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Problems and Challenges of Future Medical Education: Current State and Development Prospects

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Abstract: The system of medical education has demonstrated varying degrees of effectiveness around the world. Two approaches are dominant - the traditional approach, which consists of students acquiring knowledge, and the innovative approach, which implies a greater role of practical training. The traditional approach dominates in Asian countries, Russia, and Ukraine. The innovative approach is actively implemented in Western countries (USA, European Union). The study aimed to analyze the level

of medical education among the most effective systems. For this purpose, 703 articles were analyzed, 41 of which formed the basis of this study. The most effective systems turned out to be French and Canadian. Within the education of these systems, the duration of education can be reduced to 3 years without losing the quality of education. The features of the innovative system of medical education are the selection of applicants, the duration and structure of the educational program, the methods of teaching medical disciplines. This result is possible due to the application of the small group effect with an emphasis on individual search, interpretation of information, and its application in practice. An important factor is that learning to practice begins in the first year. With the help of the test system, students' knowledge is regularly monitored and the opportunity to work in polyclinics as well as with real patients is provided. Based on the information analyzed, we recommend applying the basics of medical education in Canada to students in Pakistan. Certainly, it will help to achieve practical results in a short period of time.

Keywords: medical education, applicants, students, doctors, problems, innovations.

Introduction

The problems of modern medical education are inextricably linked to the demands of society. In post-Soviet countries, there are too many disciplines in the medical education system, which determines the need to reduce them. The presence of too many narrow specialists in the labor market is inexpedient. For example, according to the latest data, in Russia medical education includes no less than 110 disciplines, in the USA it is twice less (49), in Germany - four times less (24), and in Great Britain - eight (16 specialties). Given that the European and American systems of medical education are generally considered the best, Asian countries need to consider the experience of their peers (Ganotice et al., 2022). There are three main areas of training for medical professionals worldwide. These include dentists, pharmacists, and health care professionals. However, a rather dangerous trend in modern medical education is the increase in the number of subspecialists (Yao et al., 2022).

The history of medical education in Europe is mostly related to the universities in which future specialists were trained. Most medical universities in Europe appeared in the second half of the 19th century and each of them has its own specific traditions and management features. For example, most medical universities in France, the Netherlands, and Denmark are separate from the ministries of health. Moreover, these universities usually have their own hospitals or seek services from private clinics. Countries such as Italy and Belgium have no restrictions on the admission of students to medical schools. Students are admitted based on their educational background. In some cases, aptitude tests are administered by psychologists and interviewers (Cant et al., 2022).

In comparison, the U.S. educational system differs from the European medical education system. Prospective physicians first graduate from medical school, then they go on to specialty training in residency. After students receive a doctor's diploma, they are required to take examinations after the next 10 years to obtain an extension of their license to practice medicine. To do this, physicians take special courses to improve their knowledge of medicine. Examinations of future doctors after residency are written and oral, after which they can work in general or private practice with the possibility of further specialization (Chang et al., 2022).

Research Problem

Thus, the system of medical education is quite diverse, and it implies the graduation of specialists with different levels of preparedness. Naturally, specialists with a low level of training will not benefit society, so it is necessary to pay close attention to their level as future specialists (Lazcano et al., 2022). Therefore, the problems of medical education in developing countries are particularly urgent, and successful experiences need to be adopted to solve them.

Research Focus

One of the most successful medical education systems is the French. The quality of education is a point of pride for the nation, with 80 universities and about 300 high schools. However, medical education is not only tied to universities but can also be acquired through higher-ranking schools (Åkerfeldt & Åberg, 2021). The French type of medical education consists of three cycles. The first cycle has a duration of 2 years, during which the student receives a general university education (DEUG or Diplôme Universitaire Générales). The choice of the medical profession is made by the student at the end of the 1st year. To advance from 1st to 2nd year, you must pass a serious competitive examination. If the competition is not passed, there is only one time to retake it. Further retraining is not limited, but it becomes a fee. There are 2 to 3 years allocated to pass cycle 2 (Dibek, 2021). The 1st year is called licensure and corresponds to an incomplete medical degree. At the end of year 2, students receive a diploma corresponding to the master's level. This level corresponds to higher education. In the case of 3 years of study, students may qualify as an engineer. Those who continue their studies enter the 3rd cycle of education. It is in this cycle that students specialize and become future researchers (Oztabak, 2021). Eligible candidates are selected from an interview and a personal dossier. The student is given the opportunity to choose between a professional orientation and a theoretical research orientation. The latter is offered to students who are to enter a doctoral program (Anghel et al., 2021).

Admission to medical school is not based on an entrance exam, but on competition between high school diplomas. The only condition is that the school diploma qualifies for admission to the university (Ross et al., 2022).

In fact, students can also receive medical education as part of their studies at universities where medical departments are present (Dhakal et al., 2022). Transitions from institutions (3 years of education) to university are possible. A knowledge of chemistry, physics, and other subjects taught in school is sufficient to enter the 1st year (Koskenranta et al., 2022). University education is somewhat different in European practice. For example, medical education also includes three stages, with the first stage lasting 2 years. The first stage involves the study of basic disciplines like medicine. The second stage (DSEM) is twice as long, in which students are educated in clinical disciplines. Finally, Stage 3 involves two degrees, residency, and internship (Mawela & Mahlambi, 2021). Whereas the residency provides 2 years of training for generalists, the internship prepares narrowly focused specialists after 4-5 years (Mwelwa & Mawela, 2021). Enrollment in the 2nd year is based on the results of written examinations not only in medicine but also in general specialties, with different subjects having different rates of significance (Hill & Abhayasinghe, 2022). According to some reports, between 60% and 75% of students fail their second-year exams (Gokalp, 2021). If a student fails his or her second attempt at an exam as well, he or she cannot continue to higher education. At the end of Cycle 1, students also take practical classes such as inpatient patient care (Blumenthal & Blumenthal, 2021). During the 1st year of the 2nd cycle, students learn the basics of virology, parasitology, bacteriology, and other medical

disciplines such as oncology, hematology, genetics, and pharmacology. Attention is paid to methods of biological statistics, as well as methods of medical examinations. In addition, training in foreign languages, psychology, and basic medical ethics is provided (Karjalainen & Nissilä, 2022). Students in the 2nd cycle can practice as nursing assistant. During the SSEM training period, students complete up to 8 practical internships for a total of up to 4 months or 36 tours of duty. By choice students study 2 disciplines, the remaining 20 are compulsory. Students are supervised by faculty members during the practicum (Duc et al., 2022).

Each semester, students take examinations that include clinical case analysis, analysis of laboratory results, and prognosis from radiographs. Today, there has been a change in the European medical education system - computerized tests have taken a back seat to direct communication between student and instructor during examinations. Students use computer-based tests, but as a means of self-testing (Nilsson et al., 2022).

The residency education process is supervised by the medical faculty. Practical training takes place within medical institutions with which the university has contracts. In another option, the performance of duties by residents is carried out within the framework of medical institutions within the structure of the university. Internships are organized for general practitioners for 2-5 semesters, with the location of the internship open to the reviewer every six months. If the thesis is successfully defended, the resident receives a Doctor of Medicine diploma but must pass a theory exam. In addition, an additional document certifying the level of qualification in general medicine is issued after practical training (Alonso et al., 2022).

In order to enter the internship, it is necessary to pass the competition. Only double participation in the competition is allowed, that is, in addition to students who have graduated from the medical faculty of the university, it can also be passed by last year's students who did not pass the exam. The competition is a difficult test because in order to pass it you must answer a test on 200 questions of theory and 150 clinical situations in practice. In addition, they are asked to analyze a medical history, establish a diagnosis, and prescribe a course of therapy. The duties of the interns include patient rounds in the inpatient unit, outpatient clinic appointments, and emergency room duty. In addition, interns may assist during surgeries or perform surgeries themselves. Interns expand their knowledge by studying in programs designed for young physicians. Specialties include hygiene, pediatrics, learning about hospital infections and their prevention. Close attention is paid to the legal specifics of the medical profession, as well as the economics of clinic and hospital management. There is an opportunity for interns to study in foreign clinics for 1-1.5 years. After passing the examinations, the interns get a corresponding diploma and can continue training in narrower profiles for 2-4 years. The head of the department supervises. After graduation, an exam is taken, the result of which is a diploma of a specialist physician. This diploma entitles you to engage in private practice. Within the polyclinic, vacant positions can be filled based on examination results after a competition is announced. As protection against competition, access of doctors from other countries is restricted (Hariyani et al., 2022).

Research Aim and Research Questions

From the information analyzed, it follows that receiving a medical education according to the Western European model is a rather labor-intensive process that takes a long period of time. At the same time, education results in the graduation of wide-ranging specialists with knowledge not only in medicine but also in jurisprudence and economics. This can come in handy if they take on leadership

positions in administrations. Among the works devoted to medical education, the relevant direction is the identification of an appropriate system for modern requirements. This has determined the need for the work.

The purpose of the study is to analyze the most effective systems of medical education and based on the analysis, recommend their implementation in the Asian system of medicine. Pakistan is a country with a well-developed system of medical education, but to eliminate the shortcomings of this system, it is necessary to adopt the experience of developed countries. The objectives of the study included: a) a detailed analysis of the process of training students in medical education; b) an identification of shortcomings in the system of medical education in Pakistan, based on the analysis of literary sources.

Research Methodology

General Background

The study was conducted in 2022. To select literature sources on the topic of the study, we used the Google Scholar search engine, as well as the search engines PubMed, ResearchGate, Elsevier.

Sample / Participants / Group

As a result, 703 articles were found, of which 42 articles were selected for analysis. The selection criteria were: compliance of the article content with the given keywords; availability of specific data on the educational system, methods of teaching medical students.

Instrument and Procedures

Internet search was used as a tool. Key words were used as the algorithm. Publications that did not contain specific results, such as a lack of analysis of the structure of student learning, were screened out. Publications with no comparison of the effectiveness of the traditional educational system and innovative methods of teaching in medicine were screened out. Publications containing such information were taken into account. We settled on the European and North American models since the most successful medical universities and institutions are located in these regions.

Data Analysis

For the search, we used keywords: medical education, problems of medical education, foreign experience in medical education, medical education in the USA, medical education in the European Union, medical education in developing countries. We chose the system of medical education adopted in Canada as a model educational system that meets such modern requirements as the motivation of students, a large amount of obtained knowledge, and graduation of high-quality specialists. The results obtained are presented in the section "Results and Discussion".

Research Results

Features of admission and selection of candidates for medical education

The Canadian medical education system is similar to the French system in many respects. First, applicants do not have to submit any documents at the time of admission; all they need is a basic level of higher education in a particular specialty (Tung & Chang, 2022). Of course, most applicants to medical

schools have a science degree, but there are also many applicants from the humanities. In some cases, applicants may have a Ph.D. or Ph.D. degree at the time of admission. D. degrees have reportedly helped these applicants gain admission despite very high competition (Majola & Mudau, 2022). Among the prerequisites for applicants is a high-grade point average, which is calculated based on grades on all exams. This score is not derived from high school graduation exams, but from examinations at the basic level of higher education. Applicants take a specialized Medical College Admission Test, which is constructed so that it is possible to assess not only the basic knowledge of medicine, biology, chemistry but also the level of analytical thinking of the applicant. Accordingly, the test results can be divided into 4 parts, which include biology and biochemistry; chemistry and physics; psychology and sociology; and the ability to solve analytical problems. The test results are valid for three years and was developed by the American Association of Medical Schools (Ongaga & Stallings, 2021). It is the latter section that is the focus of some universities. Later, after passing the test, applicants take another one, the Computer-based Assessment for Samrling Personal Characteristics, the essence of which is to identify interpersonal communication skills. The test includes 12 situations from life, 3 questions each, for the resolution of each situation is 5 minutes. On average, on the example of McMaster University (Canada), there are 5,000 applications for 600 seats. These 600 people are interviewed in a Multiple Mini-Interview, during which a final admission decision is made, based on their GPA and test scores. This mini-interview is an innovative technology in medical education, replacing the standard interview since 2002 (Yolcu & Akar-Vural, 2021). The essence of the mini-interview is as follows. To pass it, you have to go through 10 rooms, in each of which certain tasks are discussed with the examiner. Each discussion is given 8 minutes, the break between discussions is 2 minutes. At each of the 10 stages the personality, communicative abilities, and moral skills of the applicant are evaluated. The level of scientific knowledge is not assessed. Of the 600 people, only 200 qualify for admission to the 1st year, that is, even at this stage is quite a serious competition (Boz & Saylık, 2021).

The study period for medical schools in Canada and the United States is four years, which is two years shorter than in countries such as Russia. At McMaster University, which we reviewed above, the study period is even shorter, at three years. Such a period is achieved mainly not so much by shortening the program as by reducing the time of vacations. Thus, there is a very strict selection process for admission to universities, allowing for motivated and quality students as early as the first year (Shroff et al., 2021). This makes it possible to graduate physicians who are ready to work with patients from the first days of residency. Moreover, these physicians can diagnose, prescribe treatment, and they have experience interpreting scientific research.

A shortcoming of the previous (pre-60s) period of teaching was its traditional approach. The approach to the student was limited by memorizing as much knowledge as possible using didactic pedagogical methods (Nonthing & Supakicco, 2021). Since 1965, the Problem-Based Learning model began to be used, which was reduced to the active role of the student as a gatherer, analyst, and interpreter of information, including any clinical problem-solving (Islam, 2021). Students were taught to adequately assess their capabilities and to work in a small team setting. Thus, the central idea of the new method of medical education was to find, integrate information concerning clinical problems in a small group setting.

Discussion

Schedule of students in a medical education setting

When students take 3 years of education, the program is divided into 2 parts, which includes the study of medicine and biology disciplines and the study of clinical cycles. In most Asian countries, students learn the basics of anatomy, pathological anatomy, physiology, and related areas of medicine during these years of study (Ocal, 2021). Embryology and pharmacology are also given attention. These disciplines form the foundation where the following lectures are based in the senior years. The Canadian system, like the European one, is based on quite different principles. The first year and a half is spent studying the five basic blocks of medicine (Medical Foundation). You spend 9 to 13 weeks on each block. The structure of the blocks is similar, despite the different content. Students study in groups of six to eight and the classes are held in the form of seminars. The essence of the seminar comes down to the analysis of clinical cases with the study of anamnesis, as well as the results of laboratory tests. The task of the students is to make a diagnosis or outline a therapy plan (Ulukan & Ulukan, 2021). By studying these clinical cases in practice, students can more easily learn about the physiology and biochemistry of pathological processes. Each of the seminars is divided into two parts, the duration of the seminar is 3 hours. The last part is devoted to familiarization with the clinical case, students can study the terms new to them independently. Two to three days are devoted to the independent study of the literature. In the first half of the following seminar, information is exchanged between the students, and collectively it becomes easier for them to understand the pathological process that is occurring. The instructor does not lead the process but plays the role of facilitator (Ludwig, 2021). The workshop is led by experienced clinicians, and the clinician's specialty does not necessarily have to correspond to the theme of the workshop. Supervision of the seminar by the instructor is accomplished through techniques. Thus, the central idea of seminars is to make it easier for students to learn the material using case studies. This involves such qualities of students as independent search and analysis of information, ability to work collectively (Dincer, 2021).

Another format for working with students is lectures, which take place 2 times a week, the duration of the lectures is the same as a seminar. The lecture provides focused information on the topic of one of the blocks. Attendance is not required as students can listen to the lectures via video (Sarapoom & Phrakrudhammapissamai, 2021).

Students can also participate in clinical-pathology conferences. There, discussions of autopsy or histology findings related to the examination of tissue specimens take place. These sessions are held once every 1 month during the course of the study. Students can listen to a brief lecture before the conference, and during the conference, they can participate in discussions and debates (Kurnaz & Kurnaz, 2021).

Students' clinical skills are developed through their participation in seminars. Seminars are held every 7 days, three hours each, in the same small groups. The task of the seminars is to master the methods of studying the anamnesis, data collection, and methods of physical examination of the patient. In the early stages, actors may be involved; in later seminars, the patients are involved. In addition, students take part in anatomy classes, which are also held once a week and last 1.5 hours (Li & Li, 2021). All anatomy classes are tied to a specific block, with provisions for students to visit the anatomy labs at any time. Dissected and plastinated cadavers may be used as teaching material. In addition, the use of digital images and teaching modules is allowed. Like the lectures, it is also used in Asian universities,

but there is no requirement to take an anatomy class in Canada, though questions on anatomy are included in the exam. There was no statistically significant difference in the anatomy knowledge of undergraduates compared to undergraduates who did not attend anatomy classes (Sen & Karagul, 2021).

Another type of class is the Family Medicine Workshop. It is held weekly and lasts half a day. The practicum is limited to observing the work of the family physician without directly participating in it. A separate physician is assigned to each of the students (Braun, 2021).

An important element of working with students are professional competence seminars led by two instructors - a physician and a worker in a related field, social, psychologist, nurse. The essence of such seminars comes down to the creation of effective communication with patients, patients' families, and medical workers. A separate block deals with issues of ethics and morality, students learn how to make decisions. The important issue of the physician's role in society is also explored (Espinoza, 2021).

A separate block is devoted to developmental features, taking into account the norms of physical development, neuropsychological development. Such a factor as the influence of the environment is taken into account, as well as a violation of the child's development in connection with various factors. This also includes legal and ethical issues when working with adolescents as well as their families (Eser & Cobanoglu, 2021).

Students have an indirect influence on faculty, which is certainly also an innovation in medical education. Students have the opportunity to evaluate faculty members anonymously, after which the information received can be reviewed by the university administration. Based on the results, faculty contracts are renewed or terminated, and faculty members can use the comments to improve themselves. This evaluation applies to both the general and clinical phases of student teaching. The second half of the course (clinical phase or clerkship) is reserved for the last 1.5 years of study. This corresponds to the senior courses in Asian medical universities. In addition to the general courses, of which there are nine, which can be taken in any order, students have the option of taking additional courses related to subspecialties (Ludwig, 2021). A clinical practicum is different from a theoretical practicum in that students only study in groups of two to three. Usually, in a clinical setting, there is one faculty member per student; in an inpatient setting, there may be two such students as residents. By the time clinical courses begin, students already have the necessary theoretical background and practical experience. Students are already required to examine the patient, know how to make differential diagnoses, and can make a therapy plan and recommend methods of examination. During the first few days, students simply observe the doctor's work, but then, in the presence of the instructor, they perform the examination themselves and fill out the relevant medical documents. The doctor's signature certifies the accuracy of the paperwork. Students attend lectures and seminars every day except on weekends (Dincer, 2021). In addition, students complete 2 to 4 clinical duty assignments in the emergency rooms of polyclinics each cycle, during which they learn the necessary skills to handle emergencies. Students specializing in psychiatry undergo similar duties in the psychiatric clinic setting, examining patients with psychiatric pathologies under the supervision of the psychiatrist on duty (Nonthing & Supakicco, 2021).

At the end of each cycle, students take a three-hour test on an appropriate topic. Based on the results of the test, a conclusion is made about the student's success in completing the cycle. For the student to be able to account for his/her mistakes, his/her knowledge and skills are assessed twice per

cycle, in the middle and at the end. This is an obvious innovation that helps keep students engaged in the learning process and medical education. Students take the Personal Progress Inventory test 8 times at regular intervals throughout their training. The test includes 180 questions, and through the test, the student can judge his or her progress or regression. Finally, in the clinical training phase, the Objective Structured Clinical Examination is administered three times (at the beginning, middle, and end), which includes taking 10 chambers with 8 minutes to complete each task. In doing so, each examiner points out the student's correct and incorrect solutions to the proposed tasks and clinical situations. Another exam, the qualifying exam, consists of two parts, theoretical (at the end of the first, theoretical part of the training) and practical (at the end of the 1st year of residency). The duration of the exam is 2 days. Based on the results of the exam, future physicians receive a license to practice medicine, and the exam process is overseen by the Medical Council of Canada (Yolcu & Akar-Vural, 2021).

Peculiarities of Medical Education of Students in Asia, by the Example of Pakistan

Shah and Aly (2015) conducted a study to establish the humanities in medical education in Pakistan. According to the results of the study, it was possible to establish that the majority of students experienced disappointment in the medical profession. The characteristic mental states for these students were a concern, doubt about their future, and the necessity of the medical profession. This indicates a deep crisis in the medical education system not only in Pakistan but also in other Asian countries (Iran, India, Bangladesh, and Indonesia). Students do not receive such necessary communication skills with colleagues and patients in the course of their training, but only practical skills. As we have shown above, in the Western system of medical education, communication is given special attention and addressed with students not only by teachers or doctors but also by representatives of related professions. In this regard, Shah and Aly (2015) believe a radical reform of medical education in Pakistan is necessary. This will produce qualified doctors who can be humane, sensitive to, and understanding of patients, as well as possess all the necessary legal and ethical, and moral skills. The formation of such physicians in the future will help to improve the efficiency of medicine in general for the whole country, which will certainly be of definite benefit.

Conclusions and Implications

Peculiarities of medical education for students in Asia, using Pakistan as an example. Shah and Aly (2015) conducted a study to establish the humanities in the medical education system of Pakistan. According to the results of the study, it was possible to establish that the majority of students experience disappointment in the medical profession. For these students, the characteristic mental states were a concern, doubt about their future and the necessity of the medical profession. This indicates a deep crisis in the medical education system not only in Pakistan but also in other Asian countries (Iran, India, Bangladesh, Indonesia). Students do not receive such necessary communication skills with colleagues and patients in the course of their training, but only practical skills. As we have shown above, in the Western system of medical education, communication is given special attention and addressed with students not only by teachers or doctors but also by representatives of related professions. In this regard, Shah and Aly (2015) believe a radical reform of medical education in Pakistan is necessary. This will produce qualified doctors who can be humane, sensitive to, and understanding of patients, as well as possess all the necessary legal standards and skills in ethics and morality. The formation of such physicians in the future will help improve the efficiency of medicine for the whole country, which will certainly be a definite benefit.

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