

DOI <https://doi.org/10.11603/m.2414-5998.2024.4.15143>
УДК 616.31:371.3

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ADVANCEMENTS IN SURGICAL TRAINING FOR DENTISTRY STUDENTS: INSIGHTS FROM THE EDUCATION SYSTEM OF THE USA

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ОСОБЛИВОСТІ НАВЧАННЯ ХІРУРГІЧНИХ ДИСЦИПЛІН МАЙБУТНІХ СТОМАТОЛОГІВ: ПОГЛЯД НА ОСВІТНЮ СИСТЕМУ США

Abstract. The article provides an in-depth analysis of the dental education system in the United States, with a particular emphasis on the integration of surgical disciplines into the training curriculum. U.S. dental schools are renowned for their high academic standards, innovative teaching methods, and robust practical training programs that prepare students for a wide range of specializations, particularly in surgical fields such as oral surgery, implantology, and periodontics. The article explores the essential components of the curriculum, detailing courses such as basic surgical techniques, oral surgery, orthognathic surgery, implantology, and dental trauma management. These courses combine theoretical knowledge with practical skills, offering students the opportunity to develop their expertise through clinical practice, hands-on simulations, and real-world internships. The article also highlights the interdisciplinary approach in U.S. dental schools, where students collaborate with professionals from various medical disciplines to address complex clinical cases and improve their problem-solving skills. Furthermore, it examines the role of advanced technologies, including simulation tools and radiology, in enhancing surgical training. Residency programs, which allow students to specialize further after obtaining their degree, are also discussed in detail. Finally, the article reviews the assessment and certification process, ensuring that graduates acquire the necessary qualifications and skills to become competent dental professionals. The insights gained from the U.S. system provide valuable lessons for improving dental education in Ukraine, enhancing the professional development of future dentists, and contributing to the overall advancement of the healthcare sector in the country.

Key words: student, dental education, USA, surgical disciplines, innovative teaching methods, clinical training, interdisciplinary approach.

Анотація. Стоматологічна освіта в Україні перебуває у процесі постійного розвитку, і вивчення кращих практик міжнародної системи навчання є важливим кроком для покращення підготовки фахівців. Система стоматологічної освіти США є однією з найбільш розвинутих у світі, з численними медичними школами та університетами, що пропонують інноваційні програми підготовки стоматологів. Це включає висококваліфікованих викладачів, передові технології та міждисциплінарний підхід, що допомагає студентам опанувати складні хірургічні та імплантологічні дисципліни. Вивчення досвіду США у цій галузі є актуальним для України, де стоматологічна освіта також потребує удосконалення та адаптації до міжнародних стандартів.

Одним із найбільш важливих аспектів стоматологічної освіти є підготовка до хірургічних дисциплін, адже вони безпосередньо впливають на практичну діяльність стоматолога. У США хірургічні дисципліни займають центральне місце в навчальних програмах, що включають курси з оральної хірургії, ортогнатичної хірургії, імплантології, а також реконструктивної хірургії. Важливим елементом є практична підготовка студентів через клінічні заняття в медичних закладах та симуляційні тренування, що дають змогу відпрацьовувати навички в безпечних умовах. Курсова підготовка включає як теоретичне вивчення основ хірургії, так і практичне освоєння технік виконання різноманітних хірургічних процедур.

Особливу увагу у навчанні у США надають інтердисциплінарному підходу, що дає змогу студентам стоматології отримувати знання не лише в рамках своєї спеціальності, а й у суміжних медичних дисциплінах. Урахування таких аспектів, як анестезіологія та ортопедія, сприяє формуванню комплексного підходу до лікування пацієнтів. Ба більше, практичні заняття в реальних клінічних умовах, під час яких студенти працюють із пацієнтами, допомагають їм удосконалювати свої навички та отримувати досвід у вирішенні складних клінічних випадків.

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Для підвищення рівня стоматологічної освіти в Україні вивчення найкращих практик стоматологічних шкіл США має велике значення. Університети, такі як Гарвардська школа стоматології, Школа стоматології Каліфорнійського університету, Мічиганський університет та Пенсільванський університет, є яскравими прикладами вищих навчальних закладів, де застосовуються інноваційні методи та підходи, які можуть бути адаптовані для вдосконалення української системи стоматологічної освіти. Важливо також звернути увагу на постійне оновлення навчальних програм та клінічну підготовку студентів, що дає змогу майбутнім стоматологам ефективно працювати з пацієнтами.

Загалом дослідження досвіду США у підготовці стоматологів допоможе Україні адаптувати найкращі світові практики в рамках національної освіти, що сприятиме підвищенню якості медичних послуг та розвитку стоматологічної галузі в країні.

Ключові слова: студент, стоматологічна освіта, США, хірургічні дисципліни, інноваційні методи навчання, клінічна підготовка, міждисциплінарний підхід.

Introduction. Dentistry is one of the most important and dynamic fields of medicine, requiring highly skilled specialists with deep theoretical knowledge and practical skills. In Ukraine, the system of dental education continues to evolve, and studying the experience of leading countries in this field is extremely important for improving the quality of training specialists. The United States has one of the most developed dental education systems, which includes prestigious universities and medical schools known for their innovation, high teaching standards, and practical training of students. Educational institutions in this country offer advanced teaching methods, innovative technologies, and an interdisciplinary approach, helping dental students master a wide range of specializations, including surgical and implantological fields. The growing adaptation of such practices in Ukrainian dental education will help raise the level of training for future specialists and contribute to the development of the healthcare sector in the country.

In Ukraine, the issue of dental education is actively researched, particularly in the context of the development and improvement of national educational standards. However, compared to the study of the dental education system in Ukraine, scientific works that analyse in detail the training of dentists in the United States are limited. Among the few works that address this issue, it is worth noting the work of V. Myroshnychenko, which is an important step in understanding the specifics of American dental education, though it does not cover all aspects of the current state of this field [1].

In contrast, on the international level, there are significantly more studies dedicated to the training of dentists in the United States. Such works include, in particular, the articles of P. L. Davidson, which discuss reforms in the education system and dental practice in the U.S. [6], as well as those by D. Henzi, which focus on the experiences of dental students in North America, their attitudes towards clinical education, and potential improvements [5]. Given the limited number of Ukrainian studies analysing the training of dentists in the United States and the wide range of works by foreign authors, research on this topic is highly relevant.

The aim of the article is to study in detail the system of dental education in the United States, with a

particular focus on the development of surgical disciplines in training programs.

Theoretical framework. Considering the relevance and importance of the topic, it is necessary to examine in greater detail the main contemporary trends in the preparation of dentists in the United States. Taking into account the diversity of teaching approaches and innovative methods used in leading universities and dental schools, it is important to analyse the best practices that may be useful for adapting the domestic education system to international standards. The U.S. has a significant number of universities and medical schools offering dental programs. Here are a few well-known universities and dental schools where one can receive education in the field of dentistry.

Harvard School of Dental Medicine is one of the most prestigious dental schools in the world. It offers Doctor of Dental Medicine (DMD) degree programs and specialized programs for practitioners wishing to advance their careers in specific areas of dentistry.

The School of Dentistry at the University of California, Los Angeles, is a leader in dental education and offers the opportunity to earn a Doctor of Dental Surgery (DDS) degree. It is known for its innovative approach to teaching, clinical training, and research.

The School of Dentistry at the University of Michigan is one of the oldest and most renowned dental schools in the United States. It offers a variety of programs, ranging from undergraduate to graduate studies, including specialized courses in surgery, orthodontics, and other fields.

The School of Dental Medicine at the University of Pennsylvania offers programs in dentistry that include training in orthodontics, periodontology, paediatric dentistry, and other specialized disciplines.

Columbia University's College of Dental Medicine in New York is also one of the leading institutions in the field of dentistry. The dental college offers both primary degree programs and advanced programs for specialists seeking to deepen their knowledge in specific areas of dentistry.

Other well-known dental schools include the College of Dentistry at New York University, the School of Dentistry at the University of California, Stanford University, the Adams School of Dentistry at the University of North Carolina at Chapel Hill, and the School of Dentistry at the University of Washington [2].

When analysing the curricula of dental schools in the U.S., it is important to note that surgical disciplines hold a significant place in the education of dentists, as they are directly related to clinical practice and essential for effective patient care. Leading universities place particular emphasis on these disciplines, offering programs that cover various aspects of dental surgery and allow students to acquire the necessary practical skills. Therefore, when focusing on the analysis of surgical disciplines, we emphasize an important component of dental education that is critical for the training of highly qualified specialists and influences the quality of treatment in clinical settings.

In dental schools in the United States, surgical disciplines are studied within various courses that cover different aspects of dental surgery and treatment. These courses are part of a broader educational process aimed at preparing dentists for clinical practice. Let us consider some of the main courses that include surgical topics.

The Basic Surgical Techniques course introduces students to the fundamentals of surgical procedures, such as proper use of surgical instruments, sterilization techniques, and basic principles of asepsis. Students learn the principles of performing basic surgical procedures, including tooth extractions, suturing, and post-operative patient care. The goal of this course is to familiarize students with basic surgical techniques, which serve as the foundation for performing more complex procedures in the future.

In the Oral Surgery course, students study more complex surgical procedures, such as tooth extractions, wisdom tooth removal, as well as surgical treatment of injuries and complications in the oral cavity. The course also covers surgical treatment for diseases that require surgical intervention. The goal is to teach students the basics of oral surgery techniques, proper preparation of patients for surgery, and providing appropriate post-operative care.

The Orthognathic Surgery course covers the treatment of bite anomalies and jaw deformities that require surgical intervention for correction. This may include surgeries to correct the bite or adjust the positioning of the jaw. The goal of the course is to prepare students to collaborate with surgeons and orthodontists to effectively address complex cases of dentofacial anomalies.

The course of Oral Soft Tissue Surgery focuses on surgical operations involving the removal of tumours and benign lesions of the oral soft tissues, as well as soft tissue reconstruction. Students gain knowledge and skills for performing flap surgeries and tissue grafting, which are necessary for treating various pathologies.

The Implantology course covers the techniques of dental implantation, including pre-surgery preparation, implant placement, and post-operative care.

The goal is to provide students with practical skills for placing dental implants and ensuring their long-term success and stability in the patient's treatment process.

The course of Perioral Surgery and Dental Infections course addresses the surgical treatment of infections in the oral cavity, such as abscesses and phlegmons, as well as treatment of post-traumatic infections. Students learn to diagnose and treat infectious processes, apply appropriate antibiotic therapy to prevent complications, and alleviate patients' conditions.

Reconstructive Surgery is the course that covers procedures aimed at restoring function and aesthetics after surgical interventions in the oral cavity. It includes plastic surgeries that correct the effects of injuries or previous surgeries. The goal is to teach students reconstruction techniques such as tissue transplantation or creating new structures to improve function and appearance of the jaw and facial area.

The Postoperative Care and Management course focuses on managing the post-surgical period, including monitoring patients after surgical procedures, pain management, preventing complications, and ensuring proper recovery. Students acquire the necessary knowledge to effectively manage the post-operative process, ensuring the successful recovery of patients.

In the Surgical Radiology course, students learn how to use radiological technologies for diagnosing and planning surgical procedures, including X-rays, computed tomography (CT), and magnetic resonance imaging (MRI). The goal is to teach students how to apply modern radiological methods for accurately determining the need for surgical intervention and planning operations.

Dental Trauma is a course dedicated to the treatment of dental and jaw injuries, such as fractures, dislocations, and damage to the soft tissues of the oral cavity. Students learn first aid techniques and the treatment of dental trauma, which is an important aspect of practical dental work [3].

Overall, surgical disciplines in dental schools are studied at all stages of education, including clinical courses where students gain experience working with real patients. Many programs integrate various aspects of surgery and dentistry, including implantology, orthognathic surgery, oral surgery, and treatment of dental trauma. Students in U.S. dental schools must master both theoretical knowledge and practical surgical skills through clinical practice and laboratory work. These courses prepare students to perform a wide range of surgical procedures necessary for successful dental practice.

Now let us discuss how these disciplines are taught at universities in the United States. The features of education at American universities have a number of distinct characteristics that combine

theoretical preparation with practical skills and clinical training.

1. Integration of theoretical knowledge and practical skills. Dental education in the U.S. integrates theoretical lectures with practical sessions. Theoretical courses include the study of anatomy, physiology, pathology, biomechanics of teeth and maxillofacial structures, as well as basic surgery. Students learn surgical methods for treating injuries and diseases of the teeth, gums, and jaws, including procedures such as tooth extraction, dental implants, periodontal treatments, and osteotomies. These studies not only provide an understanding of the theoretical foundations but also prepare students for real clinical situations where they can apply this knowledge in practice.

2. Practical training in clinical sessions. The practical component of dental education in the U.S. is crucial. Dental students train at university clinics or partner medical facilities where clinical sessions are held. These sessions involve working with patients, giving students the opportunity to improve their surgical skills under the supervision of experienced specialists. Students can perform simple surgical procedures such as tooth extraction, as well as participate in more complex surgeries, such as correction of jaw anomalies or treatment of bone defects in maxillofacial surgery. This training includes not only performing procedures but also learning how to manage medical documentation and monitor the patient's condition before, during, and after surgery.

3. Modelling and simulation. Dental students in the U.S. actively use simulation technologies to gain practical experience before working with real patients. Simulators are used to teach surgical techniques. These can be mannequins or artificial models of organs and tissues of the oral cavity on which students can practice in a safe environment. Such simulations allow students to refine the accuracy of their movements, learn how to plan procedures, and perform them step by step. Specialized simulators for training anaesthesia or surgical intervention are also used, helping students acquire important skills without risking patient health [4].

4. Education in the context of an interdisciplinary approach. U.S. universities emphasize an interdisciplinary approach to dental education. Dental students not only study purely dental aspects of surgery but also integrate knowledge from other medical disciplines. This may include courses in general surgery, anaesthesiology, orthopaedics, and other related fields. This approach enables students to understand how different parts of the medical process interact and allows them to work in teams with other medical specialists in real clinical settings, which is essential for modern dental practice.

5. Clinical training in real-world settings. After completing theoretical courses, dental students in the

U.S. have the opportunity to complete internships in clinics, hospitals, or specialized medical institutions. This allows them to work directly with patients, applying their acquired knowledge in practice. Students can be involved in complex surgical procedures under the supervision of experienced dental surgeons. These can include operations to restore oral cavity tissues, dental implant placements, complex tooth extractions, or correction of jaw anomalies. Clinical training also includes monitoring the patient's condition before, during, and after surgery, as well as collaborating with medical personnel to coordinate the treatment process [6].

6. Focus on patient safety and ethical aspects. Patient safety is one of the primary focuses of education in the U.S. Dental students study not only the technical aspects of surgery but also the safety procedures for conducting surgical interventions. This includes knowledge and skills in organizing sterility, managing pain during procedures, choosing and using anaesthesia properly, and monitoring the patient during surgery. In addition to technical aspects, students also study ethical and legal issues that may arise when providing surgical care, such as obtaining patient consent, issues of confidentiality, and adhering to professional ethical standards.

7. Internship and residency. After completing their basic education, dental students in the U.S. can undergo an internship or residency at specialized clinics or hospitals. A residency is a period of additional training and practice after obtaining a Doctor of Dental Surgery (DDS) degree, which allows one to specialize in certain fields of dentistry, such as surgery, orthodontics, or periodontics. During the residency, students work under the supervision of experienced mentors and perform complex surgical procedures. They gain experience in patient management, treatment planning, and study advanced aspects of specialized surgery that are not included in basic education [4].

8. Assessment and certification. At the end of their studies, dental students in the U.S. take mandatory exams and assessments to validate their knowledge and skills. These include not only theoretical exams assessing knowledge of the basics of surgery, anatomy, pathophysiology, and other disciplines, but also practical exams where students must demonstrate their surgical skills. After successfully passing these exams, students receive certification that allows them to practice as dentists. For specialized fields (such as dental surgery or implantology), additional exams may be required to obtain certification in these areas.

Conclusions and Prospects for Research. Thus, the dental education system in the U.S. is highly developed due to the integration of theoretical knowledge, clinical skills, and innovative teaching technologies. Special attention is paid to the practical aspect of education through clinical sessions and

simulation-based learning, which provides students with the necessary skills to work with real patients. Surgical disciplines are a crucial component of dental education in the U.S., covering a wide range of procedures—from basic surgery and oral surgery to specialized fields such as orthognathic surgery and implantology. This enables students to acquire deep theoretical knowledge and develop practical skills for effectively performing complex surgical procedures.

The interdisciplinary approach in education, where dentists work together with other medical specialists, is another important feature of education in the U.S. It allows students to recognize the importance of teamwork in medical practice and fosters the development of comprehensive skills for solving complex clinical cases. The experience of dental

schools in the U.S. serves as an important benchmark for improving education in Ukraine, which will help raise the professional level of future dentists and contribute to the overall development of the field.

Further research in this field may include a deeper exploration of the impact of technological innovations on various aspects of cultural and artistic development. In particular, an important direction is the study of the role of artificial intelligence in creative processes and interaction with audiences. Additionally, analyses of sociocultural changes caused by digital platforms that allow a broader group of people to engage in cultural processes are promising. Furthermore, attention should be paid to the ethical and legal aspects of applying cutting-edge technologies in creativity and cultural activities.

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Отримано 30.11.2024

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