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Embracing competency-based education for modern dental practice

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Abstract

Introduction: Dental education is undergoing a major transformation due to evolving healthcare needs, technological advancements, and the demand for dental practitioners to meet the diverse needs of a global patient community. Competency-based education (CBE) is at the forefront of this change, focusing on what students are competent in upon graduation. Unlike traditional models, CBE emphasises practical skills, critical thinking, and problem-solving.

Methods: This article explo res the shift towards CBE in dental education, examining frameworks that support CBE like Miller's Pyramid and guidelines from organisations such as the Accreditation Council for Graduate Medical Education (ACGME) and the American Dental Education Association (ADEA). It also involves a detailed analysis of these frameworks and their application in designing competency-based curricula.

Results: The findings reveal that CBE facilitates a student-centric approach, enhancing critical thinking, problem-solving, and autonomous self-assessment. These frameworks guide the design of curricula including identifying core competencies, defining competency levels, mapping competencies to learning outcomes, selecting effective teaching methods and utilising various assessment strategies. However, implementing CBE faces challenges, including measuring soft skills and resistance from educators and students.

Conclusion: CBE represents a paradigm shift in dental education, ensuring graduates are not only knowledgeable but proficient in practical skills. Future recommendations include incorporating technology-enhanced learning, global health competencies, and sustainability practices into the curriculum. Continuous professional development for educators and robust feedback mechanisms are needed to maintain the curriculum's relevance and effectiveness, ensuring dental graduates are well-equipped to meet the demands of modern dental practice.

Practice Highlights

- Dental education is evolving to meet global healthcare needs and technological advancements.
- CBE focuses on practical skills, critical thinking, and problem-solving
- CBE ensures dental graduates are competent and ready for modern practice challenges.
- Several frameworks can be used to guide CBE in developing clinical competencies.
- Designing CBE curricula involves defining core competencies and using diverse assessment methods.

I. INTRODUCTION

Dental education is at a pivotal moment, facing a profound transformation influenced by the dynamic intersection of changing healthcare needs, technological advancements, and the urgent call for dental practitioners to cater to the diverse requirements of a globalised patient community. Amid this swiftly evolving landscape, traditional approaches to dental education are undergoing a fundamental reimagination. The aim is to nurture a generation of dental professionals not only well-versed in theoretical knowledge but, crucially, equipped with the competencies vital for thriving in modern dental practice. Competency-based education (CBE) emerges as a key player in this educational revolution. This approach to curriculum design and teaching revolves around a central question: What should students be able to do or achieve at the culmination of

their course or program? In the realm of dental education, CBE moves beyond the traditional focus on accumulating knowledge and places a spotlight on the practical skills students need to excel in their future roles. It is not just about what students know; it is about what they can proficiently do. Why adopt competency-based education in dentistry? The answer lies in its power to enhance student learning by emphasising hands-on skills, critical thinking, and problem-solving abilities. CBE ensures that graduates are not merely well-informed in dental theory but are also competent practitioners capable of meeting the ever-changing demands of contemporary dental care.

II. THE SHIFT TOWARDS COMPETENCY-BASED DENTAL EDUCATION

In recent years, the field of dental education has undergone a transformative shift, pivoting away from the traditional education models to embrace the principles of competency-based dental education. This evolution is rooted in a fundamental recognition that the mastery of dental skills and knowledge is a dynamic process, necessitating an educational paradigm that transcends mere adherence to a predetermined timeframe (Chuenjitwongsa et al., 2018). While various definitions of competency-based education exist, there is a consensus that it revolves around outcome-based learning, ensuring the production of graduates with the requisite knowledge, skills, and attitudes to serve society effectively, meeting the standards of national qualifications frameworks, stakeholders, and the labour market.

Traditional-based dental education has faced criticisms for its potential to produce graduates who may lack practical proficiency or struggle to adapt to emerging trends in dentistry. It emphasises time spent in the classroom, irrespective of individual mastery. Furthermore, traditional models may sometimes struggle to keep pace with the rapid advancements in dental technology and shifting paradigms in patient care, underscoring the need for a more adaptive and outcomes-focused approach. On the other hand, CBE signifies a departure from traditional education, characterised by its teacher-centred, examination-focused, time-constrained, and discipline-oriented approach. It transitions towards a student-centric educational model using an outcome-based approach that enhances students' capabilities in critical thinking, problem-solving, and autonomous self-assessment.

Moreover, in CBE, the focus shifts from completing a predefined course of study to ensuring that learners attain proficiency in specific competencies, enabling them to navigate the complexities of dental practice effectively. In a competency-based framework, success is measured by demonstrating specific skills, ensuring that graduates are not merely knowledgeable but possess the practical expertise required for clinical practice. Besides, future professionals tend to be able to make decisions even when ideal/learned circumstances are changed. This paradigm shift promotes a deeper understanding of concepts and fosters a culture of continuous improvement. In CBE, novice dental students commence their training in simulation laboratories, preparing them to progressively attain beginner and competent levels in clinical settings.

III. FRAMEWORK FOR COMPETENCY-BASED DENTAL EDUCATION

A. Miller's Pyramid

The Miller Pyramid of Competence, introduced by psychologist George Miller in 1990 (Miller, 1990), stands as a foundational framework for evaluating clinical proficiency in healthcare education. This pyramid encapsulates a four-tiered hierarchy, delineating the progressive stages of competence acquisition. At its base, the pyramid begins with "knowledge", representing the foundational cognitive understanding of concepts typically assessed in classroom-based environments. Moving upwards, the tiers evolve into "competence" and subsequently "performance", encompassing knowledge translation into practical skills through simulated clinical settings. The higher echelons of the pyramid, namely "action", signify the culmination of clinical competence in real-world scenarios. Here, learners demonstrate their ability to apply theoretical knowledge and practical skills in authentic clinical environments. The Miller Pyramid's distinction between cognitive and behavioural components is particularly noteworthy. The lower tiers, focusing on knowledge and competence, mention the importance of classroom-based assessments in gauging cognitive understanding. In contrast, the apex tiers of performance and action underline the significance of evaluating behavioural aspects within simulated and real clinical settings. This hierarchical structure provides a great understanding of competency development, guiding educators in designing competency-based curricula.

B. Accreditation Council for Graduate Medical Education (ACGME)

The ACGME plays a role in shaping the educational standards for healthcare professionals. ACGME has delineated six core competencies, transcending traditional disciplinary boundaries and applicable to various healthcare practitioners (Batalden et al., 2002). These competencies form a holistic approach to evaluating the proficiency of healthcare professionals and are integral to fostering well-rounded practitioners

capable of meeting the complex demands of modern healthcare. The six core competencies identified by ACGME are Patient Care, Medical Knowledge, Professionalism, Interpersonal and Communication Skills, Practice-Based Learning and Improvement, and Systems-Based Practice. Patient Care centres on delivering compassionate, effective, evidence-based care to individuals and populations, while medical knowledge encompasses the understanding needed for sound clinical decision-making. Professionalism emphasises ethical behaviour, accountability, and a commitment to the well-being of patients. Interpersonal and Communication Skills are crucial for effective collaboration and patient interaction, whereas practice-Based Learning and Improvement involves the ability to critically assess and improve one's own clinical practice continuously. Systems-Based Practice involves comprehending healthcare delivery systems and endorsing high-quality and cost-effective patient care within the broader healthcare system context. Customising these competencies for the dental context allows dental educators to align educational objectives, ensuring their curriculum imparts technical skills while cultivating the ethical, communication, and systemic perspectives essential for a well-rounded dental practitioner.

C. American Dental Education Association (ADEA) Competencies for the New General Dentist

The ADEA has crafted the Competencies for the New General Dentist, a set of guidelines tailored specifically for dental education (American Dental Education Association, 2017). Ratified by the ADEA House of Delegates on 2nd April 2008, this framework is a decisive step in defining the essential competencies for individuals entering the dental profession as general dentists., This document reflects a departure from the 1997 competencies, aligned with patient care responsibilities, public oral health needs, and contemporary trends in dental practice and draws inspiration from the 2002 Institute of Medicine's core competencies with a heightened emphasis on quality patient care and safety. Structured into six domains—Critical Thinking, Professionalism, Communication and Interpersonal Skills, Health Promotion, Practice Management and Informatics, and Patient Care—the competencies are thoughtfully organised, allowing for more flexible and adaptable integration into dental education curricula. This framework serves as a central resource for the ADEA at the national level and individual dental schools at the local level, fostering an environment conducive to innovation in predoctoral dental school curricula. Overall, the ADEA competencies serve as a benchmark, enabling dental educators to design curricula that not only meet but exceed the contemporary expectations and requirements of the dental profession.

D. The Graduating European Dentist Curriculum

The Graduating European Dentist Curriculum, under the auspices of the Association for Dental Education in Europe (ADEE), presents a contemporary framework embodying the optimal academic practices for undergraduate dental education in Europe (Field et al., 2017). This curriculum is structured across five integral domains, each contributing to a comprehensive educational experience: (1) Professionalism, (2) Safe and Effective Clinical Practice, (3) Patient-Centred Care, (4) Dentistry and Society, and (5) Research. Crafted through a collaborative process involving consultation, consensus-building, and collegial learning, this curriculum highlights the importance of patient safety, teamwork, and teaching excellence. Aligned with European Quality in Higher Education benchmarks, "The Graduating European Dentist" introduces an innovative approach reflecting the pinnacle of academic standards in European dental education. The revised framework features a more explicit linkage between "Learning Outcomes" and the defined curriculum, accompanied by detailed guidance specific to each competence domain, encompassing "Methods of Teaching and Learning" and "Methods of Assessment". It is anticipated that this framework would facilitate an enriched educational experience for dental students across Europe.

IV. DESIGNING A COMPETENCY-BASED DENTAL CURRICULUM

To effectively design and develop a competency-based dental curriculum, educators need a comprehensive framework that aligns with the unique challenges and requirements of dental practice. The following components are some of the basic summarised steps that serve as foundational guides for the implementation of a competency-based curriculum:

A. Identifying Core Competencies

Begin by identifying the core competencies that future dental practitioners must possess. This involves collaboration with practitioners, educators, and stakeholders to ensure that the curriculum reflects the evolving needs of the dental profession. Core competencies might encompass knowledge acquisition, clinical skills, patient communication, ethical practice, and the ability to integrate new research findings into practice.

B. Defining Competency Levels

Once core competencies have been identified, it is crucial to define distinct competency levels for each skill or knowledge area. These levels serve as benchmarks for assessing student progress and proficiency. They

facilitate a granular approach to education, where learning and assessment can be tailored to students' individual needs, recognising that learners progress at different rates and may require differentiated levels of support to achieve competency.

C. Mapping Competencies to Learning Outcomes

Each identified competency should be mapped to specific learning outcomes within the curriculum. This mapping process ensures that the curriculum is logically structured, with a clear progression from foundational knowledge to applying skills in complex clinical scenarios. It allows educators to design courses and modules that systematically build upon each other, guiding students on a clear path towards achieving the essential competencies required for successful dental practice.

D. Selecting Effective Teaching Methods

Adopt diverse and innovative teaching methods that cater to different learning styles and encourage active engagement. Techniques such as problem-based learning (PBL), case-based learning (CBL), team-based learning (TBL), simulation exercises, and hands-on clinical practice are effective in helping students develop critical thinking and practical skills. Incorporating technology, such as virtual reality (VR) and digital simulations, can also enhance learning experiences and prepare students for real-world challenges.

E. Utilising Assessment Strategies

Implement a variety of assessment methods to evaluate students' competency levels. This may include practical exams, case-based assessments, and objective structured clinical examinations (OSCEs). These should be complemented by regular, formative assessments and feedback, which are instrumental in identifying areas where students may struggle and providing them with the support needed to overcome these challenges. The ultimate goal of assessment within a competency-based curriculum is not merely to test knowledge but to facilitate the development of skilled, reflective, and adaptable dental practitioners.

V. LIMITATIONS AND CHALLENGES IN IMPLEMENTING A COMPETENCY-BASED CURRICULUM

Authenticity and the ability to accurately measure skills have been identified as the primary challenges in CBE for dentistry. In this field, knowledge and skills are often assessed as separate entities, leading to a potential loss of authenticity throughout the learning process. While CBE incorporates a variety of subjective and objective evaluations, measuring certain soft skills, such as clinician-patient communication, ethics, and values, remains a challenge due to their complex and intangible nature. Moreover, implementing CBE in dental education may face additional obstacles, including the limited availability of established theoretical frameworks to guide the teaching-learning process, insufficient training for educators in adapting to this curriculum style, and resistance from both teaching staff and students. Addressing these challenges is essential for ensuring the successful adoption and integration of competency-based education within dental programs.

VI. CONCLUSION

The transition towards competency-based dental education marks a significant paradigm shift aimed at equipping future dental professionals with the practical skills, ethical understanding, and critical thinking abilities necessary for success in the contemporary dental landscape. Future recommendations include the further integration of technology-enhanced learning tools, the development of global health competencies, and the emphasis on sustainability and ethical practices within the curriculum. Additionally, establishing robust feedback mechanisms and promoting continuous professional development among educators will be crucial in maintaining the curriculum's relevance and effectiveness.

Notes on Contributors

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Declaration of Interest

All authors have no conflicts of interest.

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