitis, osteomyelitis, peri-mandibular (peri-maxillary) inflammation, pericoronitis of wisdom tooth, radio-osteonecrosis, medication-related

		osteonecrosis of the jaw, etc.), inflammation of the tongue, cysts (mucous cyst, etc.), edema (Quincke's edema, hereditary angioedema, etc.), malignant tumor, benign tumor
	swelling of the oral floor	osteitis of jaw (osteitis of jaw, periostitis, osteomyelitis, peri-mandibular (peri-maxillary) inflammation, pericoronitis of wisdom tooth, radio-osteonecrosis, medication-related osteonecrosis of the jaw, etc.), cellulitis of oral floor, sialolithiasis, sublingual sialadenitis, fibroma & lipoma, hemangioma, lymphangioma, cancer of oral floor, salivary gland tumor, ranula, dermoid cysts, epidermoid cyst, IgG4-related diseases
	swelling of the submandibular and neck regions	osteitis of jaw (osteitis of jaw, periostitis, osteomyelitis, peri-mandibular (peri-maxillary) inflammation, pericoronitis of wisdom tooth, radio-osteonecrosis, medication-related osteonecrosis of the jaw, etc.), salivary gland disease (submandibular gland sialolithiasis, submandibular adenitis, mucous cyst, salivary gland tumor, IgG4-related diseases, etc.), lymphadenitis, lymph node metastasis of malignant tumor, cysts (thyroglossal duct cyst, branchial cyst, etc.)
changes in oral mucosa	leukoderma	oral mucosa disease (leukoplakia, oral lichen planus, oral candidiasis, etc.), benign tumor, malignant tumor (oral potentially malignant disorders, etc.)
	erythema & erosion	oral mucosa disease (catarrhal stomatitis, erythroplakia, oral lichen planus, oral candidiasis, autoimmune bullous dermatosis, multiform exudative erythema, systemic lupus erythematosus <SLE>, etc.), malignant tumor (oral potentially malignant disorders, etc.)
	pigmentation	oral mucosa disease (hairy tongue, endogenous pigmentation, exogenous pigmentation, etc.), benign tumor (pigmented nevus, etc.), malignant tumor (malignant melanoma, etc.)
	ulcer	oral mucosa disease (aphthous stomatitis, Behçet's disease, decubital ulcer, oral lichen planus, oral candidiasis, autoimmune bullous dermatosis, oral tuberculosis, etc.), malignant tumor (oral potentially malignant disorders, etc.)
	bulla	oral mucosa disease (viral stomatitis, autoimmune bullous dermatosis, burn, etc.)
	other mucosal eruptions	measles
oral bleeding	periodontal disease	marginal periodontitis
	blood disorders & bleeding tendency	blood disorders (hemophilia, von Willebrand disease, acute leukemia, aplastic anemia, hereditary telangiectasia, DIC, etc.), antithrombotic therapy (cerebral infarction, ischemic heart disease, etc.), liver dysfunction (liver cirrhosis)
dry mouth	salivary gland dysfunction	autoimmune disease (Sjögren's syndrome, IgG4-related diseases, etc.), radiation xerostomia, age-related xerostomia, GVHD
	neurological & drug-related	xerostomia (neurogenic xerostomia, drug-induced xerostomia, etc.)
	systemic & metabolic	endocrine disease (diabetes, hyperthyroidism, etc.)
mouth-opening/closure disorder	inflammatory • infectious	osteitis of jaw (osteitis of jaw, periostitis, osteomyelitis, peri-mandibular (peri-maxillary) inflammation, pericoronitis of wisdom tooth, radio-osteonecrosis, medication-related osteonecrosis of the jaw, etc.), rheumatoid arthritis temporomandibularis, idiosyncratic inflammation (actinomycosis, etc.)
	traumatic • scarring	trauma (jawbone fracture, zygomatic arch fracture, temporomandibular joint ankylosis, TMJ dislocation, etc.), scar (post TMJ arthritis, post TMJ injury, etc.)
	neoplastic	malignant tumor (parotid tumor, etc.), benign tumor (osteochondroma), tumor-like disease (synovial chondromatosis)

	arthritic & muscular	TMJ disease (temporomandibular joint disorder, temporomandibular joint ankylosis, etc.), abnormalities of the masticatory muscles (masticatory muscle tendon & tendon hyperplasia, etc.), congenital and developmental anomalies (deficiency of mandibular articular process, stunted development, etc.)	
	neurogenic & convulsive	nerve spasm (epilepsy, tetanus, oral dyskinesia, etc.)	
	others	systemic disease (acute leukemia, pseudogout, etc.)	
halitosis	true halitosis	oral diseases (salivary gland hypofunction, Sjögren's syndrome, xerostomia, dental caries, marginal periodontitis, glossitis, etc.), systemic disease (diabetes, etc.)	
	pseudo halitosis	psychogenic (halitophobia, etc.)	
taste disturbance		oral diseases (glossitis, stomatitis, xerostomia, etc.), systemic diseases (diabetes, iron deficiency anemia, pernicious anemia, gastrointestinal disease, etc.), taste neuropathy (facial nerve palsy, Ramsay-Hunt syndrome, etc.), drug-induced (antihypertensive drug use, anti-inflammatory drug use, antihistamine use, psychotropic drug use, etc.), nutritional disorders (zinc deficiency, vitamin deficiency, eating disorders, etc.), psychogenic (depression, psychosomatic disease, etc.)	
neuroparalysis in oral and maxillofacial region	neurogenic diseases	perceptual paralysis (trigeminal nerve palsy, glossopharyngeal nerve palsy, facial nerve palsy, etc.), motor paralysis (facial nerve palsy, hypoglossal nerve palsy, glossopharyngeal nerve paralysis, etc.)	
	systemic disease	peripheral nerve disorder (diabetes, etc.), cerebrovascular disease	
tooth anomaly	morphological abnormalities	giant tooth, dwarf tooth, condescence tooth & fused tooth, spotted tooth, Hutchinson tooth & Fournier tooth	
	color anomalies	tetracycline use, neonatal jaundice, congenital porphyria	
	abnormal number	excess tooth	Median tooth, Posterior molar tooth
		absence	ectodermal dysplasia, congenital syphilis, rubella symptom cluster
	abnormal eruption	early eruption	congenital tooth
		delayed eruption	impacted tooth, cleidocranial dysostosis, Down's syndrome, Gardner's syndrome, rickets, anterior pituitary hypopituitarism, congenital syphilis, cleft lip and palate, jawbone tumor, jaw cyst
dysphagia		organic causes (stomatitis, glossitis, pharyngitis, cellulitis, post head and neck surgery, etc.), functional causes (cerebral infarction, cerebral hemorrhage, Parkinson's disease, Ball paralysis, pseudobulbar palsy, etc.), psychological causes (depression, oral psychosomatic diseases, etc.)	
articulatory disorder		oral and maxillofacial diseases (cleft lip and palate, shortening of the lingual frenulum, post head and neck surgery, etc.), cerebrovascular accident	
oral abnormalities and discomfort during occlusion		burning mouth syndrome, abnormal sensitivity to occlusion, oral cenesthopathy, salivary gland hypofunction, glossitis, diabetes	

systemic symptoms	differential diseases to consider
fever	osteomyelitis, periostitis, pericoronitis of wisdom tooth, cellulitis, stomatitis (including viral), lymphadenitis, jaw fracture, malignant tumor, acute sinusitis, infective endocarditis, tonsillitis, upper respiratory inflammation
fatigue	various infectious disease, hypothyroidism, iron deficiency anemia, hepatitis, cardiac failure
weight loss	hyperthyroidism, diabetes, malignant tumor
weight gain	hypothyroidism, cardiac failure, steroid use
consciousness disturbance	cerebral hemorrhage, cerebral infarction, subarachnoid hemorrhage, epilepsy, myocardial infarction, sepsis, drug intoxication, shock
fainting	vasovagal reflex
convulsions	local anesthetic intoxication, hyperventilation syndrome
edema	hypothyroidism, heart failure, liver cirrhosis, chronic kidney disease <CKD>
dehydration	vomiting, diarrhea
eruption	measles, rubella, varicella, herpes simplex, herpes zoster, drug eruption, urticaria
dyspnea	bronchial asthma, pulmonary embolism, chronic obstructive pulmonary disorders disease <COPD>, heart failure, anaphylaxis, suffocation
chest pain	myocardial infarction, angina pectoris, pulmonary embolism, aortic dissection
palpitations	hyperthyroidism, arrhythmia, iron deficiency anemia
nausea / vomiting	cerebral hemorrhage, subarachnoid hemorrhage, hypertensive encephalopathy, diabetic ketoacidosis
jaundice	hepatitis, hemolytic anemia, biliary atresia
lymph node swelling	malignant lymphoma, infectious mononucleosis, tuberculosis
cognitive deficit	dementia, Parkinson's disease, cerebral infarction
headache	migraine, tension-type headache, cluster headache, cerebral hemorrhage, subarachnoid hemorrhage, acute sinusitis
motor paralysis	cerebral infarction, cerebral hemorrhage, transient ischemic attack
arthralgia / joint swelling	rheumatoid arthritis, systemic lupus erythematosus <SLE>, gout

## Chapter 3 Learning strategies and assessments

Chapter 2 specifies what should be learned and mastered by learners (learning objectives). When utilizing these objectives for the curriculum at each facility, it is necessary to consider evaluation/assessment methods to measure whether learners have achieved them, in addition to specific learning strategies. For curriculum development at each university, this chapter presents the theoretical backgrounds, reference and ideas of learning strategies and learning assessment, focusing on learning objectives in the domain of attitudes and skills.

In particular, as many theoretical backgrounds and reference ideas are common between medical and dental education, contents are based on “Chapter 3 of the Model Core Curriculum for Medical Education in Japan (AY 2022 Revision)”, and those specific to dentistry have been added.

## **I. Learning strategies**

### **1. Definition of learning strategies**

Learning strategies (LS) are specific teaching methods necessary to achieve learning objectives, together with more extensive educational strategies, including learning orders, human and material resources, target learners, their number, and elective/compulsory courses. Learning strategies are set not only for the objectives and learning objectives specified in the model core curriculum for dental education, but also for each university’s characteristic and original curriculum. The abilities to be acquired include knowledge, skills, and attitudes, and it is necessary to select appropriate learning strategies for each of these domains.

As learning strategies are the means to achieve objectives, there is no uniform method. For that reason, there may be various learning strategies for one learning objective. Therefore, each dental college/school is exerting creative efforts in accordance with their curriculum policy to maximize learning effectiveness. Furthermore, each dental college/school selects strategies that are feasible despite various constraints such as resources, environments, regional characteristics, and the number of learners.

### **2. Pedagogical theories that help to formulate learning strategies**

#### 1) Adult learning theory

In dental education, defined as higher education, it is important to understand the Adult Learning Theory. Knowles clarified 5 characteristics of adults’ learning process: self-concept, past experiences, readiness to learn, orientation to learning, and motivation to learn, and he proposed the Andragogy in adult education in contrast to the Pedagogy in child education. The Adult Learning Theory has been used as the basis of the highly learner-centered dental education curriculum (such as problem-based learning: PBL) developed at the end of the 20th century. For example, it can be used to “plan class sessions in relation to what learners have learned” (Saiki & Kikukawa, 2013). The Adult Learning Theory recommends active learning (Komazawa & Nakano, 2022).

Requiring self-learning before lectures (flipped learning) and utilizing ICT to promote interactive communication are examples of active learning.

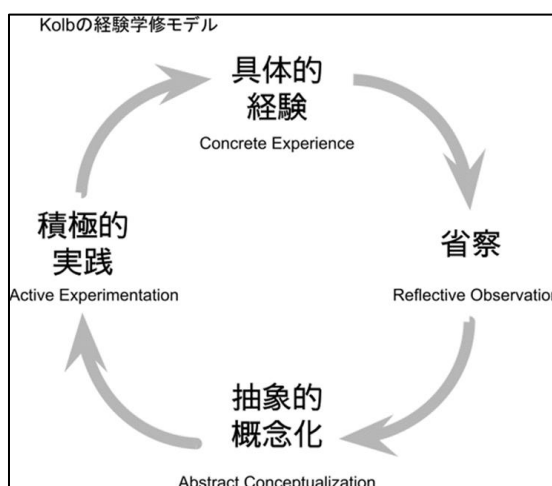
## 2) Behaviorism, cognitivism, and constructivism

Behaviorism is a psychological perspective that deems one's learning and thinking process predictable from their behavior. In the 20th century, this way of thinking was used in educational psychology, with a view to clarifying the association between learning contents and learners' behaviors. On the other hand, various criticisms against it, such as that it makes little of what thoughts one should develop, placing importance only on behavioral change, or it may even allow them not to think at all, and that it leads to the supremacy of examinations, which only evaluates objective knowledge, were raised. In contrast to behaviorism focusing only on behavior, cognitivism pays attention to how one processes and stores obtained information, and recalls this memory. It integrates attention, consciousness, language, emotion, vision, hearing, and movement into learning. Constructivism considers learning as an active process, where key concepts and big ideas are created by adding new information that is meaningful to the learner to their existing knowledge. Each learner can acquire these concepts not by memorizing detailed knowledge in solitude, but by interacting with other learners around them. Constructivism is compatible with the previously mentioned Adult Learning Theory, but it has not yet been widely used in medical education in Japan (Saiki, 2012b).

## 3) Kolb's experiential learning theory

This theory is the basis of the "documentation of experience and valuation" in the clinical training implementation guideline. Kolb observed that each learning experience does not end simply as an experience, and defined it as a cycle of four processes: the learner encounters a concrete experience, reflects on and analyzes the new experience, and learns from this experience by generalizing the learning (abstract conceptualization) and experiencing it again in a small-scale, safe situation (Kolb's Experiential Learning Model) (Kolb, 2017-04-17, p. p33). Especially in practical training, this learning cycle is repeated by creating opportunities to reflect on each concrete experience afterwards.

Kolb's Experiential Learning Model



## Column: “Instructional Design”

### 1) What is instructional design?

Instructional design is a methodology to design and implement high-quality educational approaches. The purpose of instructional design is to increase the effectiveness, efficiency, and attractiveness of target educational approaches.

Effective education requires setting appropriate goals for target learners, and designing and implementing educational approaches for them to achieve these goals. For example, if they are pre-OSCE students, and they perform auscultation of heart sounds, the goal may be to understand auscultation manners and the regions the stethoscope should be applied to. In contrast, if they are students who have completed clinical practice, to accurately classify heart sounds after auscultation, and to make a clinical reasoning from them may also be the goals.

To improve the efficiency of education, its cost, such as human, materials, time, and financial resources, should be taken into consideration. In the case of auscultation, whether to provide an environment where each student can practice with a simulated patient or simulator, whether to simulate the practice using tablets or other applications, or whether to provide the information through lectures and/or videos may be the points to be considered. These points are also important when selecting educational strategies.

Measures to increase the attractiveness of learning also help to keep students motivated, and to encourage their lifelong learning. Such measures include increasing students’ interest in dentistry and medicine through early exposure to clinical practice that takes place immediately after enrollment, for example; and supporting them to make use of their experiences during the clinical practice to select their future specialties (Suzuki, 2006).

### 2) First principles of instructional design

Various theories of instructional design have been proposed to date. Merrill defined 5 common elements as the first principles of instructional design: problem-solving, activation, demonstration, application, and integration (Merrill, 2002).

Problem-solving signifies engaging in solving real-world problems/challenges. For example, as a problem-based learning (PBL) challenge, dealing with cases that will be immediately encountered in clinical practice helps students clarify their goals, and improve their motivation to learn. Activation is recalling learning contents and experiences as existing knowledge, and associating them with new knowledge. The knowledge related to actual cases in clinical settings, which had been acquired through lectures or with textbooks, or learning about them through comparison with similar cases is an example of such activation.

Demonstration refers to demonstrating new knowledge to students, and application means that new knowledge should be applied by them. Instructing students to practice and perform a procedure in a simulation after the teacher has demonstrated it or shown it using a video is an example strategy for these principles.

Lastly, integration is integrating knowledge and skills into daily life and work, such as performing medical practices in clinical settings, reflecting on the results of their practices, and connecting them to new learning during clinical practice and participation and after graduation.



### 3. Key questions when formulating learning strategies

The first 6 questions are based on the “SPICES Model” proposed by Harden (Harden, Sowden, & Dunn, 1984), and have been added in consideration of the current situation in dental education. When analyzing and planning educational strategies for a relevant curriculum, it is easy to organize and understand if you consider the following questions:

#### 1) learner -centered or educator-centered?

In learner-centered education, educators are only guides, and learners are responsible for their own learning, understanding their learning needs and goals, learning by the methods they have chosen, and evaluating their own learning (self-directed learning). Learners’ ways of learning tend to be active, and teaching materials (including videos) play an important role in their learning. Active learning can be considered as learner-centered education, and creating opportunities for learners to actively express their opinions in group discussions is an example of such education. In educator-centered education, educators lead learning processes from the perspective that learners cannot see the view after learning (therefore, they learn). As learners do not choose to learn by themselves, their ways of learning tend to be passive, and their motivation to learn becomes weaker. In this case, educators often play a charismatic role. Unidirectional teaching styles, such as one-sided lectures and video streaming, may be examples of educator-centered education.

#### 2) Problem-based or information-gathering?

The act of resolving problems is compatible with the tasks to be performed by clinicians in clinical settings. The Adult Learning Theory also suggests that problem-based learning (PBL) is effective. It is effective for learners who prefer to identify problems through practice first, and then to learn theories to resolve these problems as an order of learning. Information-gathering learning is more effective to learn facts, concepts, and principles, or to understand a field of study systematically. It may also be effective to convey the importance of accumulating findings in unknown areas. For learners who prefer to learn the theory first and then to apply it to their practice, information-gathering learning is effective.

#### 3) Integrated or discipline-based?

In discipline-based learning, learning proceeds by discipline. The strength of such learning is it allows learning the history of each discipline, and has a strong track record of achieving educational outcomes. It is also expected to develop abilities for scientific inquiry by addressing what is not understood in each discipline. On the other hand, it has a disadvantage of becoming closed and cloistered. In integrated learning, education is designed to integrate approaches to each theme from various disciplines: basic dentistry, social dentistry, and clinical

dentistry on a single theme. Educational strategies, such as horizontal integration (e.g., learners learn about the structure and function of the human body through courses in multiple disciplines such as physiology, anatomy, and surgery) and vertical (continuous) integration (e.g., learners learn about tumors through both basic and clinical courses in anatomy, pharmacology, and clinical oncology from lower to upper grades), are effective ways to build a knowledge base that can be applied to practice (Tagawa, Saiki, & Nishigori, 2014).

#### 4) Community-based or hospital-based? (clinical education)

The optimal place of learning should be considered according to one's learning objectives and based on the question of whether it is in a hospital or community. In hospital-based learning, there are many supervisors, and learners can acquire more extensive experience in treating inpatients. They can also learn about highly advanced health care. On the other hand, in community-based learning, learners can learn about primary care, as well as collaboration with nursing care/welfare services and social aspects of health care. It is advisable to plan learning from the perspective of hospital-community collaboration.

#### 5) Elective or standard?

The model core curriculum for dental education encompasses items that are required for all dental learners. The question of what the minimum academic requirements are for learners who do not go on to their own specialty/clinical department should always be considered. In elective-driven learning, learners' act of choosing their own subjects along with the fact that they can choose their own learning methods often increases their motivation to learn (Rouse, 2017).

#### 6) Systematic or apprenticeship-based?

What learners learn in clinical practice tends to be opportunistic, as it depends on the patients they will have charge of. In contrast, simulation-based education enables systematic learning that covers all syndromes and diseases to be learned by learners. Learning through practical experience is called on-the-job training (OJT) and learning other than practical experience is called off-the-job training (Off-JT). Clinical practice is a typical example of OJT. The advantage of learning through OJT is that there is no need for reproduction of settings (i.e., learners can apply what they learned on the spot). However, as noted above, such learning tends to be ad hoc, and it is thought to be inefficient. Compared to this, simulation-based education as a typical example of Off-JT enables learners to learn what they need to learn systematically and efficiently, but it requires reproduction of settings (Rouse, Johns, & Pepe, 2017). Lectures can be systematically planned, but task-based learning such as PBL tends to be opportunistic. When designing a PBL-focused curriculum, it is necessary to confirm whether learners are systematically covering all the items they are required to learn.

#### 7) Face-to-face or online?

Online education as a means of providing learning by using ICT, such as learning management systems (LMS) and teleconferencing systems, has significantly advanced during the 2019 coronavirus pandemic (COVID-19). The question of “face-to-face or online?” is one that many instructors are asking themselves daily. The superiority of face-to-face education is clear in clinical practice, but in the case of lectures and small group discussions, almost the same learning effect can be achieved through online education, and there is another advantage of allowing learners to learn at their own pace by reviewing recorded videos. On the other hand, online education makes it difficult to schedule breaks for learners to chat between lectures, and to build a learning community. Education that combines the advantages of face-to-face and online learning beyond the dichotomy between them (AlQhtani et al., 2021), as well as education in the metaverse space, such as virtual reality, augmented reality, and mixed reality, is expected to develop in the future. Education that combines the advantages of face-to-face and online learning is called hybrid learning, which can be broadly classified into blended, dispersive, and HyFlex types (Taguchi, 2020). Blended learning is a strategy in which the format is switched according to the content and the session of learning, such as holding the first-class session online and the second one face-to-face. In dispersive learning, learners are divided into groups to participate in face-to-face/online sessions in turn. Unlike blended learning, it allows adjusting the number of learners who participate in face-to-face sessions, and is therefore suitable for special situations, such as the COVID-19 pandemic. On the other hand, it requires careful scheduling, as the order in which learners learn contents may vary. HyFlex learning enables learners to participate in each class session in various formats, such as face-to-face, simultaneous bilateral, and on-demand. As an example of HyFlex learning, a class session (face-to-face) may also be remotely shared using a teleconferencing system (simultaneous bilateral), and after the session is over, related materials may be shared on an LMS for post-class learning (on-demand). While this format allows flexible approaches to dispersive education and education for learners staying home, it is quite costly in terms of preparation and management.

#### 8) Synchronous or asynchronous (on-demand)? (online education)

Asynchronous (on-demand) learning is a form in which instructors and learners proceed with education/learning on different time axes. Instructors prepare video lectures and practice problems in advance, and learners access these materials at their own timing for self-study/learning. Questions from learners, if any, are often fielded by e-mail or using online bulletin boards. To smoothly perform this series of processes, LMS is used in most cases (Stojan et al., 2021).

The advantages of asynchronous learning include allowing to repeatedly view videos and documents, and enabling learning making use of practice problems, which especially promotes knowledge acquisition. On the other hand, such learning may make it difficult for learners to maintain their motivation to learn, as it requires them to proceed with their learning basically in solitude. In this respect, it is necessary to consider other approaches, such as combining it with simultaneous bilateral class sessions, as appropriate. Individual feedback for learners on their reports or other assignments is also useful.

Column: An introduction to ICT: “LMS”

LMS stands for a learning management system, but it is also called a course management system (CMS) or virtual learning environment (VLE). It is a system to centrally manage teaching materials and evaluations for online classes (Ellaway & Masters, 2008).

Specifically, it is often used for the following strategies in on-demand education: (1) presenting videos, PDF files, and other viewing materials, (2) presenting multiple-choice questions to confirm knowledge, and (3) using bulletin boards for discussions among students and fielding their questions to instructors. In face-to-face and simultaneous bilateral online classes, LMS may be used to instruct students to resolve problems on the spot, such as using it like a clicker. Additionally, it is applicable as a simple portfolio, such as practicum records and diaries.

Furthermore, LMS can be used to support students’ learning by examining their status of completing each material, date of learning, and academic performance in a cross-sectional manner. It also facilitates tailor-made education, such as presenting additional materials for students who desire to learn more deeply, and supplementary materials for those making little progress.

9) How to arrange educational resources?

When formulating a strategy, the feasibility/sustainability of educational resources should be considered. In such cases, human resources (Who teaches? Who cooperates in education?: e.g., hospitals, clinics, and patients); time resources (When and how long to teach?); spatial resources (Where to teach? Face-to-face or online?); material resources (What to use for teaching?); and financial resources (How much will the costs be in the first place?) (Humphrey, 2010) should be considered. The costs include, for example, honorariums and travel expenses for external lecturers, and the running costs of simulators.

4. Types of learning strategies

Learning strategies are broadly classified into 2 types: passive and active. Passive learning strategies refer to not only passive learners, but also, for example, lectures that are suitable for knowledge acquisition, especially at the level of memory recall, but not for learning related to the affective and psychomotor domains. In contrast, active learning strategies, in which learners adopt more active attitudes toward learning, include group discussions, various types of practical training, and self-learning. Clinical practice is a characteristic learning strategy in health care. For clinical practice and participation in care, a form of clinical practice, see the “clinical training implementation guideline”.

## 1) Passive learning strategies

Such as lectures, mini-lectures, observation of clinical practice, films/videos, and demonstrations.

## 2) Active learning strategies

### (1) Practical training

Such as early exposure to clinical practice, basic dentistry training, fieldwork (such as experience of community-based practice and social dentistry training), simulation-based training (model practice, participatory simulation training with simulated patients (SP), paper simulation, and virtual reality (VR) training), role-play, peer training, learners' educational activities, clinical practice and participation in care, and participation in laboratory practice.

- Simulation: An artificial learning environment close to reality is created for learners to resolve problems on given tasks. Simulators are occasionally used to promote reality, but simulated patients, models, and VR can also be used.

- Role-play: One learner plays one role (e.g., dentist), while another learner or the instructor plays another role (e.g., patient), which allows learners to simulate various positions and roles. This technique is often used to learn medical interviewing and examination skills. The advantage of role-play is that it facilitates repetitive learning, and it also encourages reflection through discussions among learners on their experience of playing each role.

### (2) Group work/group learning

Such as problem-based learning (PBL) tutorials, team-based learning (TBL), flipped classrooms, conferences, abstract reading, clinicopathological conferences (CPCs), small group discussions, debates, workshops, seminars, and case studies.

- Flipped learning/classrooms: Learners participate in each class session after working on previously assigned tasks with textbooks and literature as pre-learning. Instructors facilitate class sessions to help learners apply their knowledge and acquire critical thinking skills, assuming that they have acquired such knowledge through prior learning.

- PBL: It is an educational approach to develop the skill to find and resolve problems actively of one's own accord, unlike passive learning such as memorization. In PBL, learners are required to identify problems by themselves through small group discussions on patient cases or other issues, and to proceed with their own learning, in order to resolve these problems. Instructors do not teach knowledge, but just observe the progress of each group, and provide advice for learners to accurately understand the essence of the problems they have found and to appropriately learn problem-solving. In a typical PBL session, learners are divided into groups,

and each group is assigned to a small room with an instructor as the tutor, which requires manpower. Alternatively, multiple groups may be assigned to a sufficiently large room.

- TBL: It is characterized by evaluating learners' performance, adding up their personal and group scores. Prior to each TBL session, the instructor prepares assignments for pre-learning, and learners carry out self-learning. During the session, a test to confirm learners' personal preparedness is conducted first. Then, another test to confirm their group preparedness is conducted. In the group preparedness confirmation test, learners are provided with immediate feedback to show the correctness of their answers using tools, such as scratch cards. Subsequently, learners remaining in groups work on an applied problem using the knowledge they have acquired through the group preparedness confirmation test. After a discussion within each group on the applied problem, another discussion is held among groups with the instructor as the facilitator, where learners are guided toward the correct answer.

- Case-Based discussion (CBD): Also called case-based learning, it is a method of learning clinical reasoning and decision making through structured instructor-learner interactions based on specific cases (Kassirer, 1983). As each case report provides contextual information about the case (e.g., situation and background), CBD is said to be a more effective method of learning than learning without context in terms of knowledge application (Ertmer & Newby, 2008).

### (3) Self-learning

Such as learning about assigned tasks, e-learning, learning with textbooks, journals, reference books, and videos, learning through webinars, report writing, and independent studies.

### (4) Clinical practice

Such as clinical practice assistance, clinical practice and participation in care, ward training, and participation in home-visit healthcare services, health examinations, and the community-based integrated care system.

The form of practical training in actual clinical settings should be selected in consideration of learning goals and periods. Practical training in hospitals and other facilities during the first to third year is called early exposure to clinical practice. Early exposure to clinical practice is a form of practical training, in which learners experience the actual settings of dentistry/dental care, and their motivation for learning can be increased through interactions with actual patients and role model clinicians. During training, it is important to provide learners with opportunities for reflection, such as writing reports, as reflection enables them to objectively understand and conceptualize their own ideas based on their experiences, and to clarify their future challenges.

Clinical practice (clinical practice for learners in their fourth year and beyond after passing the common achievement tests) starts with observation of clinical practice, followed by examination assistance, and then

shifts to the clinical practice and participation in care. Clinical practice covers from prior learning about clinical practice to portfolio reflection. During this, learners also participate in medical conferences, medical safety workshops, in-hospital simulation-based training, and peer training. Simulation-based training may be provided as pre-training for clinical practice and participation in care or as an alternative training to learn highly invasive medical procedures that cannot be performed on patients. The community-based integrated care system is supposed “to be developed based on community autonomy and initiative and according to community characteristics” (Ministry of Health, Labour and Welfare). In education based on the community-based integrated care system, uniform learning strategies are unsuitable, and it is necessary for each university to determine learning strategies according to the characteristics of their community.

- Significant Event Analysis (SEA): It is a method to deal with any event considered to be significant for reflection before adopting actions, structurally reflect on the causes of the event, and use findings to develop improvement plans. SEA is often used as a strategy/evaluation method for learners to reflect on and learn from their own experiences. Based on reflection, it is applicable to a wide variety of events, especially for education in the affective domain. For example, in the case of professionalism education, learners describe events, where there was a certain code of conduct, but in reality, they had difficulty taking actions, on SEA sheets for reflection, and share their findings with the educator and other learners for further discussion.

- Learning portfolio: It is a collection of a learner’s experiences, improvements, and outcomes in one or more domains intentionally collected by the learner, which should include the learner’s active involvement in the selection of these outcomes, their reason for collecting them, and evidence of their reflection (Fleon, 1991). Concerning portfolios in dental education, they encompass descriptions/discussions/reflections on learners’ experiences, discussions and reflections on problem areas, learned items, and planning of methods to address new learning needs as a measure for the “documentation of learning and clarification of learning contents” (Snadden & Thomas, 1998).

#### (5) Educational activities

Such as near-peer (“roof-tile”) teaching, health guidance, and interprofessional education (IPE).

- Peer learning: Also called peer-to-peer education, it generally refers to mutual teaching among learners with similar levels of learning. It is also called peer-assisted learning (PAL), and includes near-peer learning, where senior learners teach junior learners, and which is considered as synonymous with “roof-tile” education. Enabling effective educational scaffolding and maintaining psychological safety based on instructor- learner cognitive proximity are thought to be the advantages of this method. On the other hand, tutor training as a form of teaching instructors what and how to teach is also important to assure the quality of education.

## (6) Presentations

Such as presentations at study/lecture/research meetings and paper writing.

## 5. Elements of a learning strategy

A learning strategy consists of the following elements, each element should be considered when formulating a learning strategy:

### 1) Specific behavioral objectives (SBOs)

Determine the specific behavioral objectives (SBOs) to be fulfilled by implementing the learning strategy. In the model core curriculum for dental education, SBOs correspond to learning objective. In some cases, multiple learning strategies are formulated to fulfill a single SBO, while in other cases, multiple SBOs can be fulfilled with a single learning strategy.

### 2) Methods

As previously defined, there are passive and active learning methods, and several methods are occasionally combined.

### 3) Timing

Examine the timing for strategy implementation during the learning period in consideration of the sequentiality with other strategies.

### 4) Target learners and their number

Clarify target learners (such as their grade) and their number (in the case of group learning, the number of members per group and the number of groups).

### 5) Resources

Select and prepare necessary resources.

#### (1) Human resources

Such as faculty members, clerks, supervising dentists, senior dentists, hospital/clinic director, staff, simulated patients (simulated/standardized patients), patients, non-healthcare professionals, learners themselves, classmates and senior/junior learners, and general public volunteers (community residents).

#### (2) Material resources (places and media)

##### A: Places



Such as lecture rooms, tutorial rooms, practical training rooms, skills labs (simulation centers), hospital outpatient departments, hospital wards, and external (off-campus) facilities.

#### B: Media

Such as documents (textbooks, reference books, manuals, journals, guidelines, printouts, etc.), boards (blackboards, whiteboards, poster board, etc.), three-dimensional media (real objects, models, specimens, etc.), auditory media (CDs, audio information, etc.), visual media (PCs, tablets, presentation software, LCD projectors, OHPs, etc.), audiovisual media (PCs, tablets, LCD projectors, CDs, DVDs, videos, etc.), and ICT media (computer software, search engines, simulators, e-learning, interactive boards, etc.).

#### (3) Financial resources (budget)

When purchasing or installing new media, a budget should be allocated. In addition to honoraria for collaborators (such as external lecturers, simulated patients, and general public volunteers) and learners, insurance costs and transportation expenses may also need to be included in the budget. In the case of model training, the costs for the purchase of models and the management/operation of exclusive model training rooms should also be considered.

#### (4) Time resources (time required)

Estimate the time required to implement the strategy.

### 6. Approaches to formulating learning strategies

When formulating learning strategies, it is important to ensure the consistency between “what to teach” and “how to teach”. Without such consistency, both educators and learners may become fatigued. Learning strategies that are consistent with learning objectives and are rich in variety stimulate the curiosity and inquisitiveness of learners. Even after being determined, learning strategies should be periodically brushed up, as learning objectives, learners, and learning environments may change.

Moreover, when determining a learning strategy, it is important not only to decide how to teach, but also to clarify the system and the sequentiality to achieve the goals. As methods to clarify the overview and sequentiality, course numbering and curriculum maps are effective. These are useful for both learners and educators to understand the system and sequentiality.

The points for selecting learning strategies are as follows:

- Methods that are appropriate for the domains to which the learning objectives belong
- Methods that are familiar to learners
- Methods that motivate learners to learn and keep them motivated
- Methods that maximize learning effectiveness and efficiency
- Methods that create many opportunities for repetitive learning and practice

- Combining various learning methods
- Considering the use of familiar methods not only for learners but also for educators

Similarly, the points for selecting media are as follows:

- Appropriateness for the learning objectives
- Active participation of learners
- Appropriateness as teaching materials
- Excellent technical performance
- Sufficient copyright protection, privacy protection, and other ethical considerations
- Familiarity of both learners and educators with their use

Learning strategies and assessment are inseparable. Therefore, assessment methods should also be considered at the time of formulating learning strategies, rather than afterwards.

## **II. Learning assessment**

### **1. Toward the acquisition of dental expertise**

In the acquisition of dental expertise, the flow of undergraduate education, postgraduate clinical training, and subsequent specialty area programs requires appropriate assessment/evaluation of the student's learning activities. The qualities and skills for a dentist are treated as multifaceted abilities/skills (competencies) and are composed of observable and assessable competencies such as knowledge, skills, and attitudes that can be observed in practice. There are different levels of learning outcomes expected at different stages of training, such as first-time student, graduate, specialist, etc., and it is necessary to set standards for assessments/evaluation at each stage.

### **2. Concept of learner assessment**

#### 1) Learner assessment

For "assessment", which is an activity to assess the qualities and abilities acquired by learners, it is extremely important to be consistent with "learning objectives" and "strategies" to promote efficient and effective learning activities.

Summative assessment, in which pass/fail and grades are determined based on the student's progress toward the learning objectives at a certain stage, such as at the end of a course, is an important evaluation opportunity for both the course director and the learner. On the other hand, formative assessment, which judges the status of the learner's learning condition in the process of learning and encourages continuous growth, is an important assessment activity as an educational activity, and feedback tailored to the individual learner makes it possible to promote learning effectively.

In addition, to assess the qualities and skills of learners comprehensively, not only a single assessment method but also a combination of various assessment methods and the accumulation of records of the growth process of learners will make it possible to conduct a more in-depth assessment. We hope that each university will consider the best assessment /evaluation activities according to the resources it possesses.

#### 2) Miller's pyramid

In 1990, Miller's pyramid was proposed as a conceptual diagram for evaluation in medical education (Miller 1990). "Knows" represents the knowledge required to demonstrate professional competence. "Knows how" indicate the ability to analyze and interpret the information gathered and apply it to dental practice. "Shows how" is the ability to demonstrate these skills in action, including in a simulated environment, and "Does" is the ability to put these skills into practice in the clinic.

In the curriculum, it is easy to organize the concepts by considering the learning objectives, learning strategies, and assessment in relation to Miller's pyramid. Learner's competence is a complex combination of "Knows", "Knows how", "Shows how", and "Does". However, having "Knows" and "Knows how" abilities (cognitive abilities) does not guarantee having "Shows how" and "Does" abilities. The following assessment methods are often used: written examinations for "Knows" and "Knows how", OSCE using simulated patients and simulators for "Shows how", and workplace-based assessments and portfolio assessments for "Does".

In the assessment of learners, it is necessary to conduct assessment that is not biased toward cognitive abilities considering learning objectives and learning strategies. In other words, it is necessary to be aware of "Shows how" and "Does" in the assessment of practical abilities in dental treatment, etc. The authenticity of assessment increases from "Knows" to "Does". In general, "Knows" and "Knows how" are mainly evaluated in basic dentistry and clinical dentistry in the lower grades, but "Shows how" in pre-clinical practice, and "Does" in clinical practice and participation in care will be the focus of assessment. The assessment of "Does" in undergraduate clinical training will lead to learning and assessment in postgraduate clinical training.

### 3) Validity, reliability, transparency, and practical elements of assessment

Learner assessment is an activity to "judge" the achievement of learning outcomes, and in its execution, sufficient attention should be paid to "validity", "reliability", "transparency", and "practical elements". When planning the curriculum, a carefully considered plan for assessment is necessary to avoid being off-target and ad hoc, and practical factors such as the resources required for assessment activities (people, materials, budget, location, etc.), the adaptability of the assessors and learners to the assessment/evaluation method, and the impact on the behavioral change of students must be fully taken into consideration. The assessment method should be based on a practical assessment method. Therefore, it is necessary to pay attention to the use of assessment methods that can appropriately measure the abilities of the subject being assessed, the use of multifaceted assessment methods that combine highly reliable assessment methods and various types of assessment, and the sharing of assessment criteria and items with the learners. It is also important to periodically conduct objective verification of assessment activities as part of curriculum assessment and improvement activities.

### 4) Blueprint in assessment

A blueprint in assessment is a design document that indicates in advance that test questions and assignments are systematically created from the areas to be assessed and that the data obtained covers the qualities and abilities to be assessed. A Blueprint describes the content of the areas to be covered, a description of the academic outcomes to be assessed, the method of assessment, the number of questions, and the distribution of scores, and are essential to demonstrate the validity of the assessment.

#### 5) Evaluation criteria and evaluation standards

An evaluation criterion is a point of view (evaluation item) in an evaluation and is a written scale that describes each evaluation criterion (point of view, evaluation item) in several levels. Only a small percentage of assessments, such as multiple-choice questions (MCQs), have results that remain the same no matter when and by whom. Many assessments methods, such as written examinations, oral examinations, and performance assessments, are influenced by the subjectivity of the assessor. Rubrics are pre-designed tables that clearly define each of the evaluation criteria, allowing different assessors to evaluate from different perspectives and with different scales at different times.

### 3. Types of assessment

In dental education, it is especially important to acquire practical abilities related to dental treatment. Therefore, it is important to set up opportunities for assessment of learners' abilities in actual dental treatment sites or in environments that simulate dental treatment sites of clinical practice, not by using a single assessment method, but by using various assessment methods and setting multiple evaluation opportunities. It is important to set up assessment opportunities that can capture multiple aspects of a learner's abilities.

#### 1) Assessment of cognitive domain (knowledge)

For the cognitive domain (knowledge), the extent to which the learner can utilize the knowledge is determined (See Bloom's Taxonomy). The following examinations are examples of assessment methods, including written examinations and CBT.

#### Objective-based examinations (multiple choice questions, matching, sorting, etc.)

An examination in which the examinee is given a choice of answers and asked to select and choose the correct answer. While these examinations can be scored mechanically and are easy to process quantitatively, they mainly ask the information which can be recalled, and the cognitive abilities, however that can tend to be shallow. It is used in the National Board Examinations and the Common Achievement Tests, CBT. The format of the multiple-choice questions includes single-choice, multiple-choice, and so on. It is known that there are pitfalls unique to this format, such as being able to derive answers by using the options as clues or being able to answer appropriately without knowing the answer, which can be overcome to some extent by devising the number of options and scoring methods.

#### Essay type examinations (short-answer/ long-answer essay type examinations)

This is an examination in which answers are written and can be broadly classified into a short-answer type and an essay type. Compared to the objective type, it is easier to question in-depth cognitive abilities such as applying

and analyzing information, but the limited examination time may not be sufficient to cover all areas to be assessed. These tests require the setting of rubrics or other evaluation criteria to ensure the reproducibility of the evaluation at the time of scoring.

Oral examination (interview)

The Mini- Clinical Evaluation Exercise (mini-CEX) may be used to assess clinical reasoning skills in the practice setting.

## 2) Assessment of skills and behavioral domain

Dental education provides opportunities for assessment of various abilities, but assessment of skills and behaviors (attitudes) related to patient care is particularly important to demonstrate that learners have acquired sufficient qualities and abilities to begin clinical practice as a clinical trainee resident. Assessment methods include simulation examinations, practical skill examinations, and portfolio assessments. In simulation examinations and practical skill examinations, assessments of work procedures, operational skills, etc. are conducted through direct observation by the assessors, assessments of deliverables, etc. In the portfolio assessments, the assessment of the learner's own reflection of learning activities over a certain period and other assessments records are comprehensively evaluated to judge the learning status and to assess professional growth. Rubrics, rating scales, checklists, etc. should be used as tools to enhance the objectivity and reliability of each of the above.

Objective Structured Clinical Examination (OSCE)

The OSCE evaluates the performance of examinees using predefined common tasks and is based on common criteria and standards. Learners (examinees) are tested at a station with common materials and equipment. It is suitable for evaluation of clinical skills and attitudes. It has the advantage of objective evaluation, however, it requires a large amount of human-, material-, and time-resources. In dentistry in Japan, the Common Achievement Test OSCE, a large-scale public examination, is conducted nationwide before the start of clinical training. In addition, OSCEs may be administered during or after clinical practice for the purpose of formative or summative assessment.

Workplace-based assessment

Observational assessment is sometimes translated as learner assessment in the practice setting. Practical ability can be assessed through assessment of daily behaviors and attitudes. It is mainly based on the assessors' direct observation. It is recommended that a rubric be developed so that different assessors can evaluate from a certain perspective and scale. On the other hand, since variations in evaluation imply multifaceted observation of learner's competence, it is not necessary to aim at minimizing such variations. Rather, having assessors in various standpoints (360-degree feedback) and describing the details of the rationale are important in

determining the generalization of the observed assessment of competences. A typical tool for observational assessment in clinical practice is the Mini-Clinical Evaluation Exercise (Mini-CEX).

#### Rubric for assessment

Rubric is a method for measuring academic achievement and is a method suitable for assessing complex performances (e.g., skills) that require the integration and use of previously learned knowledge and skills. When a rubric chart is presented to learners prior to their studies, the specifics of what is expected of them clarify the direction they should aim for, allowing learners to check their current level and consider what they will need to do to achieve higher goals. By knowing the difference between their own reflection and the assessors' feedback, students can grasp specifically where they are achieving their learning goals and where they are not. The learner's reflection based on the rubric will lead to the next step. Rubric enables evaluation based on fixed evaluation perspectives and standards, and ensures the quality of evaluation.

#### Portfolio

The portfolio is a record of the learner's learning steps, and is a continuous record of the learner's own reflections on the learning situation and achievement level, and the teacher's evaluation of those reflections, by collecting related materials created in the learning process. It is also a strategy for promoting learner-centered learning and fostering self-evaluation skills through teacher guidance for reflection, and is an assessment method that enables comprehensive evaluation of the learner's "behavior" through continuous evaluation activities that combine the results of other evaluations.

### 3) Assessment of clinical ability

In the field of patient care, it is necessary to make appropriate judgments based on reasoning from a variety of knowledge and to provide quality care based on their skills. As for patient care, it is necessary to practice not only the skillfulness of dental clinical procedures, but also comprehensive abilities in patient safety, infection control, ethical considerations, and communication, which requires direct observation and evaluation by the assessors in various situations. The characteristics of learning in clinical practice include the difficulty of ensuring the identity of cases studied among learners, and the fact that there are multiple evaluation opportunities and multiple assessors. Until now, evaluation of clinical practice has been based on the accumulation of the number of self-experiment cases. However, it is necessary to evaluate not only quantitatively, but also to specifically evaluate the degree of achievement of learners toward their learning goals and their comprehensive abilities necessary for clinical practice. The 360-degree feedback conducted with the cooperation of clinical staff and patients, in addition to faculty members, is also a highly useful method, although it requires careful preparation for administration.

#### Assessment methods related to clinical competence

The following are examples of evaluation of clinical dental skills that can be conducted in a simulated or actual dental care environment (e.g., simulated patients, simulated dental situations, etc.).

Knowledge: oral examination (mini-CEX)

Skills and behaviors: simulation test (OSCE), clinical practice test, observation record, activity logbook, portfolio, 360-degree feedback, etc.

\*Tools for objectivity and reliability: rubrics, rating scales, checklists, etc.

#### 4) The common achievement test

After a trial period from 2002 to 2005, the common achievement test, which was officially implemented in 2006, was designed to evaluate whether dental students who had not yet begun clinical training had acquired the ability to perform acceptable dental procedures in clinical practice. Based on the results of these examinations over the past ten years, it has been highly regarded by society and will become an official examination in 2024. In order to evaluate the acquisition of the necessary skills at the start of clinical training, Computer Based Testing (CBT) is used for the comprehensive understanding of knowledge, and clinical skills and attitudes required for dental treatment are assessed by the Objective Structured Clinical Examination (OSCE). The Post-CCPX was implemented in 2020 after a trial period from 2017 to 2019. The Post-CCPX is designed to evaluate clinical skills mainly in the areas of “I. Practice under an instructor” and “II. Practice under an instructor is preferable”. The examination consists of a Clinical Practical Examination (CPX), which mainly aims to evaluate the attitude domain, and a Clinical Skills Examination (CSX), which evaluates the skill domain using an integrated common model that simulates multiple diseases.

#### 5) The national examination for dental practitioners National Dental Practitioners Examination

The national dental practitioners examination is a national examination that is administered in accordance with Article 9 of the Dental Practitioners Act. The national examination for dental practitioners tests the requisite knowledge and skills related to dental science and dental health in clinical practices that a person should possess as a dental practitioner. Currently, it is administered once a year. The number of questions, content, and passing criteria are determined by Standards for the national dental practitioners examination, which are reviewed approximately every four years. In addition to making the common achievement test official, this examination is designed to assure the public and society of the quality of dentists who begin dental practice. For the latest information, please refer to the Ministry of Health, Labour and Welfare.



## **Clinical training implementation guideline**

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## **I . Introduction**

### **1. Guideline background**

Based on the contents of the model core curriculum for dental education revised in 2022, this guideline summarizes the items that each dental school should maintain in implementing clinical practice, mainly consisting of clinical practice and participation in care in dental education. Based on these guidelines, each dental school should, under their own responsibility, develop a system to appropriately implement clinical practice based on clinical practice and participation in care.

In 2021, the Dental Practitioners Act was partially amended, Article 11 made it a requirement to pass the Common Achievement Test for eligibility to sit for the National Dental Practitioners Examination, and Article 17 clarified the legal status of dental practice performed by dental students in clinical practice. In accordance with this, only dental students who have passed the Common Achievement Test are allowed to practice dentistry under the supervision of a dentist during their clinical practice at a university. The specific dental practice that can be performed was discussed at the “Study Group on the Scope of Dental Practice by Dental Students in Clinical Practice” established within the Ministry of Health, Labour and Welfare in 2022, and clinical practice is required to be executed based on the results of these discussions. Based on the discussions in the study group, this guideline describes the information that will be helpful for each dental school in planning and carrying out clinical practice and participation in care.

Dental care is unique in that it involves many irreversible medical procedures. Therefore, particular attention must be paid to the safety of patients and the protection of their rights. In addition, with the revision of the Dental Practitioners Act in 2021, further consideration is required when planning and carrying out the practice as clinical practice involving participation in medical treatment will be promoted more than ever. Clinical practice will be conducted mainly at hospitals affiliated with each dental college and dental school (hereafter referred to as “university hospitals”). Students need to understand and be aware of the various hospital rules and regulations and be aware of their role as a member of the dental team. In addition, hospitals are required to recognize students as members of the dental team and manage them appropriately, given that students (who have passed an examination shared by universities to evaluate whether the student has acquired the knowledge and skills necessary to start clinical training) are legally called “Student Dentists”.

### **2. Significance of clinical practice and participation in care**

The purpose of clinical training is for students to learn the basics of professionalism, knowledge, skills, and attitudes as dentists under the supervision of a supervisor. In particular, the purpose of clinical practice is not only to acquire knowledge, skills, and attitudes, but also to cultivate thinking, responses, and practical skills related to diagnosis and treatment, as well as motivation to conduct research through the experience of clinical practice and treating actual patients.

The following are educational features of clinical practice and participation in care.

- 1) Students learn not only textbook and reference material knowledge, but also professionalism such as ethics and a patient-centered perspective, thinking methods such as clinical diagnosis and planning of dental treatment, medical interview, essential medical examination, basic clinical skills, preparation of medical records and other documents, and other skills required in the clinical field. Students learn comprehensively, including clinical and academic attitudes, and acquire the skills, so called competencies, to become dentists.
- 2) Students learn fundamental knowledge, skills, and attitudes as dentists, not only from patients but also from all dental staff, including dentists, dental hygienists, and dental technicians (interprofessional education).
- 3) By systematically conducting clinical practice as a whole, including clinical practice and participation in care, students acquire comprehensive treatment skills and learn about social systems and dental care-related laws and regulations. In addition, according to the improvement of their ability level, students learn the necessary knowledge, skills, and attitudes in a step-by-step and continuous manner by performing more advanced dental procedures within the scope of acceptable standards.
- 4) For students to acquire the basic knowledge and skills required for dentistry by graduation, and to contribute to the progress and improvement of dental medicine and dentistry, it is necessary to have students perform clinical practice, considering the unique characteristics of dental care where highly invasive procedures are frequently performed.
- 5) Faculty members are also encouraged to conduct self-learning through questions based on new perspectives emanating from students.

### 3. How to utilize this guideline

In implementing clinical practice, which is based on clinical practice and participation in care, it is necessary to obtain a common understanding among faculty members, dental staff, and others regarding the fact that students observe, assist, and perform dental treatment, as well as other educational characteristics, risk management, and other legal issues.

This guideline describes the items that are considered highly useful for each university and affiliated hospital to establish a system for implementing clinical practice and participation in care, along with the concept and examples of such a system. It is expected that each institution will refer to this guideline, prepare its own guidelines for clinical training, and implement them appropriately.

## **II. Objectives of clinical practice and participation in care**

1. Qualities and skills that dentists are expected to develop throughout their lives

In clinical practice and participation in care, students are required to learn the following objectives.

- 1) Basics of dental treatment

In order to provide reliable, safe, and secure dental care, students are required to learn emergency treatment methods, practice dentistry with patient safety in mind, and practice appropriate pain control (pain relief methods) during dental treatments.

#### 2) Basic examination and diagnostic skills

Students should acquire skills to listen to patients' symptoms and abnormalities in the clinical setting, select appropriate examinations and tests, and make a diagnosis.

#### 3) Clinical reasoning based on symptoms and pathology

Students should acquire the basic skills to make a differential diagnosis based on major symptoms and conditions in the oral and maxillofacial region.

#### 4) Organization of medical records and treatment planning

Students should understand how to handle medical information obtained from patients and learn how to formulate patient-centered treatment plans based on the information obtained.

#### 5) Basic treatment techniques

Students should acquire basic treatment skills to provide safe and secure dental care.

#### 6) Interprofessional collaboration, team-based health care, and regional health care

Students should participate in regional health care as a member of a healthcare team.

### 2. Aim of clinical practice and participation in care

Clinical practice and participation in care, which is positioned as the final stage of the six-year dental education, is based on all the knowledge, skills, and attitudes that students have learned up to that point, and students are required to apply these acquired skills in the clinical setting. In clinical practice and participation in care, dental students participate in a healthcare team and share clinical duties as team members, while acquiring the basic clinical skills they need to acquire as dentists.

The objectives that students are required to acquire in clinical practice and participation in care are mainly based on "Chapter 2: E. Medical examination, diagnosis and clinical skills" of the model core curriculum for dental education, as well as the "Skills and attitudes required of students participating in clinical practice and participation in care" which was prepared by the Common Achievement Test Organization. On the other hand, each institution has its own educational philosophy, university hospital philosophy, and so on. Furthermore, the environments in which they are located and the human and physical resources they possess are diverse. For example, the medical needs that citizens (patients) expect from a university hospital may differ between facilities in urban and rural areas, and the number of medical staff and faculty may also differ, as well as the learning support system for dental students. Therefore, it is expected that each facility will set its own objectives for clinical practice and participation in care, taking into consideration the situation of each facility.

### **III. Strategies for clinical practice and participation in care**

There are various forms of clinical training, but the basic structure is clinical practice with participation in treatment. Clinical practice and participation in care is clinical training in which dental students take on certain roles and responsibilities as members of a healthcare team that includes supervising dentists, dental trainees, dental hygienists, dental technicians, and other professionals. Since dental treatment has a surgical aspect and most treatment involves invasive procedures, it is necessary to establish a step-by-step learning strategy, such as organizing the essential knowledge (e.g., writing a pre-treatment report? plan?) and conducting careful simulation training before participation in clinical treatment. In addition, university hospitals, which serve as a foundation for clinical training, need to obtain the cooperation of patients, which is the most critical aspect of training, and the number of such patients may differ significantly from facility to facility. Furthermore, university hospitals have a variety of professions, medical staff, and various related departments, and to promote effective training, it is necessary to make effective use of human and material resources according to the background of each facility.

Dental students who experience the clinical setting for the first time are first treated as “legitimate members” in a healthcare team and learn through proactive activities as a member and by deepening the level of participation by emulating the central presence. Program directors are expected to examine what training and rotation methods are appropriate for students’ learning, with reference to legitimate peripheral participation theory. In addition, students are expected to implement structured reflection using portfolios and other methods to become autonomous learners who do not merely process their practical training as an experience, but also explicitly record what they experience in the clinical setting and actively use it in their next experience.

### **IV. Assessment of clinical practice and participation in care**

Assessment is the measurement of the degree to which the learner has approached the objectives that were initially set. The learning objectives in clinical practice include not only understanding dental knowledge and clinical reasoning based on that knowledge, but also technical areas such as examination and tooth preparation, and attitude such as professionalism, including communication with the patient and other healthcare professionals. Therefore, it is necessary to select various assessment methods according to what is to be measured. In particular, since practical training is based on participation in treatments, it is thought that the main subjects to be assessed will be skills and attitudes rather than knowledge. Since it is more difficult to clarify and operationalize assessment criteria in these areas than in knowledge, sufficient advance consideration must be given at each facility.

During practical training, if the results of the assessments of the dental students’ clinical skills do not meet the goals, the results can be fed back to the dental students to encourage them to improve their behavior in the future (formative assessment). In addition, if an examination is conducted at the end of the practical training as the culmination of the training, the results can be used for summative assessment.

By setting a practical examination as the final evaluation of clinical practice and participation in care, it is expected that dental students will work hard to acquire clinical skills toward this goal. However, if the final evaluation is a written examination, students' motivation to participate in clinical training is likely to decrease. Since it is said that the assessment method itself drives learning behavior (assessment drives learning), appropriate assessment methods should be selected and implemented in the training program to enhance clinical practice and participation in care.

## **V. Points to note when implementing clinical practice and participation in care**

### 1. Organization for clinical practice and participation in care

#### **1) Organizational structure for effective implementation of clinical practice and participation in care**

In order to make clinical practice and participation in care more effective, it is necessary to establish an organizational structure that allows student participation in clinical practice. For this purpose, the following points are important.

##### (1) Establish an organizational system

Establish an appropriate management system by strengthening the roles of educational organizations such as the dean of the school of dentistry, the faculty council, the academic affairs and education committees, and the administrative department, and through smooth cooperation with the university hospital and cooperating facilities for clinical practice.

##### (2) Establish a medical practice system with an educational function

By integrating students into the healthcare team, build an education and practice system that cultivates professionalism in students and gradually nurtures their sense of responsibility and role as dentists through the achievement of their academic goals.

##### (3) Improve the educational skills of faculty and staff

Hospital staff, including supervising dentists, faculty members, and medical staff, who are directly and indirectly involved in the education of students, are required to participate in faculty development (FD) and staff development (SD) to promote their understanding of clinical practice and participation in care and to improve their educational skills.

#### **2) Parties/stakeholders necessary for the implementation of clinical practice and participation in care**

##### (1) Persons in charge of training facilities, such as dean of school of dentistry, director of university hospital

Heads of university hospitals and cooperating facilities for practical training are required to cooperate with the school of dentistry and support the smooth implementation of clinical practice and participation in care. Although the school of dentistry is responsible for the guidance and management of the practical training, since dental

practice is under the responsibility of each training facility, if any legal issues arise, they should be discussed and handled with the school of dentistry.

- (2) Persons responsible for the practical training program, such as chairperson of the academic affairs committee, head of clinical practice supervising dentists

The person in charge of the clinical training program at the school of dentistry shall centrally supervise all clinical training plan, draft, and manage the implementation of the clinical training program, provide advice and guidance to the supervising dentists and students, and offer other assistance.

- (3) Persons in charge of clinical training departments, such as department heads, division heads

The person in charge of practical training in a department manages the planning and implementation of clinical practice and participation in care in that department and supervises the educational evaluation.

- (4) Supervisor of teachers in charge of practical training in the department

The supervisor of the faculty members in charge of practical training is involved in the planning and formulation of the content of practical training in the department. They also supervise the implementation and evaluation of practical training in the department under the supervision of the department supervisor in charge of practical training. It is strongly recommended that the supervisor take an FD course on practical training instruction. It is desirable that the supervisor has at least five years of clinical experience and has attended workshops on education and teaching methods (e.g., workshops for supervising dentists for postgraduate clinical training).

- (5) Clinical practice supervising dentists

Clinical supervisors directly supervise and evaluate students at clinical sites in departments. It is strongly recommended that they attend FD courses related to clinical practice guidance.

- (6) Other medical staff

In clinical practice and participation in care, students participate in treatment as a member of the dental team, so all medical staff other than dentists, such as dental hygienists, dental technicians, and nurses, are involved in the instruction of the students.

- (7) Administrative organization

There is a strong requirement to establish a system that enables smooth cooperation between the school of dentistry (teaching and academic affairs, etc.) and the hospital (training, medical safety management, infection control, etc.) for the effective management of clinical practice and participation in care.

- (8) Patient consultation desk

It is recommended that existing patient consultation services be utilized to promote clinical practice and participation in care. In addition, it is required to set up a contact point that can respond to consultations from patients regarding clinical practice and participation in care, and this should be made known to the public.

### **3) Clinical practice at cooperative clinical practice facilities**



In order to acquire the ability to provide dental care that comprehensively supports patients and consumers thereby realizing individual and social wellbeing, while taking into account their psychological and socio-cultural backgrounds and relationships with their families and local communities, while also fulfilling accountability as described in the model core curriculum for dental education, it is effective to develop a curriculum that includes local medical institutions, long-term healthcare facilities, and welfare facilities outside university hospitals.

The functions required of university hospitals also vary depending on the social needs of the region in which they are established. University hospitals are highly advanced medical institutions with specific functions and tend to attract a different caseload than outside facilities. Therefore, in order for students to experience diseases that should be experienced in clinical practice, such as examination and treatment of frequently occurring diseases, consideration should be given to collaborating with other dental and medical institutions.

In order for each university to introduce clinical practice and participation in care at cooperating facilities outside university hospitals, the facilities should also improve their teaching system by requiring the dentist in charge of instruction to take FD and, in facilities where dentists are not available, to have a faculty member accompany the students or get advice and feedback from an appropriate faculty member. In addition, the school of dentistry and each cooperating facility are required to collaborate with each other. It is also desirable for the school of dentistry and each cooperating institution to discuss and conclude an agreement on the following.

- Details of mandatory or common learning objectives, evaluation methods, risk management system and response policy during training, etc.
- Transportation and accommodation for students, etc.

## 2. Dental practice by students in clinical practice and participation in care

### 1) Legal arrangement of dental practice by students

The 2003 Health and Labour Sciences Research “Survey and Research on Pre-Graduation Clinical Practice for Dentists” report states the following. If the practice is performed under the consent of the patient, as part of pre-graduate education to improve the quality of dentists, and if it is performed by reasonable means under an appropriate system, such as being relatively less invasive and being performed under the guidance and supervision of a supervising dentist, it is reasonable from a socially accepted viewpoint to perform pre-graduate clinical practice as dentists. In this case, the illegality under the Dental Practitioners Act is said to be overturned.

Specific conditions for proper implementation of clinical practice include the following:

- a. It must be performed with the consent of the patient.
- b. Invasiveness must be relatively low.
- c. It must be performed under the guidance and supervision of a supervising dentist.

- d. The formulation of the training plan, qualifications of the supervising dentist, establishment of the guidance system, and management of medical records must be properly implemented.
- e. The technical skills of the students must be ensured.
- f. A system must be in place to respond appropriately in the event of an incident.
- g. Educational evaluation methods must be established for each practical training item.

All dental schools in Japan have been implementing clinical practice and participation in care based on the above conditions.

Due to a partial revision of the Dental Practitioners Act, passing the common achievement test is now a qualification to sit for the national dental examination. It was also clarified that students who pass the test are allowed to practice dentistry as part of their clinical practice and participation in care. As a condition for students to participate in clinical practice and participation in care, the above seven points continue to be appropriate and training should be conducted in accordance with these ideas.

## **2) Scope of dental practice performed by students in clinical practice and participation in care**

The content of dental practice performed by dental students in clinical practice and participation in care is organized in the “Content and Categories of Clinical Practicum“ in the model core curriculum for dental education (2016 revision) such as “ I. practice under an instructor (direct patient care)”, “II. practice under an instructor is preferable (if direct patient care is not feasible, supplement with simulation, etc.)”, “III. assist instructors” and “IV. preferable to observe and experience under an instructor”. To some extent, the dental practice in which dental students are actively involved can be classified according to the level of dental difficulty. However, in actual practice, the patient’s situation and the dental student’s proficiency level are considered to be greatly affected. Therefore, it is difficult from a medical point of view to individually enumerate from among the myriad of dental practices the ones that dental students should not perform.

The degree of invasiveness and safety of dental procedures performed by dental students vary depending on the situation in which the dental procedures are performed, the patient’s condition, and the dental student’s proficiency level. In addition, the degree of invasiveness of dental procedures is expected to change with advances in dental medicine and other factors. When dental students perform dental procedures in clinical practice and participation in care, they must comply with the scope of dental procedures stipulated by each university based on the newly revised “Content and Categories of Clinical Practicum”. Furthermore, it is appropriate for the dentist supervising the dental student to decide whether or not to perform the prescribed dental procedures, taking into consideration the patient’s condition, the difficulty of the case, and the dental student’s level of proficiency.

When a dental student issues a prescription, the drug received by the patient is used outside the medical facility and is not under the direct supervision of the dentist at the time of the medicinal effect. Therefore, in the unlikely

event of an error in the prescription, risks and damages cannot be avoided, which could lead to serious incidents. In addition, pharmacists who dispense drugs based on prescriptions are required to check with the dentist who issued the prescription if there is any doubt about the prescription. However, if the person who issued the prescription is a dental student, they may not be able to properly handle the confirmation process. Therefore, the issuance of prescriptions by students is a dental practice that should be excluded by government ordinance.

### **3) Medical records and documentation by students**

(1) Significance of students' recording their participation in dental treatment in the medical record

- a. It is necessary for the educational effect of clinical practice and participation in care, to record the fact that students participated in dental treatment.
- b. As with dental hygienist's records, it is treated as a record by a dentist's assistant.
- c. As an assistant to the supervising dentist, the results of the review by the supervising dentist are recorded.
- d. On the other hand, the medical record is a legal document, and there may be situations where it is not appropriate for students to create a medical record, such as when students are not used to entering the information. Therefore, it is necessary for each university to establish guidelines on an individual basis as necessary.

### **4) Electronic medical records**

If an electronic medical record system is installed, it is necessary to consider how to handle it in light of the computerization of medical information, for example, limiting the scope of access by students to patients and others necessary for practical training, and having supervising dentists and others check, correct, and add to the record when it is entered by students. For example, it is desirable to establish a system between the dental school and the university hospital through the following processes.

- (1) Establish a working group of experts in medical information, medical policy, medical safety, and dental education, such as a medical records committee of a university hospital.
- (2) Establish basic specifications for electronic medical records and compliance requirements for student use.

### **5) Protection of personal information**

When implementing the clinical practice and participation in care, it is necessary to provide thorough learning and guidance on handling personal information in advance. In doing so, it is necessary to have students pledge before the start of training that they will strive to ensure safety based on the principle of patient priority, handle medical information appropriately, follow the instructions of supervising dentists, strive to improve their medical skills and attitudes, and comply with ethical morals and norms required of students along with various hospital regulations. Students must also be made to understand that if they violate hospital rules and regulations, the

university will take the necessary measures. Furthermore, students should be informed that the revised Dental Practitioners Act, which will be effective from April 1, 2024, Article 17 imposes a duty of confidentiality on students who pass the common achievement test and participate in clinical practice and participation in care. It is necessary to make this known to the students. Regarding the protection of personal information, it is essential to ensure that students as well as hospital staff comply with the policies established by each hospital (e.g., medical safety management department and medical information management department) based on the Personal Information Protection Law and other laws and regulations. In addition, since medical information is patients' personal information, it must be handled appropriately when a patient requests disclosure. Therefore, medical information should always be prepared on the assumption that it may be disclosed to patients.

### 3. Patient consent

#### **1) Necessity of patient consent**

When explaining to patients that students will participate in clinical practice and perform dental procedures, oral or written consent is usually required, since patients do not always see the notices posted in hospital outpatient clinics, and it is difficult to confirm their willingness to consent. According to the 2003 Health and Labor Sciences Research "Survey and Research on Clinical Practice for Pre-Graduates of Dentists" report, "Patient consent is essential in clinical practice for dental students as well, since they are to perform dental procedures. In obtaining the patient's consent, it is necessary to first present the patient with a written explanation, and then obtain the patient's signature on the consent form, which clearly indicates that they agree with the content of the explanation, and that they have then given consent for the student to undergo clinical practice. This consent form (signature) should indicate the involvement of both the medical institution conducting the clinical training and the university to which the student belongs, in order to clarify where the responsibility lies and to obtain accurate understanding from the patient. In addition, it should be clearly stated in the explanation and consent form that the patient has the right to discontinue participation in the practical training at any time. On the other hand, it is necessary to create an environment in the hospital to obtain the cooperation of the patients, for example by clearly indicating that the hospital is the facility where the practical training is to be conducted," the report organizes. (Omission of middle part of a text) Under the revised Dental Practitioners Act that will be effective from April 1, 2024, students will be able to practice dentistry (excluding those specified by a Cabinet Order) under the guidance and supervision of a dentist in clinical practice and participation in care. However, the public is not yet fully aware that university hospitals are teaching hospitals, and that they are places for education for students, etc. Therefore, for the time being, consent should not be given only by posting a notice in the hospital, based on the previous concept. When dental students perform a dental practice, it is important to clearly identify dental students by name tag or other means so that the patient can recognize that dental students are performing the dental practice.

## **2) Hospital postings**

While university hospitals serve as institutions that provide advanced dental care and research institutes, they are also teaching hospitals that train dentists, and it is crucial to gain the understanding of dental education from patients who visit university hospitals. Therefore, it is required to post notices in appropriate places in the hospital to inform visitors that students are conducting clinical practice and participation in care in the hospital. Similarly, cooperating hospitals for off-campus training should post notices in their hospitals asking visitors to understand and cooperate with clinical practice and participation in care as well.

## **3) Explanatory document for comprehensive consent**

A “comprehensive consent” should be obtained in writing or orally from the patient for the student to participate in or observe/assist in the patient’s treatment activities, after indicating the scope of dental practice to be performed by the student in clinical practice and participation in care as stipulated by each university. If oral consent is obtained, it should be documented in the medical record.

## **4) Explanatory document for individual consent**

Dental procedures that are not within the scope of dental procedures to be performed by students in clinical practice and participation in care as defined by each university, or those that are within the scope but are deemed to be highly invasive, should be explained to and consent obtained from patients individually along with comprehensive consent.

### **4. Student’s written pledge**

The students involved in clinical practice and participation in care must submit a written pledge in advance regarding the strict adherence to the rules for participating in clinical practice and participation in care and the confidentiality of patients’ personal information.

### **5. Safety and infection control**

## **1) Accidents that may cause injury to students (including needlesticks and exposure to blood and body fluids)**

It is desirable that guidelines be prepared and disseminated to all concerned regarding measures to prevent infection and other accidents and how to respond promptly in the event of an accident during clinical practice and participation in care. It is desirable to provide students with sufficient guidance on infection prevention and to obtain their written consent to perform such dental procedures after fully explaining the risks and other factors.

## **2) In the event of an accident resulting in disability to a patient due to a student’s conduct**

### **(1) Dental practice under the guidance of a faculty member**

- a. If a patient is injured by a direct dental practice performed by a student in a hospital, the hospital administrator may be held liable for the employer's liability under the Civil Code. This is because the patient who received the dental treatment has a contractual relationship with the hospital, and the dentist who is in charge of teaching students is performing their duties as an employee of the hospital.
- b. Depending on the accident, the hospital administrator may be held liable to the supervising dentist and student, for corresponding liability. The extent to which either party is legally liable for damages will depend on the outcome of discussions between the parties or the outcome of a civil lawsuit.
- c. Depending on the circumstances of the accident and subsequent actions taken, the supervising dentist who instructed the student to practice dentistry may be held personally liable. The extent to which the individual supervising dentist is legally liable for damages will ultimately depend on the outcome of civil litigation.
- d. If the supervising dentist is held liable as a result of discussions between the parties or as a result of a civil lawsuit, compensation will be paid if the supervising dentist has liability insurance. When contracting with insurance companies, it is necessary to investigate and confirm the details of each policy individually.

## **(2) Conduct outside the guidance and supervision of faculty members**

If students take the initiative in participating in clinical practice, they may be held legally liable in the event of a medical accident. If, as a result of a civil lawsuit, the student is found to be legally responsible for the accident, the student may be held liable. However, if the student has liability insurance, the insurance company will compensate for the actual amount of the legal liability for the injury to the patient's body or life or damage to the patient's property caused by the student's conduct toward the patient during the clinical practice in Japan, unless the accident was caused intentionally. Even in such cases, the hospital administrator that manages the practice may still be held liable for compensation.

## **(3) Accidents at cooperative clinical training facilities**

The handling of medical accidents that occur during clinical training at cooperating facilities should be clearly stated in the "agreement" between the university and the facility, and the method of handling such accidents should be shared in advance.

## **3) Insurance to be purchased by students**

Since students in clinical practice and participation in care perform invasive dental procedures on patients, it is strongly recommended that they be covered by liability insurance to protect patients and students. Although universities are currently making decisions on liability insurance for students, it is strongly recommended that they join liability insurance in order to promote clinical practice and participation in care. As a measure for accident

compensation, it is essential for students to join insurance such as “Accident Insurance for Student Education and Research” and “Liability Insurance for Student Education and Research”. On the other hand, it is necessary for each university to consider whether to allow uninsured students to practice dentistry to the same extent as insured students.

#### **4) Incident reporting**

When an incident involving a student occurs in clinical practice and participation in care, an incident report should be filed in accordance with the arrangements at each university hospital. In addition, the organization that manages the clinical training should share information among the supervising dentists in charge of the clinical training in order to prevent recurrence. Students in the clinical training program should understand and carry with them at all times the same manuals as the hospital staff, since they will be under the management of the hospital’s medical safety measures, just as other hospital staff members are.

#### **5) Measures against hospital violence**

In clinical practice and participation in care, students will participate in daily dental care, which means that they will have many opportunities to directly interact with patients. Students, like other hospital staff, come under the management of the hospital’s medical safety measures, and therefore need to understand and have available at all times the same medical safety management manuals as other hospital staff.

Intra-hospital violence is classified as,

Level 1: Verbal abuse and harassment

Level 2: Threats, intimidation, violent behavior, and damage to property

Level 3: Violence resulting in disability requiring medical attention

Level 4: Life-threatening violence due to disability, etc.

Each facility is required to clarify the response measures and communication system for each level and be prepared to respond as an organization.

### **6. Safety management for students**

#### **1) Practical training hours**

According to the Labor Standards Law, working hours are 40 hours per week, 8 hours per day, with at least a 45-minute break for working hours exceeding 6 hours, and at least a 1-hour break for working hours exceeding 8 hours. Students are not subject to the labor regulations because they are not workers. However, in order to ensure the safety and health of students and to ensure study time outside of the training, it is recommended that the training supervisory department indicate the concept of training hours.

#### **2) Health management for students**

### **(1) Periodic medical examinations**

In accordance with the School Health and Safety Law, periodic medical examinations must be provided to students.

### **(2) Management of students' physical condition, mental health, and harassment response**

For students, the clinical practice setting is nerve-racking and involves a variety of physical and mental stressors. Moderate tension is necessary for learning. Excessive pressure, however, can lead to physical and mental illness. In addition, students may not be able to talk to their supervisors about their physical condition due to their sense of responsibility for practical training, and they may end up keeping it to themselves. Therefore, it is necessary to build a system that enables early detection and early response to mental health management by implementing measures such as daily observation by supervisors, mentors, and advisors, periodic interviews, the establishment of a consultation counter, and the assignment of specialized counselors.

Harassment is a violation of human rights, and its occurrence must be prevented to the greatest extent possible. Harassment depends on the subjective viewpoint of the person who is subjected to it, and it is difficult to take uniform measures to deal with it. In addition, the frequency of harassment is higher in clinical practice than in earlier school years because students have more opportunities to communicate with a variety of people concerned in clinical practice. In order to ensure an appropriate environment for learning, awareness of harassment should be shared among students and faculty members, and measures to prevent perpetrators and victims should be clearly stated in clinical training implementation guidelines at each facility.

### **(3) Antibody titer testing and vaccination**

Opportunities for contact with patients increase in clinical practice and participation in care. The School of Dentistry, which manages the clinical training, and the university hospital, which manages infection control, should discuss the following points, and require students to undergo antibody titer testing and vaccination against measles, rubella, varicella, mumps, hepatitis B, and so on. This will protect patients from pathogens being brought into the hospital as well as protect students and faculty staff from infectious agents in and outside the hospital.

### **(4) Handling of students with disabilities or allergies to goods, chemicals, etc. used in practical training**

For students with disabilities or allergies to items or chemicals used in practical training, the university will plan and implement practical training after careful and thorough consideration to ensure fairness among students.

### **(5) Radiation exposure management**

It is important for the safety of students participating in clinical practice to manage their exposure to ionizing radiation. The following guidelines are provided for students' exposure to ionizing radiation.

a. Clinical training that may expose students to ionizing radiation should be limited to the minimum necessary.

(To the extent possible and reasonable, limit visits to areas where there is risk of exposure)



- b. The university (university hospital) should decide whether to treat students as radiation practitioners or not, depending on the content of the clinical practice.
- c. When students are treated as radiation practitioners, prior radiation health examinations as radiation practitioners, radiation education, and individual monitoring are required.
- d. Even when students are not treated as radiation practitioners, dose control and recording should be conducted in an appropriate procedure (e.g., lending electronic pocket dosimeters, recording entry/exit to/from controlled areas, etc.).

#### 7. Dealing with students who behave unprofessionally

Clinical practice and participation in care requires social and ethical behavior beyond those required of university students in general. It may be necessary to deal with “students with unprofessional behavior” who are considered to have behavior inappropriate to engage in dental care as dentists in the future.

Since unprofessional behavior includes a variety of behaviors, it is desirable for each university to accumulate information and share it with other universities in order to make it easier to identify and deal with such behaviors.

#### 8. Students’ interaction with dental professionals (dental hygienists and dental technicians) and other health professionals

Collaboration with dental professionals (dental hygienists and dental technicians) and other allied health professions is essential for students to perform dental procedures in clinical practice and participation in care.

Under the dentist’s direction, dental hygienists are responsible for providing dental prevention treatment, assisting in dental care, and providing dental health guidance. There are no explicit instructions for dental hygienists on how to interact with dental students. When students participate in the practice as so-called Student Dentists, they should learn to work with dental hygienists primarily through assisting in dental care.

The Dental Technician Law stipulates that dental technicians must not perform dental work as a profession without written instructions from a dentist. Therefore, the student’s relationship with the dental technician is through the preparation of written instructions under the supervision of the supervising dentist, and through the dental laboratory work. Students should learn to work appropriately with dental technicians to carry out dental care in the future.

In university hospitals where the clinical training program is conducted, students have opportunities to collaborate not only with dental specialists but also with other allied health professions (nurses, radiology technicians, speech-language-hearing therapists, dietitians, clerical staff, etc.). Students need to fully understand the roles of each profession, recognize the abilities required to practice a smooth team approach to health care, and make efforts to improve their skills.

#### 9. FD (Faculty Development), SD (Staff Development)

When the learning strategy shifts from observation and simulated treatment to participation in treatment, dentists who supervise students in clinical training (including faculty members at the school of dentistry and university hospitals, clinical staff, clinical graduate students, dentists at cooperative off-campus clinical practice facilities, dental trainees) will be required to respond differently from the conventional lectures, small group learning, and observation. In addition, the staff at the university hospitals and off-campus clinical training facilities where practical training is conducted will also be required to respond to 360° evaluations and other such requests. Therefore, in order to maintain and improve the quality of practical training, it is important to conduct FD and SD for the purpose of acquiring clinical teaching methods. FD and SD should be conducted for dentists and staff members of on- and off-campus clinical training cooperative facilities. Alternatively, it is conceivable to use the “training course for supervising dentists for clinical training” that has been confirmed to be in accordance with the Ministry of Health, Labour and Welfare’s guidelines or other seminars for instructors.