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BALANCE OF THEORETICAL AND PRACTICAL KNOWLEDGE IN HIGHER MEDICAL EDUCATION: MODERN REQUIREMENTS

Abstract: Medical Education requires high competency levels in various clinical skills such as examination of patients and execution of clinical techniques on patients by integrating skill and simulation-based teaching and learning as supplementary to traditional methods of bedside clinical teaching. However, in recent years, we have come to a realization that theoretical knowledge is a sound base in medical education on which you top up your education with practical knowledge. . Depending on the subspecialty, the courses include lectures, seminars, practical laboratory training, and clinical training at varying quantities. In addition to attendance times, sufficient time slots are prepared for self-study in lectures, seminars, and practical work. With our curriculum, we provide an easily applicable backbone for a modern course of medicine that can be installed also at smaller academic institutions.

Key words: Medical education, bedside teaching, practical medical education.

Medical education is a multifaceted journey that combines theoretical knowledge with practical application. While theoretical knowledge lays the foundation for understanding medical concepts, practical knowledge is equally indispensable in shaping competent and proficient healthcare professionals.[1,2]

1. Clinical Competence: Theoretical knowledge provides the necessary framework, but practical knowledge is essential for translating theories into real-world applications. Clinical competence, involving skills such as patient examination, diagnosis, and treatment, cannot be fully acquired without hands-on experience.

2. Skill Development: Theoretical knowledge provides the necessary framework, and practical knowledge is essential for translating theories into real-world applications. For example: Simulation labs offer a hands-on approach to skill development, enabling learners to practice and perfect clinical procedures repeatedly. Whether it's suturing a wound, administering anesthesia, or conducting a surgical operation, practical knowledge obtained through simulations can be the difference between success and failure in the operating room.

3. Decision-Making Abilities: In a clinical setting, healthcare professionals often face unexpected challenges and emergencies. Theoretical knowledge provides a framework for understanding the context in which decisions are made. In medicine, understanding the theoretical underpinnings of diseases, patient history, and symptoms enables healthcare professionals to recognize patterns and make informed decisions based on those patterns. Practical knowledge on the other hand gained in simulation labs allows individuals to develop problem-solving and decision-making skills in a risk-free environment. This experience is invaluable in preparing students to handle real-life medical crises.

4. Teamwork and Communication: Medicine is not just about individual knowledge but also about effective teamwork and communication. Theoretical knowledge provides team members with a common understanding of foundational concepts, terminology, and principles within their field. This shared knowledge creates a common language that facilitates clear and effective communication

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among team members. Practical knowledge foster collaboration among healthcare professionals by simulating real clinical scenarios, encouraging participants to work together, delegate tasks, and communicate efficiently.

5. Mistake Learning: Making mistakes is a natural part of learning. Theoretical knowledge enables medical professionals to conduct thorough root cause analyses when mistakes occur. Understanding the theoretical foundations of medical procedures, protocols, and principles helps identify the underlying factors contributing to errors, allowing for targeted improvements. Practical Knowledge, students can make errors without causing harm to patients. This allows them to learn from their mistakes, refine their skills, and become more confident in their abilities, which is challenging to achieve through theoretical knowledge alone.

6. Bridging the Gap: Theoretical knowledge provides students with conceptual frameworks that serve as a foundation for understanding the fundamental principles of medicine. This foundation is essential for bridging the gap between basic science concepts and their practical applications in clinical settings. Practical knowledge bridges the gap between theory and real-world practice. It helps students and medical professionals apply their theoretical knowledge to practical situations, ensuring they can deliver effective patient care.

Medical education faces numerous challenges. Curriculum development at a medical university is critically dependent on established clinical, laboratory, and staff prerequisites. Environmental ramifications such as the availability of a campus and rooms may cause additional problems[3,4]. Limited resources and political interests further impair an optimal curriculum development. There are reformed and integrated curricula that use organ-based teaching together with early clinical skills teaching and problem-based learning not only in the US but also at European universities. However, many existing European curricula while following an organ-or system-based approach with regard to didactics, strongly reflect what has been traditionally taught at medical universities with regard to contents. Furthermore, most existing curricula do not meet the Bologna criteria for both Bachelor's and Master's degrees.[4] Our curriculum aims at adopting organ-or disease-based teaching together with early clinical skills teaching and problem-based learning, both at the Bachelor's and Master's degree levels, with a stronger focus on practical clinical relevance than in any other curriculum we are aware of. The bachelor course starts with a general introduction covering general physiology, biochemistry, anatomy, histology, embryology, clinical chemistry, human genetics, immunology, microbiology, pharmacology, toxicology, and general health care, which enables students to understand the ensuing curricular contents. Importantly, patient-oriented and thus problem-based learning is a central feature of training already in this very first step of education at our university. Thereafter, structure, function, and major mechanisms of dysfunction of organ systems are covered. This block dealing with organ systems equips students with the basic knowledge of human health and disease. One essentially novel approach of our curriculum is the next large block focusing on the "twelve most important diseases", covering an array of important conditions from back pain to diabetes mellitus. This focus on a set of the most important diseases appears helpful both from a clinical and from an educational viewpoint. By this approach, two major effects are intended: First, more than 80% of daily clinical work of residents and general practitioners deals with these most important diseases; in-depth knowledge of their management at an early stage of medical education enables students to undergo efficient practical work and thus provides an optimal basis for bedside teaching throughout the curriculum. Second, the art of clinical decision making requires in-depth

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knowledge. Having gained detailed experience in these most important diseases, students will be able to better understand not only their management but also general medical decision making. Consequently, these two facets of early professionalism strengthen student motivation. Insights into scientific methods and principles are of major importance for the understanding and interpretation of results from trials that lead to changes in the treatment of patients. Therefore, even though it is not the primary intention of our curriculum to educate scientists, students receive scientific training as part of their preparation courses for their Bachelor and Master theses, including basics of scientific reading and writing, project planning, and biostatistics. Typically, representatives of medical subspecialties teach their fields of expertise. In this context, it is important to consider that the subdivision of medicine into its various disciplines has grown historically but is inherently arbitrary: there is an enormous overlap between many medical subspecialties. To guarantee optimal medical education in the shortest possible time, overlap between medical subspecialties that entails overlap in curricular contents must be avoided. Indeed, patient-oriented learning should be given priority over subspecialty-driven learning in modern medical education. First, the concept is free of external constraints, ie, no historical obligations – like an employment of an ancient structure – were to be met. Second, the curriculum is comprehensive in that clinical orientation is melted with basic knowledge from the very beginning on. In particular, the focus on clinical practical issues results in well-trained physicians, who are prepared to immediately care for patients. In the development phase of our curriculum, we extensively studied existing curricula of several existing institutions. Our curriculum aims at adopting organ-or disease-based teaching together with early clinical skills teaching and problem-based learning, with a stronger focus on practical clinical relevance than in any other curriculum we are aware of. Third, the courses are unusually efficient because they avoid outdated contents and unnecessary replication. In addition, the teaching methods are chosen to provide fast progress in knowledge. Fourth and fifth, we use a concept of classes with a maximum of 10 students. This fosters the short duration of 6 years only for the whole curriculum. This in turn allows for a slim teaching crew. In particular, we calculated a need for full-time teachers at the resident level. Together, these five points offer essential advantages over many existing curricular approaches. The usefulness of a separate Bachelor course in a curriculum of medicine has been debated widely, mainly because the professional outlook was not clear. However, with our practicality approach, bachelor graduates can be employed in a number of professional positions. Examples are outdoor positions in the pharmaceutical industry, as administrative assistants in hospital documentation, as officers in public health, and as laboratory and radiology technicians (with additional specific training).The Bachelor conception enables the graduates' entry not only into the medical master's course, but also into other master's courses. Altogether, with our curriculum, we have developed an easily applicable backbone for a modern course of medicine. We intend to install the present curriculum soon at our university and teaching hospital or elsewhere. We publish it because we want to elicit further discussion. We are aware of the fact that a curriculum is never final or perfect.

While theoretical knowledge is a sound base in medical education on which you top up your education with practical knowledge. The combination of theoretical and practical knowledge is the key to producing well-rounded, competent medical professionals. Through the integration of these two pillars, we can ensure that future generations of healthcare professionals are not only well-informed but also well-prepared to meet the challenges of modern medicine, delivering the best possible care to their patients.

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