


The Curriculum at the College of Medicine and Medical Sciences at Arabian Gulf University: A Way Forward to Meet the Future Medical Education Needs

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ABSTRACT: Arabian Gulf University (AGU) follows a curriculum based on Problem Based Learning (PBL). PBL is a learner-centered approach that empowers students for life-long learning. Students are taught through problems that are designed based on global health problems customized to the local needs. The classroom teaching is complemented through adjunct programs like community health activities and professional skills program. Medical education aims to meet the changing needs of society. Demographics, disease epidemiology and healthcare needs of the gulf countries have changed over 38 years since the inception of AGU. To keep pace with the changing demands, it is imperative that the curriculum is reviewed in the light of advances in technology and newer techniques of medical education. In the present article the curriculum at AGU is reviewed based on the predictors for future medical education and alternative teaching methods that can be integrated to optimize the student outputs are explored.

KEYWORDS: medical education, problem-based learning, curricula

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A physician's education aimed to produce "a cultured and highly educated gentleman with, quite secondarily, an adequate knowledge of medicine."

—Dr Charles's Newman¹

Medical education is not just a program for building knowledge and skills in its recipients . . . it is also an experience which creates attitudes and expectations.

—Abraham Flexner

Introduction

The objectives of medical education are in constant flux throughout history. As the social, political, cultural, and economic needs of a region change, so do the health care needs and the aims and objectives of medical education. We have come a long way since the inception of medical education. During the years preceding 1910, the education and training of medical students were based mainly on a master-apprentice model.² Early in the 20th century, medical education became guided by principles formulated by Abraham Flexner and William Osler.³ Post the influence of Flexner, medical education has moved into a fully integrated curriculum combining the preclinical and clinical components. Problem-based learning (PBL) is one of those curriculums which revolve around the establishment of a realistic and reciprocating knowledge base between the student and the facilitator. It emphasizes problem-solving in a realistic environment.

Arabian Gulf University

College of Medicine and Medical Sciences (CMMS) at the Arabian Gulf University (AGU) is a multinational medical institution established in 1982. It is a joint educational and cultural venture of 6 gulf countries, that is, United Arab Emirates, Bahrain, Saudi Arabia, Oman, Qatar, and Kuwait. The university aims to promote higher education and research in the Gulf region and to respond to health care and other developmental needs of the member countries.

Since inception, the institute has adopted a problem-based, learner-centric, community-responsive curriculum. Problem-based learning is a learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem.⁴ The curriculum is organized around small groups that would facilitate peer learning and teamwork. The curriculum integrates the skills and teaching along multiple planes to prepare future doctors for multifaceted and holistic roles.

The curriculum is integrated horizontally across the subjects and concepts. Basic medical sciences are integrated with clinical subjects. Classroom teaching in professional skills program is integrated with community and hospital activities. The preclinical and clinical curriculum is integrated vertically to provide comprehensive training at every stage.

Medical education is of 6 years duration and is organized into 3 phases. The first phase is a premedical year. It acts as a foundation and prepares the students for further learning and



AGU Medical Curriculum Map					
Year	Semester I 15 credit hours		Semester II 16 credit hours		Phase
1	Biology - I	(3 Hrs)	Biology-II	(3 hrs)	I
	Medical Physics	(3 Hrs)	Biochemistry	(3 hrs)	
	English I	(5 Hrs)	English-II	(5 hrs)	
	Social Sciences	(2 Hrs)	Biostatistics	(3 hrs)	
	Psychology	(2 Hrs)	Islam & Medical Ethics	(2 hrs)	
2	Unit I 12 Weeks		Unit II 8 Weeks		II
	Man & His Environment		Respiratory System		
			Cardiovascular System		
Professional Skills & Community Health Programs					
3	Unit IV 12 Weeks		Unit V 11 Weeks		II
	Metabolism, Endocrine & Reproductive Systems		Gastrointestinal & Renal Systems		
			Haemopoietic & Immune Systems		
Professional Skills & Community Health Programs					
4	Unit VII 9 Weeks		Unit VIII 12 Weeks		B.Sc
	Musculo-Skeletal & Integumentary Systems		Nervous System & Human Behavior		
			Multi-System Integration		
Professional Skills & Community Health Programs					

Figure 1. Curriculum map phases I and II.

Source: Curriculum map available at <https://www.agu.edu.bh/en/Academics/CMMS/Programs/UndergraduateMedical/DoctorofMedicine/Pages/Curriculum-Map.aspx>.

practice of medicine. The second phase is a preclerkship phase and is of 3 years duration. The curriculum during this period is arranged around the organ systems. The third phase is the clerkship phase and is of 2 years duration. Students are exposed and trained in the real-world setups. Teaching is through clinical rotations, bedside clinics, and interacting with patients at health centers in the community (Figures 1 and 2).

The AGU places a strong emphasis on self-directed learning through supportive supervision and facilitation. Various platforms are created for the same. Problem-based learning tutorials are organized twice a week. Professional skills activities help students to learn from the wisdom of practicing clinicians. Community health activities orient students to the principles of primary health and community care. Resource and review sessions help in prioritizing the learning and skills development.

Professional skills program is a unique endeavor to train the students in applied basic medicine, core clinical skills, and effective communication skills in a controlled environment. The college hosts the medical skills and simulation center, a state-of-the-art educational facility that resembles a real hospital. Students learn about comprehensive medical care in a simulated and safe environment.

Community health programs help students to internalize the concepts of public health, community-driven, and people-centric care. Students are exposed to the whole spectrum of promotive, preventive, curative, and rehabilitative health care

delivery. Students learn to provide need-based, society-centered, essential health care with an emphasis on health determinants. Students also get introduced to the concepts of research, health planning, and response in this program. Along with a chain of primary health centers in Bahrain, those in other gulf countries are also used to train the students.⁵ Two major teaching hospitals are also affiliated with the college, and a new multispecialty hospital “King Abdulla Medical City” is being affiliated with the college.

Being human is the first prerequisite to be a care provider. The CMMS strives to sensitize students to these essential qualities through professionalism and leadership program. The program consists of an online course (11 modules) and 7 workshops. Students are taught about medical ethics, professionalism, innovation, leadership, and so on throughout the curriculum.

The medical students’ gifted and talented program is a special program which has been designed for catering to intellectually gifted students by acknowledging, nurturing, and supporting their cognitive and affective needs, as well as to honor them based on their achievements and valuable contributions. The program aims to prepare AGU gifted students to be innovative and productive researchers in different fields of medical studies. The program will provide gifted students with advanced research skills and tools and will offer intensive workshops and courses in areas of clinical research, educational research, and descriptive and inferential statistics.

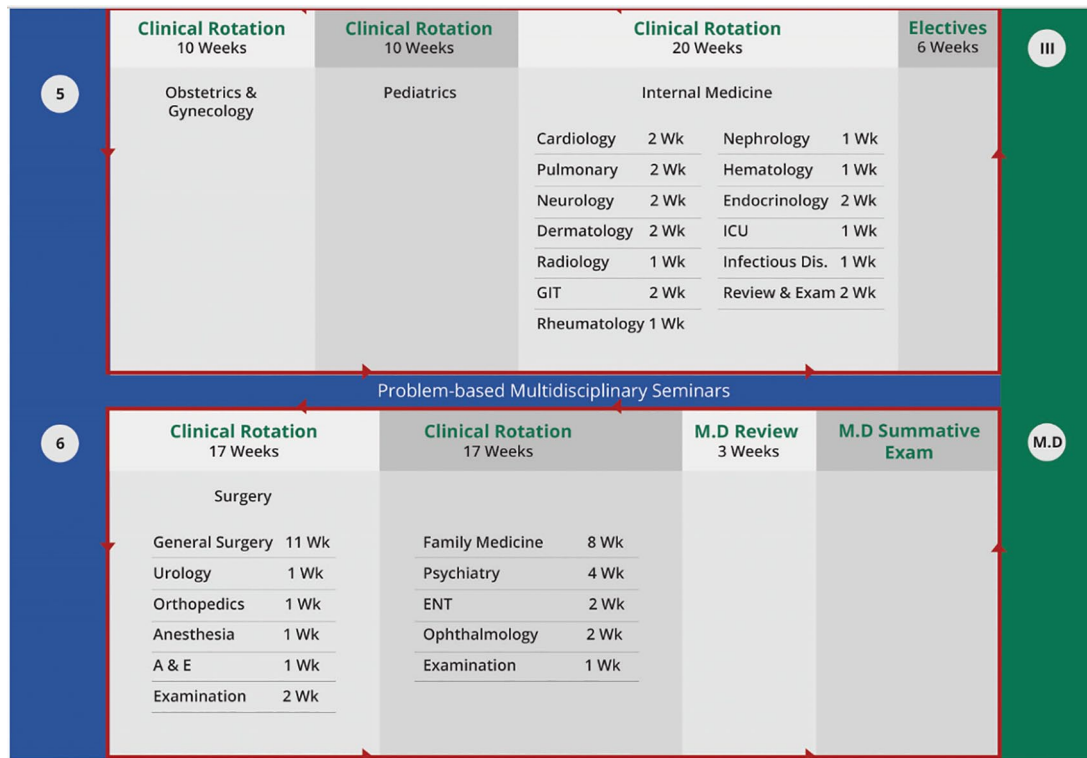


Figure 2. Curriculum map phase III.

Source: Curriculum map available at <https://www.agu.edu.bh/en/Academics/CMMS/Programs/UndergraduateMedical/DoctorofMedicine/Pages/Curriculum-Map.aspx>.

Although the tentacles of curriculum have spread into multiple domains, PBL has been the core philosophy of teaching and training at the CMMS. All the components are integrated with the core problems designed in the early years of the institute.

Need for Review

Although the college has achieved its intended objectives so far, the medical curriculum must keep pace with the changing demands. Today the world is evolving at a rapid pace. In Western countries, medical education now seems to have a half-life of a decade.⁶ An advance in science and technology along with the changing geopolitical landscape is influencing the way health is perceived, demanded, and delivered. Demographic and epidemiological patterns have changed. There are paradigm changes in the expected roles of a future medical graduate. Ubiquitous and digitalized health care systems allow both physicians and patients to access biomedical information easily.⁷ He or she is expected to lead, communicate, plan, and deliver holistically throughout the continuum of care from the promotive, preventive, curative, and rehabilitative services. There is a lag period between educating a medical graduate and his tenure of serving the society. Medical education should be futuristic and should aim to answer the challenges and the needs that would arise in the future. The typical medical curriculum requires students to study texts and data without proper reasoning and understanding the logic behind it. The revised medical curriculum should consider the disruptive

technology in medicine. New technologies started to appear to facilitate student learning. For example, social media, mobile health, personal genomics, telemedicine, 3-dimensional printing, wearable devices, Anatomage Table, virtual human body, regenerative medicine, narrative medicine, imaging health, robotics, and artificial intelligence will change the future of medical professionals.

These factors necessitate that we examine the systems in place and redesign them to accommodate the added expectations. The problems that are used in PBL need to be reviewed comprehensively for relevance, importance, and completeness. They need to be checked against the advances of today and predictions of tomorrow. Evidence generated should be backed by an action that would either rewrite the old problems or design the new problem as the need may be.

Predictions for the Future of Medical Education

Bridget et al conducted extensive global consultation and identified many factors that may impact the future of medical education. Some of these factors are as follows:

- Greater emphasis on preventive and long-term care;
- Need to address the issue of workforce shortage;
- Addressing changing values and expectations among and toward patients;
- Technological factors, including technology-supported clinical reasoning;
- Changing relationships with patients;

- Information access and the role of knowledge acquisition;
- Methods of instruction in medical education;
- Market aspects like finances and selection process.

Several respondents predicted that future medical education models will focus more heavily on outcomes and will apply milestones.⁶

Han et al⁸ conducted an integrated review to assess trends for future physicians. They concluded that medical education should be more humanistic, collaborate with others for patient safety, provide patient-oriented integration earlier and longitudinally, encourage them to respond to the changing community needs and respect the diversity, and facilitate student-driven learning with the aid of advanced technology.

The current curriculum at the CMMS can adopt strategies from these pieces of evidence to equip students with skills to tackle new world health demands.

Areas That Would Need an Additional Emphasis

- Empowering the students to harness the use of digital technology, including those of electronic medical records, decision support systems, electronic information systems, and so on;
- Customizing the curriculum to student needs/interests;
- Customization can be explored in different mediums of teaching (printed/ audio/video/discussions);
- Setting the competencies to be achieved at the end of a set period;
- Training of students in newer emerging care patterns like home-based care/hospices;
- Training in patient education and communication and shared decision making.

Criticism of PBL

- Problem-based learning is a resource-intensive model. But the research so far on the effectiveness of PBL is contradictory.^{9,10} Although most of the studies have studied student satisfaction, some of the studies have concentrated on its effects during medical school and postgraduate education.¹¹⁻¹⁴ Evidence related to the effectiveness of PBL, in the long run, is adequate.¹⁵⁻¹⁸ There are not many randomized controlled trials conducted to objectively measure the effectiveness of PBL.
- The philosophy of PBL is grounded in cognitive psychology, citing curiosity as a main driving force for learning.¹⁹ If the problem presented fails to ignite that curiosity, it will be a failed path to achieve the objectives.
- In PBL, the role of a facilitator is passive and the core responsibility of reaching the objectives lies in the student. Often it may be directionless compared with facilitator-guided learning.
- Problem-based learning is not outcome-based but is rather process-based. Although few objectives are set to be achieved at the end of the sessions, these need not be the solutions or diagnosis.

Alternative Methods That Can Be Integrated

Case-Based Learning

Case-based learning is a more structured approach where the learning is kept relevant and it enhances clinical skills. This method is argued to overcome the limitations of PBL, yet offering a curiosity-increasing and student-centered approach to medical education.¹⁹ In CBL, students in small groups use knowledge from advance reading to solve a clinical problem under the direction of a facilitator familiar with the subject matter. Although PBL focuses on critical thinking and clinical judgment, CBL emphasizes on clinical competency.²⁰ Problem-based learning is an open inquiry and the facilitator plays a passive role. Case-based learning is a guided inquiry and the facilitator plays an active role in guiding the learning toward a particular end. In CBL, the problems are identified beforehand, and study material for the same is available to them beforehand and hence they can be prepared better to face the world. Case-based learning focuses on people and their circumstances, whereas PBL focuses on situational factors. In CBL, typical experiences and intentions of people are central, whereas in PBL people form one part of the situation and solution.

Case-based learning can be incorporated into a PBL curriculum, either as occasional case-based exercises²¹ or it may have many formats, including the structured bedside case, patient management problems, extended case studies, clinico-pathological conferences, computerized or videodisc case studies, and classroom electronic display of student responses.²² If introduced, CBL at the basic level may help introduce a new topic or dramatize the importance of a particular health problem. It also would provide students with empirical wisdom as in CBL learning is through real-world cases than constructed problems. This would also provide an opportunity for students to explore the variations in biological features and beings.

Options like introducing CBL in the second phase to provide guided learning following PBL in the third phase can also be explored to reap the benefits of both systems of teaching.

Competency-based education

Competency-based education (CBE) relies heavily on the independent responsibility of the student in meeting established educational criteria. Critical elements of learning are defined and standardized for all learners. The emphasis of CBE is on “results” rather than “learning” as is in many of the educational programs.²⁰ In CBE, it is not time but acquired competence that should determine the license to practice in health care.^{23,24} Competency-based education promises greater accountability, flexibility, and learner-centeredness. It accepts that each learner is unique and learns at his or her own pace.²⁵

Discussions on differences between the outcome-based and process-based approaches to knowledge go far back in time. While both of them have their advantages and disadvantages, today’s health outcomes should determine health planning. If introduced, CBE would provide better direction to learning. It would help prioritize limited resources. There is evidence that

merging PBL and CBE may create a higher level of learner inquiry and a more expert clinician.²⁵

Team-Based Learning

In a TBL course, students are strategically organized into permanent groups.²⁶ The philosophy of learning remains the same as that of PBL, but the same teams are carried forward for the whole semester/term in contrast to PBL where teams are disengaged at the end of each week. If introduced, this will foster a better sense of belonging and facilitate better exchange of communication and collaboration within teams while retaining all the advantages of PBL.

Project-Based Learning

Project-PBL may enhance student engagement and motivation by allowing them to direct their learning. If introduced, project-PBL may help students develop metacognitive competencies by forcing them to collaborate and regulate learning in settings without a facilitator. Project-PBL may foster skills and competencies related to medical research, which is of paramount importance in today's world.²⁷

Conclusions

Whichever method is integrated or changes adopted, we envisage a medical curriculum which will produce a clinician, who understands and can provide preventive, promotive, curative, palliative, and holistic care to his patients, can recognize the newer health needs at both the regional and national levels, and be able to fulfill his or her societal obligations toward the realization of these goals. The curriculum would also equip the student with the skills to harness the available tools and opportunities to address emerging health needs.

Author Contributions

KMB makes substantial contributions to conception and design, and acquisition of data. KMB drafted the article. AD revised it critically for important intellectual content. both KMB and AD gave final approval of the version to be submitted.

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