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Abstract

Background: The first medical college in Iraq was established in 1927, adopting a subject-based curriculum.

Aims: To provide a description of undergraduate medical education curricula in Iraq and how they developed since 1927.

Methods: We identified Iraqi medical schools and curricula from local and global directories. Curricular data were compared to 3 educational benchmarks (Dale's effectiveness of teaching methods, SPICES, Miller's pyramid). We searched for studies describing curricula and modernization.

Results: There are 34 medical colleges in Iraq (32 with identified curricula) with a wide scope of visions and aims adopting 3 types of curriculum: subject-based (SBC) 20 (63%), integrated (IC) 10 (31%) and problem-based learning (PBLC) 2 (6%). The majority of updates were SBC to IC, with only 1 moving from SBC to PBLC. The predominant type of curriculum at the start of instruction is SBC or IC. Although PBLC and IC provide opportunities for inquiry-driven competencies in the first 3 years only, none provide such opportunities in the clinical phase (last 3 years).

Conclusions: Curricular reform needs to focus on modernizing the learning process/outcomes rather than reorganization of the teaching only. A new approach is needed to provide opportunities for competence and experience to prepare doctors to deal with challenges. One such approach would be the adoption of an outcomes-based curriculum model based on domains of competence with clearly defined outcomes/competencies achievable the time of graduation. All curricula should lead to the achievement of the same outcomes.

Keywords: curriculum, medical education, quality assurance, undergraduate, Iraq

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Introduction

The first college of modern medicine was founded in Iraq in Baghdad in 1927 (1). At the time of the establishment of the Royal College of Medicine of Iraq (affiliated to Al-Albayt University), it adopted a post-Flexner curriculum (from Edinburgh) with separate subjects (2). In 1935, the study duration was increased from 5 to 6 years (1). The same subject-based curriculum format, with updates in the syllabus, was copied by all colleges which started afterwards until 1987 (Table 1). In the mid-1960s, the 6-year programme was divided into 4 phases: non-medical basic sciences (Year 1), basic medical sciences (Years 2 and 3), paraclinical medical sciences

(Year 4), and clinical training (Years 5 and 6) (3).

The WHO conferences on medical education in the Eastern Mediterranean Region in Tehran in 1962 and 1970 (4,5) called for curricular development considering advances in medical education, including the concepts of integration (6) and lifelong study/learning (7). It also called for the convergence of the medical sciences and clinical disciplines, the elimination of repetition and the participation of teachers from different branches in joint planning and teaching in response to the first call for integration as had been applied at the Western Reserve University in the United States of America in the early 1950s (8).

In 1967, the first change in curriculum in Iraq was implemented at Mosul Medical College aimed at extending clinical training and focusing on the social aspects of disease. As a result, teaching basic sciences was significantly reduced to a semester in Year 1 to accommodate basic medical sciences; this continued throughout Year 2 and paraclinical sciences (Year 3) with introductory clinical training (5). Clinical training was extended to span the last 3 years of study (Years 4–6). As a result, sporadic participation of clinicians in the teaching of basic medical sciences ensued, with the initiation of student-driven seminars during the final clinical rotation, where students prepared and presented pathophysiological aspects of clinical presentations. The experiment was innovative, enjoyed by students and left a lasting impression and appreciation. Because the clinical aspects of basic science topics were not emphasized during the student examinations, such attempts faded over time (5,9). These developments were piecemeal change of a didactic teaching approach focusing mainly on theoretical knowledge that remained largely unaffected and left little time for students to adopt a deep learning strategy (10). In the mid-1960s, multiple choice questions were introduced (11), for example in Mosul Medical College. Late in the 1970s, further development of the curriculum in Basrah College of Medicine included establishment of new departments for paediatrics, the addition of public health-structured field training and the organization of national workshops in medical education (12,13). This was in addition to the implementation of the Objective Structured Clinical Examination in paediatrics and community medicine for the first time in Iraq in December 1978 (Alkafajei AMB, personal communication, 2020). Despite these developments, in the 1980s all 5 medical colleges (Baghdad, Mosul, Basrah, Mustansiriya and Erbil) adopted the traditional "unified subject-based curriculum" (14). In 1987, Saddam College of Medicine (renamed to Al-Nahrain in 2003) was established, adopting a semester courses curriculum with electives and was under the supervision of the then Presidency Office (15). In 1989, a problem-based learning (PBL) curriculum was adopted at Tikrit University College of Medicine upon its establishment (16). This completely different model was community-oriented, problem-based, student-centred and fully integrated (16). The college was supported by the WHO because "there has been an increasing awareness of community-oriented medical education and of the need to reform medical education and make it more relevant to community health needs. WHO visits to model educational institutions adopting such approaches like in Gezira (Sudan) and Suez Canal (Egypt) were intensified, and consultants from these and other institutions were assigned to help Member States (e.g. Tikrit in Iraq)" (17). The programme adopted the educational strategies of

Harvard Medical School (the New Pathway) (18) and those of the WHO (17) and designed its own community needs programme content based on Iraq's Ministry of Health priorities (19).

A study in 1981 conducted a comprehensive evaluation of the performance of Iraqi doctors who had graduated from the existing medical colleges using 2 tools: patient management problems and assessment of the resident's daily performance by their supervising clinicians (20). It showed that only 4% of residents were able to obtain the minimum level of competence in dealing with common cases according to the patient management problems, compared with two-thirds of residents through evaluation by their supervisors. This showed that the dominant subject-based approach was not providing students with opportunities to acquire needed abilities. It recommended changing the curricula in Iraq to focus on skills rather than on information (20). Almost 2 decades later, another study found significant differences between the performance of newly graduated doctors of Iraqi medical colleges when compared with graduates of the only PBL programme introduced in Iraq in 1989 (21). Studies in other colleges assessed students and graduates and indicated the inadequacy of subject-based curricula in preparing graduates (22–25).

Iraq has experienced significant armed conflicts and sanctions since 1980. As a result, the health system has been destabilized and marked by instability, leading to significant disruption, ineffectiveness and inefficiency (26). Competent but unprepared newly graduated doctors are vulnerable to psychosocial harm (27). To prepare a new generation of physicians to deal with the health system challenges ahead will require a new approach and new inquiry-driven competencies (28).

Globally, medical curricula have witnessed major developments over the last 7 decades, moving from subject-based (2), integrated (8), life-long learning (7) and PBL (29) to competency- and outcomes-based curricula (30) and now advancing to the introduction of "entrustable professional activities" (31) to provide more explicit measures of student education and training to meet population needs. Other countries have developed outcomes-based frameworks and models to improve the quality and outcomes of education such as Outcomes For Graduates/General Medical Council United Kingdom (32), CanMEDS/Canada (30) and Hybrid Curriculum/United States of America (33). More recently, there have been calls for more experiential learning opportunities in these competencies during the undergraduate study (27,28). The provision of such opportunities for experiential learning could be argued as being a necessary step in any future curriculum design based on inquiry-driven educational activities (34). Reviewing the medical education curricula in the Iraqi schools needs to be looked at through the lens of global advancements in medical education.

This review aims to provide a description of undergraduate medical education curricula in Iraq (since the establishment of the first medical college in 1927) and how they have developed compared with global developments in educational strategies.

Methods

To identify the individual medical colleges operating in Iraq, we searched the websites of the Iraqi Ministry of Higher Education and Scientific Research, World Directory of Medical Schools and the World Higher Education Database. Information about current curricula and evolution over time were obtained from the individual colleges' websites. We obtained curriculum details, vision/mission, institutional objectives, departmental educational activities and weekly timetables of educational activities and assessments. The data were compared to parameters from 3 benchmarks:

Dale's effectiveness of teaching methods measuring recall by the learner (35). The highest rates were achieved by participatory teaching methods (teach other 90%, practice by doing 75%, discussion groups 50%) compared to passive teaching methods (lectures 5%, reading 10%, audio-visual 20%, demonstration 30%);

the quality of educational strategies (known as SPICES) domains (active/passive learning): student-centred/teacher-centred, problem-based/information-gathering, integrated/discipline-based, community-based/hospital-based, elective/uniform and systematic/apprenticeship-based (36);

George Miller's four-stage pyramid runs through student training and the assessment of competencies to be acquired at graduation (37). The stages were used to evaluate the training opportunities available for students to acquire different competencies.

We conducted a search in the English and Arabic literature of relevant studies irrespective of year of publication using the terms: Iraq, medical education, curriculum and undergraduate. We searched in PubMed, Google Scholar, ResearchGate and the Iraqi Academic Scientific Journals (IASJ) databases websites. The references lists were scanned for additional sources. Last search was performed in December 2020.

Results

The number of medical schools in Iraq has increased markedly over the past 4 decades in relation to the population, with a total of 34. We identified 32 colleges where the type of curriculum was mentioned (Table 1). Broadly, there are 3 types of curriculum in use:

subject/discipline-based curriculum (SBC): the majority of colleges 20 (63%) still follow the unified (standardized) curriculum (14) which is based on separate subjects dominated by lecture-based teaching with piecemeal curricular updates (e.g. small groups teaching, objective examinations, introduction of teacher-led problem-solving sessions);

integrated curriculum (IC): 10 (31%) colleges adopted the new integrated curriculum starting with Kufa (2012) and followed by other colleges; this curriculum was either used as the first adopted curriculum since establishment or as a move to change the adopted curriculum;

problem-based curriculum (PBLC) adopted by Tikrit (1989) and Karbala (2013) (6%);

curriculum unknown yet: 2 colleges.

Irrespective of chronology, the predominant form of curriculum on the establishment of studies is SBC (27/32, 84%). Of these, 6 have (since 2012) changed to the IC. Four new colleges (4/32, 13%) since 2017 adopted the IC on establishment. One college changed to PBLC from SBC (1/32, 3%). Only 1 college (1/32, 3%) started with PBLC (Figure 1).

The SBC is dominated by passive learning and training strategies throughout the years of medical study

(Table 2). All adopted curricula provide limited curricular training opportunities for students to acquire inquiry-driven competencies and experiential learning in the clinical phase of studies (last 3 years). During the 6 years of medical study, most of the colleges use traditional student assessment focused on the bottom stage of Miller's pyramid (knows), less on the second stage (knows how), and seldom on the third (shows how) and fourth (does) stages. Without such curricular training opportunities, students would not acquire the ability to use these competencies upon graduation. The colleges adopting the SBC have not yet adopted a

recommended set of outcomes and competencies (38).

No doubt the adoption of an elaborate set of graduate competencies in integrated curriculum is a key achievement and development compared to the more general set of optimum competencies adopted by PBLC (19). During training, each competency is linked to educational activities in integrated curriculum compared with the use of standardized checklists used in PBLC. However, on examining the SBC curricula (14), competencies could not be traced because these have not been well developed, aligned or blueprinted with learning objectives, teaching and learning strategies, and assessment methods. Even SBCs need better alignment and blueprinting.

Discussion

Over the last 4 decades, the number of medical colleges has increased from only 5 in 1980 to 34 (Table 2), tracking the growth in population (39). The number of operating schools is 33 (2020). The college:population (per million) ratio has steadily increased since 1927(39), from 0.29 (1:3.5) to 0.27 (2:7.29) in 1960 rising to 0.37 (5:13.65) in 1980, 0.6 (14:23.5) in 2000 and 0.82 (33:40.22) in 2020, surpassing the Eastern Mediterranean Region average of 0.44 (40).

There are 2 important national benchmarks for curricular evaluation. The first is the Graduate Outcomes for Iraqi Medical Colleges, which was proposed and discussed during a national workshop on accreditation (September 2012) (38). It is divided into 3 domains of competency (knowledge and application, skills and behaviours). Only a few Iraqi colleges have adopted and worked on such outcomes. To date, there is no nationally adopted graduates outcomes similar to CanMEDS (30), UK Outcomes for Graduates (superseding Tomorrow's Doctors in 2018) (32).

The second document is the accreditation standards of the Iraqi Council for Accreditation of Medical Colleges Accreditation (41). Various (but separate) decision-making centres in the Ministry of Higher Education and in the National Council for Accreditation of Medical Colleges failed to support the operation of a system of accreditation of colleges to monitor the change and curriculum development in all colleges. Strengthening the regulation and accreditation of medical education accomplished 2 out of the 7 strategic priorities set up by WHO for countries of the Eastern Mediterranean Region, including Iraq (42).

The national outcomes framework standards and accreditation process can have a major influence over curricular reform and offers a structured, evidence-based evaluation of the

currently adopted curricula and the proposed reform. Accreditation can be the antidote to "fossilization" of the curriculum (43) and can help steer medical colleges towards implementing processes likely to improve the quality of medical education (44).

It is rare to find one curriculum today that can be described as applying a single learning strategy or using a single learning method. The boundary between the roles of teachers (as an outlet for the teaching process) and students (as an outlet for learning) is a sensitive and influential area in determining the effectiveness of any curriculum (Table 3). The results of the analysis of the currently used curricula in Iraqi medical colleges (SBC, integrated curriculum, PBLC) using the 3 educational benchmarks stated above are described in Table 2 . The findings indicate that PBLC uses more active teaching/learning methods than integrated curriculum, which, in turn, adopts more active methods than the SBC. In fact, PBLC adopts clearer student-centred, problem-based, meaningful integration and systematic community-oriented training in health and community settings; it also offers repeated curricular opportunities for all students to practise competencies in class and in health/community settings more than those offered in both integrated curriculum and SBC. However, there are no systematic inquiry-driven learning and training opportunities during the clinical phase (last 3 years) in all 3 curricula throughout which learning is mainly based on observation and unstructured and subjective clinical exposure.

The integrated curriculum adopts a mixed approach of several educational strategies and depends on the horizontal and vertical integration of separate subjects, with complementary modules that are systems-based. This type of study covers the normal and abnormal structure and function of the body parts. The integrated curriculum applied in Iraqi medical colleges seems to be based on the "compare-and-contrast learning strategy" to facilitate learning and develop a better objective understanding of the approach based on separate topics (45). This is an important development from the SBC because it guides students' understanding and integration of information by placing the learning process within a clinically relevant framework. The learning process starts with lectures, followed by teacher-centred small group teaching and then followed by case discussions. The addition of activities such as "small group teaching" and not "small group learning" results in an imbalance between the large volume of scientific information taught to students and the limited amount of learning activities. The amount of factual knowledge being assessed is far greater than clinical knowledge/skills/behaviours. It retains the teacher-centred role and encourages teaching delivery rather than promoting learning. There is a lack of opportunities to practise knowledge which would help students gain in-depth integrated knowledge. As long as the focus is on teaching compared to learning, mixed hybrid approaches fail to achieve its clinical integration goal because of the limited opportunities to deal with the needs and abilities of the learner (33). Compared to the problem-based approach, implementing the integrated approach creates far fewer curricular opportunities to allow students to use and implement the higher steps on Miller's pyramid for training on and evaluating competencies which cover the stages of "Shows how" and "Does" (37). It is important

to assess the level of integration of the newly adopted curriculum and the outcomes of such integration. The mere reorganization of parts of scientific subjects, clinical disciplines and other components of the curriculum without the corresponding creation of clearly measurable learning outcomes has been superseded by newer evidence-based concepts and strategies since the curriculum was developed in the early 1950s (8).

In PBLC, through a weekly programmed discussion of a problem, followed by study activities and practice, the learner will meet the educational objectives of the problem that students themselves formulated earlier in the same week. The content of the educational activities of the week are combined in a way that meets the students' educational needs in regard to the knowledge, skills and behaviours to solve a particular problem, thus promoting deep experiential learning. However, the PBLC only provides inquiry-driven learning and training in the first 3 years while clinical training (last 3 years) mainly comprises traditional bedside teaching (Table 2). The problem-based approach allows the self-identified students' learning needs recognized through structured small group discussion. The presence of the need to learn followed by inquiry motivates students to extend their investigations and "practise" their own pursuit of self-study, self-assessment (46) and self-reliance (47). This weekly repeated process enhances learning throughout the medical study and beyond. According to comparative research, the PBLC provides opportunities for students to practise how to apply knowledge, skills and professional behavioural abilities described in the graduates' outcomes (48).

Several Iraqi medical colleges have recently implemented curricula supported by British universities, starting at Kufa (in 2012) with other colleges in Iraq following the same integrated curriculum applied at the University of Leicester with varying degrees and differences in application. Other colleges, e.g. Al-Kindy, have collaborated with American universities and made their own efforts to design their integrated curriculum and adapted the most appropriate elements for themselves (49). Students and staff will be affected most with the adoption of a "ready-to-use" imported curriculum. There will always be doubts on the level of effectiveness and outcomes. Of note, the integration in some colleges has been confined to reorganizing the teaching activities in the timetable without integrating the students' examination and assessment. Is it a different curriculum when the teaching activities, the majority of which are delivered as lectures, and magnitude of knowledge required, are unchanged? An effective curriculum for Iraqi medical colleges is the one that achieves the main goal of the whole process of education, namely "experiential learning". The methods of learning, teaching and assessment of competencies determine the nature of any given curriculum. A successful curriculum is one that includes all the necessary components to provide curricular opportunities for students, not only to use but to repeatedly practise what has been learned to attain experience not just competence (27). The students being trained need to be able to use the same principles during medical studies (problem solving plus inquiry-based learning) in not only solving day-to-day issues but also considering societal needs, public health and adaptation to the rapid change in health care delivery systems (28), particularly in the case of Iraq, which has been extensively affected by wars and instability over the last 40 years (50,51).

As bioethics is not clearly addressed by the 3 curricular models, it is necessary to clearly emphasize the way these behavioural abilities are taught, trained and assessed as an essential core curricular component and not as part of the immeasurable components of the "hidden curriculum". Previous research has indicated that the PBLC graduates scored higher in 7 out of 8 behavioural abilities when compared with SBC (21). However, with the existence of 3 curriculum models at present, it seems legitimate to ask for studies to evaluate graduate outcomes to inform policy-making.

A potential new approach to cover the 6 years of study involves combining deductive (e.g. problem-based learning for the first 3 years) and inductive learning strategies (e.g. case-based learning for the final 3 years), which incorporates the essence of inquiry and discovery learning (34,52). The deductive method is suitable for beginner learners to acquire and experience the basic inquiry skills. The inductive method is suitable for advanced learners who need to experience what is known to, and followed by, experts (53). This combination provides curricular opportunities for all students to gradually attain experience and competence which help graduates to work in health settings upon graduation (27,34). This arrangement first builds students' problem-solving abilities and basic inquiry capabilities, and they then progress to learn the working methods of the doctor as carried out in daily clinical practice through developing their clinical reasoning skills. The work with the patient's clinical complaint concludes with care planning, diagnosis, treatment and prevention. This is the basis of the doctor's job. The curriculum encourages students to plan their study based on their own needs to search, find, use and apply knowledge, basic and clinical, to solve the patient's problem. The steps to develop and adopt the innovative curriculum and a brief account of the most effective curricular approach have been described previously (54). This 6-year curriculum allows the integration of learning and training (results of teaching) and not only the integration of teaching (the process of teaching) and therefore moves beyond the concepts adopted in the theories of the 1950s on integration at the level of teaching (8).

All curricula, regardless of their type, must be contextualized to the needs of the local community. An outcomes-based model can set curricular guidelines for all colleges to frame their curricula within the identified boundaries.

Future directions include:

establish an effective national mechanism to oversee curriculum reform in the form of national curriculum guidelines with clear outcomes;

design responsive curricula to produce change agents–graduates equipped with experience and inquiry-driven competencies;

transform teacher-dominated to student-centred educational strategies;

emphasize training and assessment of skills and behaviour as essential core elements;

promote evaluative research studies to provide evidence for policy.

Conclusion

The preparation of a new generation of doctors, able to deal with the evolving challenges facing the national health service in Iraq, requires a new inquiry-driven approach. A curricular approach that combines deductive inquiry for the first 3 years (e.g. problem-based learning) and inductive inquiry for the last 3 years of study (e.g. cased-based learning) offers ample opportunities to inspire deep learning through repeated practice of inquiry-based competencies. It integrates the learning and not just the teaching. It is important that the regulatory authorities adopt an outcomes-based curriculum model (like CanMEDS, Outcomes for Graduates), with clearly defined outcomes and competencies to be achieved through the curriculum. The regulatory authorities can develop curriculum guidelines based on the local community needs. Whatever teaching/learning strategies are used, all should lead to the achievement of the same outcomes.

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Examen des tentatives nationales de transformation des programmes des écoles de médecine en Iraq au cours des 10 dernières décennies

Résumé

WHO EMRO | Review of Iraq’s nationwide attempts to transform medical school curricula over the last te

Contexte : La première école de médecine d'Iraq a été créée en 1927, et son programme d'enseignement était centré sur les matières.

Objectifs : Décrire les programmes de l'enseignement médical de premier cycle en Iraq et leur évolution depuis 1927.

Méthodes : Nous avons identifié les écoles de médecine iraquiennes et leurs programmes d'enseignement à partir de répertoires locaux et mondiaux. Les données concernant les programmes ont été comparées à trois référentiels pédagogiques (le cône d'apprentissage de Dale, le modèle SPICES, la pyramide de Miller). Nous avons recherché des études décrivant les programmes d'enseignement et la modernisation.

Résultats : Il y avait 34 écoles de médecine en Iraq (32 disposant de programmes d'enseignement identifiés) dont les visions et les objectifs variaient. Celles-ci avaient recours à trois types de programmes d'enseignement : l'apprentissage centré sur les matières, 20 (63 %), l'apprentissage intégré, 10 (31 %) et l'apprentissage centré sur les problèmes, 2 (6 %). La plupart des évolutions consistaient à remplacer un programme d'enseignement centré sur les matières par un programme d'enseignement intégré, et une seule école est passée d'un programme centré sur les matières à un programme centré sur les problèmes. Le type de programme prédominant au début de l'enseignement était le programme centré sur les matières et le programme intégré. Le programme d'enseignement centré sur les problèmes et le programme d'enseignement intégré ont permis l'acquisition de compétences axées sur la recherche au cours des trois premières années seulement, mais aucun programme n'a offert de telles possibilités durant la phase clinique (trois dernières années).

Conclusions : La réforme des programmes devrait se concentrer sur la modernisation du processus d'apprentissage et des résultats au lieu de réorganiser uniquement l'enseignement. Une nouvelle approche est nécessaire pour améliorer les compétences et l'expérience des médecins et ainsi les préparer à faire face aux défis de la vie réelle. Une telle approche consisterait à adopter un modèle de programme d'enseignement centré sur les résultats, fondé sur des domaines de compétence, dont les résultats et les compétences sont clairement définis et réalisables avant l'obtention du diplôme. Tous les programmes d'enseignement devraient permettre d'atteindre les mêmes résultats.

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