

Temporomandibular Disorders Core Curriculum for Predoctoral Dental Education: Recommendations from the American Academy of Orofacial Pain

AAOP Committee on TMD Predoctoral Education

Temporomandibular disorders (TMDs), a common cause of orofacial pain, are defined as “a set of diseases and disorders that are related to alterations in the structure, function, or physiology of the masticatory system and that may be associated with other systemic and comorbid medical conditions.”¹ Orofacial structures have close associations with functions of mastication, communication, vision, and hearing, and they form the basis for appearance, self-esteem, and personal expression. As a result, pain and dysfunction in the orofacial region can deeply affect an individual and may lead to chronic pain, addiction, and disability. The 2020 National Academies of Science, Engineering, and Medicine (NAEM) report on TMDs states that they are one of the most common chronic pain conditions.² In addition, other orofacial pain conditions, pain in other parts of the body, psychologic conditions, and sleep-related issues commonly coexist with TMDs and affect their evaluation and management. The connection between TMDs and systemic health requires a change in the disease model from a dental-based biomechanical model to a whole-person biopsychosocial model to allow mechanism-based evaluation, management, and prevention.

Although many dental and medical educators have recognized the biopsychosocial model for TMDs, the predoctoral curriculum content in many schools does not reflect the current understanding of the disease.³ In addition, the education on TMDs and the care for individuals with TMDs lies between medicine and dentistry, often resulting in a lack of training in TMDs and orofacial pain management in all health care disciplines and at all levels of education.^{4,5} This lack of understanding has commonly led to misdiagnosis, delayed treatment, or even mistreatment.⁶

TMDs and orofacial pain are major pain conditions that dentists encounter daily and are not just secondary to dental pain. Since TMDs and orofacial pain conditions primarily affect oral and jaw-related functions, dentistry is one of the primary health care disciplines involved in their evaluation, diagnosis, management, and prevention. Therefore, dental education on TMDs and orofacial pain needs to be “upgraded” to allow dental graduates a basic understanding of and the ability to recognize these conditions in order to differentiate from dental pain, to appropriately provide prevention and early treatment, and to collaborate with others on comprehensive care.

Because of the lack of predoctoral educational training in TMDs and the limited number of orofacial pain specialty training programs, there is an insufficient number of health professionals who understand how to manage the large number of patients with TMDs, which collectively ranges from 20% to 40% of the population.^{7–16} Thus, access to care for patients with these disorders is severely limited, leading to continued pain and suffering.

Commission for Dental Accreditation Adopts TMD Predoctoral Standards

For these reasons, in August 2020, the Commission for Dental Accreditation (CODA) approved a revision to Standard 2-24k to include the teaching of TMDs in the predoctoral curriculums of all U.S. dental schools by 2022.¹⁷ All dental school graduates should therefore be competent in the prevention, screening, risk assessment, acute management, and appropriate triage of individuals with TMDs, ranging from simple to complex, in order to improve the quality of and access to care for these patients.

However, although CODA sets education standards, it does not mandate how these standards are defined, implemented, or assessed. Each school is responsible for setting their requirements for each standard. Thus, there is a need for the development of a national guideline to facilitate implementation of the CODA standard 2-24k to ensure that evidence-based content associated with TMDs is taught with consistent quality and depth at all U.S. dental schools.

In response to this need, the American Academy of Orofacial Pain (AAOP) formed a task force (ie, the Committee on TMD Predoctoral Education) with national experts and representatives from pertinent fields to develop a core curriculum for teaching TMDs at the predoctoral level. This framework is based on current evidence of TMDs,⁶ previously suggested predoctoral medical and dental core curriculums,¹⁸ the International Association for the Study of Pain (IASP) Pain Curriculum Outline on Pain for Medicine¹⁹ and for Dentistry,²⁰ and a consensus on present and future health care and educational needs for TMDs and orofacial pain. This document is the report from this task group.

Mission of Curriculum Standards

The mission of this document is to provide a competency-based core curriculum framework for predoctoral TMD dental education dedicated to educating future clinicians on providing excellent health care management for their patients with TMDs.

Vision of Curriculum Standards

Graduates of all U.S.-accredited dental schools will understand the basic mechanisms, etiology, evaluation, diagnosis, treatment, and prevention of TMDs. They will apply the latest evidence-based knowledge to collaborate with orofacial pain specialists and pertinent dental, medical, and other health professionals in caring for and preventing TMDs.

Definitions of Curriculum Competency, Domains, and Objectives

Competency

Competency is defined based on the CODA Predoctoral Education Standards and the ADEA Competencies for the New General Dentist,²¹ which states:

A 'competency' is a complex behavior or ability essential for the general dentist to begin independent, unsupervised dental practice. Competence includes knowledge, experience, critical thinking and problem-solving skills, professionalism, ethical values, and technical and procedural skills. These components become an integrated whole during the delivery of patient care by the competent general dentist. Competency assumes that all behaviors are performed with a degree of quality consistent with patient well-being and that the general dentist can self-evaluate treatment effectiveness.

Domains

The domains are proposed by integrating CODA's classification of biomedical science, behavioral science, and clinical science knowledge bases and the ADEA's domains for competencies: Critical Thinking, Professionalism, Communication and Interpersonal Skills, Health Promotion, Practice Management and Informatics, and Patient Care, which includes Assessment, Diagnosis, and Treatment Planning and Establishment and Maintenance of Oral Health.²¹

When proposing the domains, the definitions of domains for cariology²² by the American Academy of Cariology (AAC) were also considered due to the similarity in disease management between caries and TMDs; that is, to control these diseases, one must understand predisposing, initiating, and perpetuating

factors for the affected patients. The TMD domains defined here are analogous with the domains within the cariology predoctoral curriculum.

Based on this background and knowledge, the proposed domains for the TMD curriculum include:

- Domain 1: Knowledge Base of TMDs and Orofacial Pain
- Domain 2: Screening, Evaluation, Diagnosis, and Risk Assessment
- Domain 3: Health Promotion and Prevention of TMDs
- Domain 4: Clinical Decision-Making, Treatment Planning, Evidence-Based TMD Management, Communication, and Interdisciplinary Collaboration in Clinical Practice
- Domain 5: Practice Management and Informatics

The domain-based objectives were developed based on the current CODA Accreditation Standards for Dental Education Programs,¹⁷ previous recommendations on TMD predoctoral education,¹⁸ the IASP Curriculum Outlines on Pain for Medicine (2018)¹⁹ and for Dentistry and Oral Health (2018),²⁰ and the NASEM consensus study report on TMDs (2020).⁶

Objectives

Objectives will define the core knowledge, abilities, aptitudes, and attributes that the dental student should achieve upon completion of the predoctoral education. The overall objectives will be assigned to each domain of the TMD curriculum according to relevance, and the objectives within each domain will be achieved with the presentation of the Objectives and Learning Outcomes.

Learning Outcomes

The learning outcomes define the qualities that support the performance of each objective. Learning outcomes are divided into what entry-level general dentists should:

- Be clinically capable of: Upon graduation, the dentist demonstrates sound theoretical knowledge and understanding of the subject together with an adequate clinical experience to be able to resolve clinical problems independently.
- Have knowledge of: Upon graduation, the dentist demonstrates sound theoretical knowledge and understanding of the subject together with limited clinical experience.
- Be familiar with: Upon graduation, the dentist must demonstrate a basic understanding of the subject but need not have clinical experience.

Each objective may have one, two, or all three of the possible categories of learning outcomes.

Predoctoral TMD Core Curriculum Framework

Domain 1: The Knowledge Base of TMDs and Orofacial Pain

This domain describes the foundational knowledge needed for Domains 2 through 5. A varying depth of knowledge and understanding of each of the aspects of the knowledge base will be required in order to reach the appropriate competence level.

Objectives. Upon graduation, a dentist must be able to demonstrate and apply knowledge and understanding of the biomedical, behavioral, and clinical science related to TMDs. The dentist must be able to integrate this knowledge and understanding to screen for and recognize TMDs and to make decisions about the management and prevention of TMDs in individuals. The dentist must demonstrate sound understanding of current evidence-based theories on TMD etiology and treatment and avoid non-evidence-based treatments.

Learning Outcomes. With regard to the evolution of understanding TMDs, upon graduation, a dentist must:

Be familiar with:

- The history of TMDs and their significant impact on individuals and society
- The role of dentistry in TMD management
- The history of ethical and legal issues in the management of TMDs
- The ethical principles involved in TMD management

With regard to basic biologic principles related to TMDs (map to CODA standards 2-12 and 2-13), upon graduation, a dentist must:

Have knowledge of:

- Nociception and its peripheral and central mechanisms related to TMDs
- Pharmacology of pain transmission and modulation related to TMDs
- Behavioral and psychosocial mechanisms related to TMDs
- Masticatory system structures, function, and dysfunction related to TMDs

With regard to etiology, epidemiology, pathogenesis, and prognosis of TMDs (map to CODA standard 2-14), upon graduation, a dentist must:

Have knowledge of:

- Epidemiology of TMDs
- Common comorbidities of TMDs
- Physical and biologic changes in the structures and functions of the masticatory system as related to TMDs
- Multidimensional etiologic factors that contribute to TMDs
- Risk factors and protective factors that are involved in acute and chronic TMDs and their development, progression, recurrence, and prognosis

With regard to behavioral sciences (map to CODA standards 2-16 and 2-17), upon graduation, a dentist must:

Have knowledge of:

- The biopsychosocial model of disease
- Behavioral, psychosocial, and environmental risk and protective factors underlying the etiology of TMDs
- Interpersonal skills, communication, and behavioral aspects associated with the evaluation, management, and prevention of TMDs

Domain 2: Screening, Evaluation, Diagnosis, and Risk Assessment

This domain is the bridge from fundamental knowledge about TMDs to examination, evaluation, diagnosis, and risk assessment, as well as the application of this knowledge to clinical decision-making and treatment planning for both prevention and management of acute and chronic TMDs. The evaluation and diagnosis not only imply the detection of TMDs, but also determine its characteristics and status within the disease process. Equally important, the evaluation and diagnosis imply understanding the risks of development or recurrence of TMDs, as well as the risks of progression from acute to chronic TMDs.

Objectives. Upon graduation, a dentist must be able to detect, assess, and differentiate between the need for treatment and the need for referral of TMD patients through collecting and integrating signs, symptoms, examination findings, and diagnostic testing for TMDs. The dentist must also be able to identify and assess the risks of development or recurrence of TMDs and the risks of progression from acute to chronic TMDs.

Learning outcomes. With regard to the knowledge base of evaluation, assessment, diagnosis, and risk assessment of TMDs (map to CODA standard 2-14), upon graduation, a dentist must:

Have knowledge of:

- Principles of screening a dental patient for TMDs
- Principles of evaluating a patient with TMDs
- Principles of differential diagnosis of TMD conditions
- Principles of risk assessment for acute and chronic TMDs

With regard to the application of history-taking, examination, diagnostic studies, differential diagnosis, and risk assessment of TMDs in patient care (map to CODA standards 2-22 to 2-25), upon graduation, a dentist must:

Be capable of:

- Completing a TMD screening evaluation to identify individuals with TMDs
- Performing a TMD risk assessment to identify risk and protective factors that can lead to acute and chronic TMDs

Have knowledge of:

- Completing an evaluation of patients with TMDs to arrive at an accurate differential diagnosis as related to the need for treatment and/or referral
- Completing diagnostic studies to help determine the diagnosis as needed
- Differentiating TMD pain from dental conditions, nondental tooth pain, and other orofacial pain disorders
- Assessing patient goals and treatment needs to inform treatment planning
- Critically appraising information collected from evaluation to arrive at an appropriate management plan

Domain 3: Health Promotion and Prevention of Acute and Chronic TMDs and Their Consequences

This domain is concerned with the primary, secondary, and tertiary prevention of acute and chronic TMDs. It involves applying the principles of prevention to the development, recurrence, and progression of TMDs. These objectives are developed based on the principles of prevention and the current knowledge and best evidence available. This is expected to evolve as more evidence (particularly at the population level) becomes available.

Objectives. Upon graduation, the dentist must be capable of implementing TMD preventive strategies based on the best current evidence when providing routine dental care. The dentist must also be capable of conducting an evaluation of all dental patients to determine the presence of TMD signs or symptoms and then formulating appropriate prevention plans to present and discuss with the patient to arrive at a per-

sonalized preventive plan for TMDs. This requires an awareness of the potential for change and the need to reassess and monitor risk status over time and formulate alternative preventive plans when required.

Learning outcomes. Upon graduation, a dentist must (map to CODA standards 2-15, 2-16, 2-17):

Be capable of:

- Communicating and educating dental patients concerning TMD prevention and support them in assuming responsibility for their health to prevent onset, recurrence, or progression of TMDs
- Communicating risk factors and protective factors that are involved in preventing the onset, recurrence, or progression of TMDs, and formulate a patient-centered preventive plan as related to TMDs
- Evaluating for the presence of TMD signs and symptoms as part of standard dental evaluations
- Implementing a TMD preventive plan at the individual patient level

Domain 4: Clinical Decision-Making, Treatment Planning, Evidence-Based TMD Management, Communication, and Interdisciplinary Collaboration in Clinical Practice

This domain is concerned with the management of TMDs with an emphasis on knowing the difference between treatment and referral when treatment planning, managing accordingly, and interdisciplinary collaboration. These learning objectives apply to all patients regardless of their characteristics, such as age, gender, and socioeconomic, racial, and ethnic backgrounds. The intent is to define basic skills to ensure appropriate management of TMDs in dental practice. This includes management decisions regarding identified TMD cases, as well as TMD management when providing dental care. Because common dental procedures can initiate or perpetuate TMDs, our focus is on appropriate management (ie, treatment and/or referral) and prevention.

Objectives. Upon graduation, the dentist must be capable of clinical decision-making to formulate appropriate management options, which should be presented to and discussed with the patient to arrive at a personalized treatment plan and possible referral to an orofacial pain specialist or other health care professional, as appropriate. This requires an awareness of the need to monitor TMD signs and symptoms over time and to formulate alternative treatment plans when required.

Learning outcomes. With regard to clinical decision-making, treatment planning, and communication, upon graduation (map to CODA standards 2-15, 2-16, 2-17, 2-21, 2-22, 2-23, 2-24, 2-25), a dentist must:

Have knowledge of:

- Formulating management options based on diagnosis, best evidence available, patient characteristics and needs, and the principles of clinical shared decision-making and ethical professional responsibility
- Communicating management options with the patient to develop a transformative patient-centered management plan
- Appropriately managing dental patients with TMDs or with an elevated risk of TMDs when providing dental care
- Re-assessing and adjusting the management plan over time

With regard to evidence-based management and communication, upon graduation (map to CODA standards 2-15, 2-16, 2-17, 2-21, 2-22, 2-23, 2-24, 2-25), a dentist must:

Have knowledge of:

- Educating patients concerning the etiology of TMDs, training them in basic TMD self-care, and encouraging them to assume responsibility for self-care
- Assessing, critically appraising, applying, and communicating current evidence on management options for acute TMDs
- Managing acute TMDs with patient education and other current available evidence-based options as appropriate
- Monitoring and evaluating management effects over time

Be familiar with:

- Assessing, critically appraising, and communicating current evidence on management options for chronic TMDs

With regard to interdisciplinary collaboration in clinical practice and communication, upon graduation (map to CODA standard 2-15, 2-20), a dentist must:

Have knowledge of:

- Making appropriate referral of patients with TMDs and orofacial pain to pertinent health care team members, including dental specialists in orofacial pain, other dental specialists, physicians, physical therapists, health psychologists, health coaches, social workers, pharmacists, and others
- Communicating and collaborating with other members of the health care team to facilitate the provision of health care related to TMDs

Be familiar with:

- The role of an orofacial pain specialist as related to TMD care
- The roles of medical and health care professionals as related to TMD care

Domain 5: Practice Management and Informatics

This domain is concerned with practice management concepts and integration of information technology to facilitate both practice management and patient care in routine dental practice as related to TMDs.

Objectives. Upon graduation, the dentist must have knowledge of electronic health record (EHR) systems for secure communication, medication prescription, and clinical documentation and be familiar with billing to health plans as related to TMDs. In addition, the dentist must have knowledge of the use of patient-centered digital technology for symptom and risk assessment, self-care training, telehealth support, and monitoring of progress.

Learning outcomes. On graduation, a dentist must (map to CODA standards 2-18, 2-19, 2-20, 2-21):

Be capable of:

- Collecting and documenting patient information on the screening evaluation, risk assessment, and management action taken (such as prevention, treatment, and/or referral) of TMDs in EHR systems

Have knowledge of:

- Secure communication, medication prescription, and clinical documentation for TMD care via EHR systems
- Use of patient-centered digital technology for TMD symptom and risk assessments, self-care training, telehealth support, and remote monitoring of progress as related to TMDs

Be familiar with:

- Billing within EHR systems as applied to TMDs
- Ethical and legal considerations as applied to TMD management

Conclusions

The AAOP Committee on TMD Predoctoral Education has developed this core curriculum guideline for teaching TMDs at the predoctoral level in the United States. This framework is based on current evidence, previous recommendations, and a consensus on present and future educational needs in TMD and orofacial pain education. The intention of developing this document is to facilitate implementation of the CODA

standard 2-24k to teach the evidence-based content of TMDs with consistent quality and depth for all dental schools in the U.S. Ideally, these suggested domains should be filled with scientifically sound, evidence-based information. However, due to the complexity of the conditions, our understanding of TMDs regarding basic and clinical science is still evolving. Therefore, it is important for dental schools to educate on current evidence-based information and to teach students in critical thinking when evaluating evidence on TMD management. When evidence on an evaluation method or a treatment approach is lacking, the principle of “do no harm” should be followed.

In summary, the disease model for TMDs is changing from a dental-based biomechanical model to a whole-person biopsychosocial model to allow for mechanism-based evaluation, management, and prevention. Dental educators and students should understand that current evidence indicates that TMD management should be and therefore is moving toward multidisciplinary care—encompassing diagnostic and management options that all pain and complex health conditions require.

Acknowledgments

The views in this article reflect the results of research conducted by the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, Uniformed Services University of the Health Sciences, or the US Government. The authors report no conflicts of interest.

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