Twelve tips for essential aspects in the elaboration of Global Medical Curricula in a context of Medical Competencies, EPAs, and Milestones

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**Abstract**

Good global education values cultural diversity, sharing of essential views and encourages regional development, believing that it is possible to understand humans as global citizens, who can contribute to a more peaceful, just and sustainable world, without discarding their nationality. The construction of a global medical curriculum is still challenging. The aim of this set of twelve tips is to present conceptual aspects, opinions, and suggestions regarding points of essentiality and convergence in a context of Medical Competencies, EPAs, and Milestones. Based on the literature and empirical observations, we present 12 tips on medical education issues: professional identity; mobility; digital culture; educational objectives; definition of competency-based medical education; implement CBME; assessment; understanding the EPAs; designing EPAs; milestones; faculty development; and artificial intelligence. The strategic points of a learning-teaching-assessment process at CBME are real and significant educational objectives; clear and well-defined competencies; EPAs planned for learning and assessment in all subjects, from the beginning of the school; and milestones as references of complexity and structured by levels. The CBME as a new and positive paradigm needs to invest heavily in faculty development and the assessment system.

**Keywords:** Global Medical Curriculum; International Medical Education; Competency-Based Medical Education; EPAs; Milestones; Assessment

**Introduction**

Collaboration among countries for medical training has been intensified by globalization and is being re-designed with the COVID-19 pandemic. The learning and training opportunities were outlining a global medical educational process and demanding an adjustment to improve health of societies (Melnick, 2006; Sherif et al., 2020). One of the consequences was the concern to develop curricula that could train and certify medical students for international practice (Thompson, 2006; Giuliani et al., 2020). It is challenging to identify the set of essential skills in medical
education, regardless of geographic, sociocultural or learning environments (Barbosa et al., 2011; Brouwer et al., 2020).

The American Association of Medical Schools (AAMC) and Medical Students Associations around the world are recognizing the importance of the global curriculum and the exchange of healthcare experiences (Stigler et al., 2010; Farmer and Rhatigan, 2016). It is important to have a conceptual understanding of global health and how the functioning of the health system influences medical training, strengthen the partnership between medical education and health systems, and be increasingly collaborative and less dependent (Christensen, 2004).

The construction of global undergraduate curricula is still challenging (Sherif et al., 2020). The aim of this set of Twelve Tips is to present conceptual aspects, opinions and suggestions based on the literature and empirical observations regarding the major contemporary issues of medical education, that we believe are essential and consensual for the construction of global curricula.

**Tip 1**

**Plan, create and evaluate opportunities for development of professional identity, this being customized according to regional characteristics**

Educators have a strategic role in the development of a professional identity, where the patient is the central reference (Sternszus et al., 2020). As far as we do not know what will be the experience that will awaken the student to the existence of a medical identity, it is mandatory to offer many training opportunities, simulated or real, and monitor emotional development and social skills (Schei et al., 2019). Curricular organization, appropriate strategies and supervision are necessary investments for the success in the transition from a "layperson” to a "medical" identity (Dagnone et al., 2020). The positive performance in becoming a doctor is associated with the planning of activities and experiences of different levels of complexity, from the first to the last day of medical school, between students and teachers, establishing a reflective partnership (Hatem and Halpin, 2019).

**Tip 2**

**Become a Mobility Network**

Encouraging the improvement of the quality of training and the free movement of students, teachers and physicians is important not only to fill gaps, but also to facilitate interactivity and collaboration among individuals with different identities, cultures, and values (Giuliani et al., 2020). The strong association between health system and medical training does not seem to depend only on national traditions, but mainly on the way medicine is practiced along with the socio-cultural differences (Hamdy, 2017). It is necessary to encourage mobility and move towards greater flexibility in learning. Linguistic differences do not represent a barrier when there is a sociocultural identity and, in general, students and professionals are able to overcome these constraints (Tayem et al., 2020).

The mobility of administrators, teachers and students can be an alternative for institutional updating, which becomes aware of local and global projects and experiences, creating a menu of probabilities and choices for maintaining an active and successful system. Mobility can harmonize face-to-face, digital, or virtual travel, in a network that can connect objectives, methodologies, goals and actions quickly and independently.

**Tip 3**

**Stimulate digital culture, invest in medical data quality and multiple learning**
Medical education involves as many aspects as those required in patient care and training programs. The search for quality is a reference that can improve the organization of this complex system. It already seems a consensus to classify individual, family and population according to complexity, with a greater concentration on primary care and hospital care (Ravioli, Soárez and Scheffer, 2018; van Til et al., 2019; Cooper et al., 2019; Al Asmri et al., 2020). The assessment of the effectiveness of different models is hampered by the lack of common terminology, outdated taxonomies, and heterogeneous research methodologies (Cooper et al., 2019). In this context, the database can be the guiding thread for the analysis and functionality of health systems (Bousquet et al., 2020). Denmark, where the division of care corresponds to four segments: primary care, hospital care, mental health care and care for the elderly, is shown as an example of success (Schmidt et al., 2019).

Before we think of artificial intelligence as the big solution, it is important to invest in data quality. The development of systems with an accessible, accurate and secure approach has a direct impact on the quality of data, and since the correct filling is fundamental, it is necessary to invest in this challenging area (Ospina-Pinillos et al., 2020; Chen et al., 2020).

Experiences in the development of collaborative learning platforms and training with expanded or virtual reality, have positive aspects that include quick feedback on learning assessments and managing the organization of opportunities to achieve the best results (Muralha et al., 2017; Izard et al., 2018).

**Tip 4**

*Do not forget! Educational objectives continue to play an important role in guiding procedural methodology*

Everyone involved in the learning-teaching-assessment process needs to understand the meaning and value of the objectives, which remain in their original state as a target to be achieved. They represent the outcomes that are expected to be achieved through the planning and performance of educational actions. The adequate, clear, and precise elaboration of the teaching objectives is considered a fundamental element for the successful implementation of planning for professional training. Adequately designed goals and competencies establish a reliable path for everyone involved in the educational process and have an important impact on interpersonal relationships, which must be collaborative.

It is up to each institution to have absolute control over the definition of its major objective. In addition to the general objectives, a curriculum of an institution that chooses Competency-Based Medical Education (CBME) needs to explain its procedural methodology, that is, through which methodologies the objectives will be achieved (Fritze et al., 2017). It is possible to start with consensus and establish the main nuclei of the procedural matrix with their respective objectives. A success goal map is a complex structure with a life programmed and must be established within a comprehensive view of the entire graduation, such as a timeline with its horizontal and vertical connections.

**Tip 5**

*Emphasize the importance of a clear and objective definition of CBME, understandable by the entire institutional community*

Competency-Based Medical Education (CBME) is the most current pedagogical proposal. Its origin is associated with social dissatisfaction and the demand for greater responsibility from doctors and teachers (Ten Cate, 2019). The proposal to train doctors based on competencies and integrated learning emerged in the 70s and involves several concepts (McGaghie et al., 1978; Frank et al., 2010; Ten Cate, 2017). Thus, due to the importance of the institutional definition of competency as a consensus product, several definitions must be considered and discussed.
The Concise Oxford English Dictionary defines competency as "to do something successfully", assumed by some authors (Brightwell and Grant, 2013; Ten Cate, 2017). This definition, clearly and objectively, encompasses three aspects: being able (individual quality), doing (action resulting from the integration of cognition, skill and attitude) and success (positive result); these meanings correspond to the essence of CBME and, in a transdisciplinary way, can be a reference in preparing a competency: quality of doing successfully. In this way, the universe of knowledge, psychomotor skills, attitudes, communication, collaboration, professional integration, permanent assessment, self-improvement, and other necessary components make up the quality set (what is required to do so). The element to do is the concrete action taken in the real environment. And the quality of this action must be high, with success. The definition of competency, a choice with context and meaning, becomes the institution's identity and is the first step in the construction of CBME.

Tip 6

Implement CBME as a procedural choice and experience as a culture: the implementation of a learning, teaching, and assessment process

One of the most outstanding characteristics of CBME is the focus on evaluable results, with learning, teaching and assessment being the main drivers of the process that makes CBME concrete. And its implementation requires continuous planning and assessment, medical and pedagogical knowledge, good sense, pragmatism and, above all, efficient management. The collaborative strength between them may be an indicator of CBME's success, justifying our proposal to replace the classic "teaching-learning process" with the learning-teaching-assessment process.

CBME was implemented with great enthusiasm in Canadian and American schools, and it gradually becomes the international standard of medical education (Sohrmann et al., 2020). Among the favourable arguments are: focus on skills, training and results, personalization of time for learning, planned assessment, and institutional role in decision making (Chuang and Hsieh, 2018; Ten Cate, 2019; Ten Cate and Carraccio, 2019; Veale et al., 2019). The emphasis on results highlights professionalism, which needs to be well delineated, without distancing itself from the transversal insertion of the research (Franco et al., 2020).

CBME management includes qualities such as the organization of strategies and methods, guidelines for preparation, application and feedback of assessment, organization of the domains associated with each competency, planning and implementation of flows, adequacy of the learning, teaching and assessment environments, curricular organization and flexibility, continuous investment in the faculty and medical certification. The strategies to face these challenges depend on the ability to plan the prevention or early detection of difficulties (Touchie and Ten Cate, 2016; Wijnen-Meijer, 2019). We highlight the structures of CanMEDS and German schools (Nationaler Kompetenzbasierter Lernzielkatalog Medizin - NKLM) as references, with several associated analytical articles (Frank, 2005; Fritze et al., 2017).

Tip 7

Assess continuously: the formats can be quantitative, qualitative, or mixed, the valuable thing is that they allow, in a reliable way, the passage to a next step or if the student needs more time and more supervision

Assessing at CBME is an opportunity for planning action in a biological and clinical context, where objectivity is important and desirable, and subjectivity can be reduced. It takes wisdom and time to harmonize, in a contextualized and personalized way, objectivity and subjectivity in the learning-teaching-assessment process, in a collaborative environment (Brightwell and Grant, 2013).

As of 2016, publications increased and began to indicate different ways to assess more safely, and the results are
promising (Schumacher et al., 2020; Henry and West, 2019; Chan et al., 2020). However, the high and low performance approach are not being presented, and the application of in the workplace based assessment (WPBA) does not seem to ensure the detection and management of low performance (Brightwell and Grant, 2013).

Assessing is always challenging and, at CBME, the demand is greater, as it is a continuous process, more participatory, collaborative, objective, less centred on the teacher, less authoritarian and less disorganized. Veale et al. (2019) use the term "post-psychometric era" to represent and draw attention to the shift from standardized, cross-cutting, and numerical assessments to a competency-based model. They emphasize the importance of an assessment system where the objective is to determine whether the student is ready or not for indirect supervision. The creation of a useful "toolbox" to evaluate is an important collaboration for success (Homer et al., 2020; Cecilio-Fernandes et al., 2020).

**Tip 8**

**Perfectly understand the meaning of an Entrustable Professional Activities (EPA)**

Several recent studies emphasize the importance of integrating CBME and EPAs concepts, and their impact on learning, teaching and assessment (Sohrmann et al., 2020; Schumacher et al., 2020).

When training is planned with reference to quality and safety, we are preparing an EPA. The concept of EPAs was introduced in 2005 by Ten Cate as an action or set of actions in medical practice that can be fully entrusted to a trainee (resident or medical student), after proof of the acquisition of competency to perform this activity without supervision (Ten Cate, 2019). The conceptualization was based on theoretical readiness for unsupervised practice, with confidence in medical education for safe, effective and patient-centred care. EPAs are intrinsic to professional work, requiring adequate knowledge, skills, and attitudes; they may reflect one or more competencies acquired; are executable and observable, with established deadlines; and measurable throughout the process, with binary decision. AAMC aroused national interest by proposing 13 EPAs that medical graduates should conduct, with limited supervision, when starting residency (Englander et al., 2016).

**Tip 9**

**Did you understand what EPAs are? So, design, assess, and adjust**

When designing an EPA, it is important to focus on the description of a task and which tasks are independent of people. If we are going to design for a real medical work setting (outpatient clinics, wards, operating rooms, dressing clinics, ICU beds), EPAs correspond to the list of tasks that must be done in each sector or location, over a period. Competencies are associated with people and EPAs with tasks, so a doctor has competencies, but does not have an EPA, which is the activity that he can perform, if approved in the corresponding assessment (Peters et al., 2017).

For a simple EPA such as measuring blood pressure, the necessary skills are: knowledge about blood pressure, about measurement techniques and devices, approach techniques; ability with gauges and with the patient; and have attitudes appropriate to a correct and responsible measurement. So, the student needs to prove that has the skills and perform the EPA correctly. Several relevant experiences have already been presented in the preparation and implementation of EPAs in medical graduation (Englander et al., 2016; Ten Cate and Carraccio, 2019). The association of common situations, such as walking movement and the identification of atypical marches, helps us to understand the complexity of competencies and EPAS.

Studies involving CBME and EPAs have positive aspects and difficulties in operationalization, especially in relation to teacher training and the frequency with which trainees must be assessed (Carraccio et al., 2017; Broussenko et al.,
A relevant question in the context of EPA-based learning and assessment is the impact this environment has on students. Investigating behaviours and changing personality traits is important so that actions can be effectively positive (Lourinho et al., 2017).

The EPAs, characteristically straightforward, designed as tasks in a workplace have become a model of procedural structuring that is easier to be absorbed by teachers and doctors, in real or virtual environments (Ten Cate et al., 2018).

Tip 10

Milestones? For what?

The desired assessment in the context of CBME and EPAs is integrated, collaborative and shared responsibility. Cultural change is needed, starting with integrated learning, a challenge still under construction (Kayani, Gilani and Mahboob, 2018). The organization of the assessment system is as fundamental as the development of methods applicable to simulation stations (virtual or real), and to the assessment in the workplace with feedback (Prins, Brondt and Malling, 2019; Andler et al., 2020).

The need to establish assessment points with terminality, and determinants of progress for more complex stages, meant that the "Milestones" were added to the organization of the process. According to ACGME, milestones correspond to a description of the performance that residents must demonstrate they have acquired in terms of skills, knowledge, and behavior (Nasca et al., 2012). We highlight the personalization of time for learning, completely contextualized in CBME.

Milestones is an important area of practice, observation, and research, with many questions still to be revealed and that, associated with EPAs, can strengthen CBME’s objectives (Carraccio et al., 2017; Ten Cate, 2019). The Milestones can correspond to Dreyfus’ five levels of results assessment, namely: beginner, advanced, competent, proficient, and expert (Torralba, Jose and Katz, 2020). Correspond to strategic points for changing levels so that EPAs are performed safely and effectively. ACGME milestones can be adapted by medical schools (Havyer et al., 2017).

Tip 11

Invest, facilitate, believe in teacher training as an institutional partnership

The specific faculty development of medical staff has recognized relevance and needs to be expanded and better organized (Görlitz et al., 2015). The education of new generations of doctors faces great challenges. Students from several medical schools in the United States were interviewed and revealed that the medical school, in addition to being an extreme physical and emotional challenge, has several conflicting goals (Rath, Mazotti and Wilkes, 2020).

The tools are available for teachers to act to facilitate the learning of medical students at all levels (Walsh et al., 2018). However, are institutions committed to faculty development or does this training remain optional, among the residual hours of routine medical work? Does faculty understand the need to dedicate time to teaching or supervision preparation or are they primarily involved in research? The teaching activity integrated with the medical activity needs to be reassessed in the direction of a more efficient integration and not of distancing.

The preparation of the faculty has a very significant role in medical training, it is important to have a historical perspective and try to understand emerging trends, especially in collaborative opportunities, technology for remote communication, activities and pedagogical experiences in the work environment, change and organizational development research.
Tip 12

Design the future. Today, what can we plan beyond CBME, EPAs and Milestones?

Learning environments become increasingly complex and milestones and EPAs contribute significantly to the realization of CBME ideals. The huge amount of data produced in the context of medical training requires a robust digital system, capable of managing, integrating, and synthesizing the learning and assessment data, and assisting the real-time assessment processes with feedback (Möltner, Wagener and Burkert, 2020).

Artificial intelligence is the great expectation for success in the planning, implementation, assessment and adjustments of a learning-teaching-assessment process centred on users, with easy and intense interactivity, which can be used for learning and assessment, as well as administrative work in a CBME environment. The experiences already carried out in anatomy learning are good references for integration, technological and digital resources for CBME (Guimarães et al., 2017).

The use of artificial intelligence in medicine has a high impact on precision and diagnostic competency, creates possibilities to improve patient care, generate real time data analysis and allow continuous monitoring of the patient. Doctors and health informatics, together, need to take on this great challenge in the 21st century. So, in the context of CBME, basic computer learning is no longer enough, and the digital environment must be encouraged and used since the student's admission into medical schools (Sapci and Sapci, 2020).

Conclusion

The strategic points of a learning-teaching-assessment process at CBME are: real and significant educational objectives; clear and well-defined competencies and sub-competencies; EPAs planned for learning and assessment in all subjects, from the beginning of the school; and milestones as references of complexity and structured by levels.

The CBME as a new and positive paradigm needs to invest heavily in faculty development and the assessment system. Gradually, a new system of learning, teaching, assessment, proficiency, and certification is being built, with the expectation of training better and better, committed professionals, and empathetic doctors.

Take Home Messages

- It is still a challenge to build global curricula and, starting with the essential and consensual issues, can be a good start.
- Where there are medical students, it is necessary to take care of the development of professional identity, collaborative mobility and stimulate digital culture. Think about!
- Educational objectives remain important! Choosing CBME means facing medical training as a dynamic process, and always upgradeable.
- Evaluate continuously! EPAs and Milestones, understood to perfection, are great measures to evaluate well.
- Believe in teacher training as an institutional partnership and invest in it! Look beyond the established.

Notes On Contributors

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**Appendices**

None.

**Declarations**

_The author has declared that there are no conflicts of interest._

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