

Original Article

Trends in Medical Education, An Example from A Developing Country

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Abstract

Background: Iran is presently designing a long-term plan for promoting science, technology and innovation in medicine. An important part of this plan will be a strategy for future planning for medical education considering the important trends affecting the future of health status and medical education in Iran. Here, we sought to clarify such trends in Iran and compare them to trends reported for similar developing countries.

Methods: For this qualitative study, the opinions of stakeholders and experts were obtained during three focus group discussions, each lasting four hours and including 10 – 12 participants (132 total man-hours). Data were collected using audiotapes, which were then transcribed. Interim analysis was used for member checking and triangulated data from other recent studies were used to increase the trustworthiness of findings.

Results: Participants identified the following trends as affecting the health system and medical education in Iran: aging of the population; epidemiologic transition; changes in patients' expectations of health services; increases in the popularity of alternative and traditional Iranian medicine; growth in information and communication technologies; changes in the roles of tutors; new emphasis on basic sciences and new and interdisciplinary fields; increases in the emphasis on research and scientific production; loss of educated persons to other countries (e.g., brain drain); and new advances in diagnostic and therapeutic technologies.

Conclusions: The circumstances and future of a given community's health should be kept in mind when policymakers plan for changes in medical education. The present study found that trends affecting healthcare and medical education in Iran are similar to those in other countries (even developed countries), suggesting that Iranian policymakers could potentially adopt the policies and strategies that have proven useful in other countries when planning for medical education.

Keywords: forecasting, Iran, medical education/trends, policy-making, teaching/standards

Introduction

Throughout history, the medical community has sought to define the responsibilities of physicians and determine how to best educate them in these tasks. At present, health systems and medical education have reached a point where they must evolve in response to changes in political and economic conditions, epidemiological and sociological transitions, and advances in science and technology. A great deal of scientific evidence supports the need to change the principles of medical education in the modern world, including in developing countries such as Iran, and some studies have provided suggestions on the forms these changes should take. In 1998, the World Federa-

tion of Medical Education (WFME) announced: “*The purpose of medical education is to train physicians who can promote people's health. And in spite of the advances made in bio-medical sciences, often the achievement of this goal has not been possible. This shortcoming has long been felt, but raising social awareness among medical faculties has not been successful. These realities have created apprehensions of 'equity in health, the humanitarian side of service provision, and the total expenses imposed on the community' in medical education.*”¹ Also, the Association of American Medical Colleges stated: “*Over the past 60 years, most medical schools have done little to correct the major shortcomings in the ways they educate their students, even though these differences have been documented repeatedly.*”²

The United Kingdom's (UK's) General Medical Council studied medical education in the UK and published a report named *Tomorrow's Doctors*. In it, physicians were exhorted to undergo training that would prepare them for professional work, and thereafter continue such education throughout their lifetimes.^{1,3}

Currently, the medical universities of many Asian countries, including Iran, offer traditional, teacher-centered, hospital-based educational systems. Many policy-makers believe that these universities should move towards prob-

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lem-based, student-oriented learning in the future.⁴

Medicine in Iran dates back to the pre-Islamic era; the first center for medical education in Iran was founded during the Sasanian era (third century AD) in Jondi Shapoor, a town close to the modern town of Ahwaz. Medical education in Iran has come a long way since then. The medical faculty of Tehran University was inaugurated in 1938 and training of specialists began in 1953. In the 40-year period between the foundation of the medical faculty of Tehran University and the Islamic Revolution in 1979, medical education was taught using classical Western methods. Since then, medical education in Iran has undergone a vast integrative reform. At the Eastern Mediterranean Regional Conference of the WFME, held in Al-Ain in 1985, Iranian professors first suggested that all medical schools and institutes of higher education should be integrated into the Ministry of Health, which would become the Ministry of Health and Medical Education (MOHME).⁵ Thereafter, a ministerial summit was held in Cairo with the goal of completing and implementing the suggestions put forth at the conference. In that summit, representatives from MOHME described the integration of health service provision and medical education, and the increased coverage of health care in the country. To date, numerous articles have examined the success of medical service integration in Iran.⁶⁻⁸ In addition to providing the human resources needed to meet a given community's health needs, integration has helped promote the quality of medical education.^{9,10}

In 2008 there was one medical doctor for every 690 persons in Iran.⁹ However, in that same year there were 36, 15, and 11 medical, dental and pharmacy schools in Iran, respectively. A total of 6177 students were admitted to all medical science programs and these programs employed 13108 teachers. Despite such strong numbers, though, the evidence suggests that Iran's medical education system needs to evolve further, with due consideration of the communities and health systems in which new graduates will be working.

Researchers worldwide have been trying to identify important international trends and forecast their consequences on various fields, including medical education.^{11,12} The Iranian government, as part of preparing Iran's Health Innovation and Science Development plan by 2025, established a panel that was tasked with foresight in medical education.¹³

Materials and Methods

In this qualitative study, a focus group discussion method was used to gather expert opinions. The participants were chosen from among faculty members, specialists and researchers in medical education, and authorities from different levels of MOHME. We wanted to bring together a diverse group in order to maximize our exploration of different perspectives within a group setting. The ultimate

goal of these meetings was to analyze the future of medical education in the context of Iran's long-term plan for science, technology and innovation. Therefore, the participants were invited through MOHME, and the importance of the sessions was emphasized by the Minister of Health and Medical Education.¹³

As we wished to focus on the factors perceived as influencing the future of medical education, three sessions emphasized this topic. Each session included two moderators: one who was familiar with medicine and medical education, and one who was familiar with management and foresight planning. During the first session, we explained the study concept and clarified the goals of the meetings, and then asked questions regarding potential world factors that could affect Iran's medical education system, including values, as well as social, technological, economic, environmental and political trends (STEEP-V analysis).¹⁴

Next, participants were asked to list what they perceived as being the most important trends. As the participants brainstormed their answers, the stated trends were projected onto a screen via computer, so participants could see the results in real-time. The conversations were recorded on audiotapes and transcribed after the session (by the same typist who input the trends into the computer, and was therefore familiar with what had been said in the session). Brainstorming was allowed to continue until no new opinions were forthcoming. We performed an interim analysis because we wanted to use the results in the next sessions. Two researchers independently read the transcripts and discussion notes, and then analyzed the data using a thematic framework approach.¹⁵ Based on this analysis, a trend list was prepared for the next session.

In the second session, participants were asked to review and prioritize the trend list, and then think about the impacts these trends could have on medical education, and also consider possible strategies to deal with these impacts. We concentrated on the impacts and strategies in the second and third sessions, using data-gathering and analytic methods similar to those used for the first session. A final result was prepared by combining the results from all three sessions.

Simultaneous to these discussion groups, a literature review on trends affecting medical education and potential ameliorating strategies that have been used in Iran and other countries was performed. We used this review to confirm the validity of our results and compare Iranian strategies with those used in other countries. In an effort to increase the credibility of our results, we used data triangulation and member check.¹⁵

This study was approved by the review board of Tehran University of Medical Sciences in different aspects including ethical issues.

Results

The panel members agreed on 12 trends that they felt had

the largest effects on the health system and medical education in Iran, as follows given in order of perceived importance:

Trend 1: Aging of the population

This trend was identified by many of the participants. For example, one faculty member said, "I am sure that life expectancy is increasing in Iran. This will correspondingly increase the number of older patients, who require different care than other patients."

The numbers back this up; based on population and mortality data from MOHME,¹⁶ the average life expectancy in Iran has steadily increased from 58.9 years in 1980 to 71.56 years in 2003 [for the total population; 95% uncertainty interval (UI): 71.52 – 71.62].

Furthermore, child mortality in Iran has generally declined over the past few decades; infant mortality decreased from an estimated 154 deaths per 1000 live births in 1964 to 26 in 2004.¹⁷ This has created a "youth bulge." As one clinician said during our discussions, "...imagine the day this youth bulge will become old. Our physicians must be more familiar with the care they need." Indeed, Iran's demographic profile will be aging in the coming two decades. In 2005, the proportion of under-15 year olds was 28.7% and the proportion of individuals age 15 – 24 accounted for a quarter of the total population. In 2025, it is projected that the proportion of under-15 year olds will be reduced to 23.3% and the proportion of individuals of over 60 will nearly double to 11%.¹⁸ In twenty years, these relative reductions in younger populations and substantial increases in the older groups will impact the epidemiologic profile and disease burden in Iran. Since this trend is predictable, it should be possible to forecast the health needs of this group and prepare the health system to fulfill these needs. As part of this, we should emphasize the importance of geriatric medicine as a specialty and add geriatric studies to the curricula of other relevant fields.

Trend 2: Changing disease patterns

One participant said: "When I was young, my patients mostly had infectious diseases. These days, I see more chronic diseases. Therefore, future doctors shouldn't be given the same education I was."

In the past, infectious diseases and malnutrition were the main focuses of macro-level health policies in various international gatherings, including the World Health Organization (WHO). Today, however, non-communicable diseases (NCDs) cause 43% of the disease burden worldwide.¹⁹ Furthermore, it has been estimated that NCDs will be responsible for more than 60% of disease burden and 70% of deaths by 2020.¹⁹ In Iran, NCDs in the year 2003 caused the highest disease burden in both sexes: 45% for males and 33% for females.^{19,20}

In the future, these chronic illnesses will create an even

greater disease burden for the health system. Therefore, medical education should familiarize physicians with the care and prevention of NCDs, and the healthcare system should shift its focus from tertiary to primary care and emphasize specialties that are capable of implementing a primary focus (e.g., family medicine) in the hopes of increasing primary-level referral of NCDs. Community-level public education on the value of adopting correct lifestyles is another important factor in controlling NCDs, and should be promoted in the future.

Another significant change in disease patterns is the increase of mental disease, which is already a large burden on Iran's health system. According to a report on disease burdens in Iran, mental diseases and behavioral disorders are the current leading causes of years lived with disability (YLD), and major depressive disorders comprise the second leading cause of disability-adjusted life years (DALY) in women.²¹ Medical education in Iran therefore needs to pay special attention to these diseases in the future.

Trend 3: Change in patients' expectations of physicians and the health system

A clinician said: "...these days some of my patients have so much information about their diseases and different treatment options, that I'm surprised by it. They usually learn these things through the media. This is an opportunity for us, but we must be careful because sometimes the available information is misleading. I think that this will become a more prominent issue in the future."

Recent increases in global awareness and the literacy rate of the Iranian population has been accompanied by changing expectations for the health system, with patients now rightfully expecting to be involved in their own diagnostic and therapeutic decisions. As it becomes increasingly necessary to foster appropriate bilateral relationships with patients and their families, physicians and other healthcare personnel will need to be taught how to create and maintain these relationships.

Another important trend is the employment of general physicians as family physicians at the first level of healthcare delivery. The family physician program was established in 2004, and is currently being expanded throughout the country. The most recent estimates on the number of physicians needed in Iran are based on the scenario that family physicians will be practicing throughout the country. Accordingly, medical students must be taught how to function as family physicians and medical education must be brought into line with the expectations of the health system and the community.

Given this new level of public awareness, patients' complaints are also likely to increase. "We are witnessing the increase in number of patients suing their physicians for treatment complications..." said a participant from MOHME. Indeed, as continuing developments in science and tech-

nology have the potential to act as a double-edged sword (harming both patients and the healthcare system), it will become imperative for health workers to pay strict attention to ethical principles. This necessity is currently being felt in all medical and allied sciences, and will require further deliberation.

Trend 4: Increased focus on alternative and traditional medicine

Traditional medicine, which is among the oldest treatment techniques used by mankind, was practiced by different nations long before modern medicine. In Iran, traditional Iranian medicine (TIM) has its historical roots as far back as 8000 B.C. In recent years, the importance of TIM and its growing place in healthcare have been demonstrated by increasing public and industrial demands for traditional remedies, as well as growing support from both politicians and academic societies.²² TIM is now being studied at the Tehran University of Medical Sciences and Health Services, which established Iran's first traditional medicine faculty in 2007.²² In the future, additional scientific studies will be warranted, and physicians and health professionals should be trained in TIM.

Trend 5: Advances in information and communication technologies

In recent years, rapid developments in information technology have been seen worldwide. These developments have affected medical education, research and healthcare delivery. One application of this technology in medical education is the inception of distance and virtual learning. These educational strategies have the benefit of increasing access to education, but they can suffer from certain shortcomings, such as the absence of close ties between students and teachers (or doctors and patients), and the absence of teamwork.

During our discussions, one faculty member said: *"When I was a medical student, I learned a great deal from having face-to-face contact and close relationships with the great physicians who were my teachers, and seeing their humanistic manner with their patients. You can't teach these things to students through virtual learning. We need to be careful that the increasing trend toward virtual learning doesn't cause students to miss out completely on these interactions, which are a necessary part of medical education."*

Information technology can be used in continuing medical education (CME), and it can help medical and paramedical schools plan self-directed learning for their postgraduates. However, our discussion participants noted that one downfall of information technology is that an enormous amount of information is available, and students may become overloaded and overwhelmed. Therefore, modern curricula should seek to teach future medical professionals not just to memorize information, but also to manage the volume of available information.

The application of the information and communication technology is expected to increase in the future, in the form of telemedicine and long-distance patient monitoring. The use of such technologies will require special skills, which should be taught to medical professionals before and after graduation.

Trend 6: Changes in the roles of professors

Given the trends described above, it seems that the roles and performance of professors need to change in the near future. Knowledge is readily available to the students of today and this trend is likely to increase in the future. Thus, professors will no longer be the primary information source for most students and they should instead seek to teach proper learning techniques. Professors currently play roles in passing values to their students but this role is likely to become more critical in the future. In the context of medical education tutors should focus on directly and indirectly instructing their students on ethical principles and how to communicate with patients and colleagues.

Trend 7: Increased focus on basic sciences

"We see increasing attention being paid to basic sciences, especially biology, and a stronger relationship emerging between the basic and clinical sciences. We must take this into account when planning for medical education in the future." said a faculty member who participated in our discussions.

The basic sciences, particularly the biosciences, have played significant roles in clinical scientific developments and the surveyed professionals expressed their beliefs that this role will become even more prominent in the future. Therefore, it could be useful to place more emphasis on these sciences within the medical education system. In this context, the "basic science graduate admission" process may prove useful. This method of admission has been used three times in one of the medical universities of Iran, and its advantages and disadvantages in Iran have been assessed.²³ Another field that is expected to grow in the future is translational science. New advances in this field could have many applications in fostering the use of basic science in the clinical setting, and vice versa (e.g., converting clinical questions into basic science topics).

Trend 8: Increased focus on new and interdisciplinary specialties

In recent years, rapid growth in science and technology has supported the evolution of new fields. This growth is expected to continue (and perhaps increase) in the future. When designing future curricula, therefore, decision-makers should plan to include combined and interdisciplinary specialties.

Trend 9: Increased significance of research and scientific production

One participant said, “*The paradigm of the world has changed and we live in a knowledge-based world. In this situation, you will have no success if you can’t produce science and use it. This trend will be more prominent in the future.*”

In recent years, Iran has experienced great progress in terms of research and scientific production, with Iran’s relative share in world scientific output increasing from 0.0003% in 1970 to 0.29% in 2003.²⁴ Consistent with this, the number of clinical guidelines and systematic reviews published in Iran have also increased in recent years.²⁵ Accordingly, educators should seek to emphasize the spirit of research, critical appraisal and self-reliance in science, especially in new areas of science and technology.

Trend 10: Brain drain

According to the International Monetary Fund (IMF), 150,000 educated Iranians leave their home country each year to pursue better opportunities abroad. Iranian experts put the economic loss of this so-called “brain drain” at 50 billion USD or more per year.²⁶

During our discussions, one expert said, “We must address the problem of brain drain when setting policies, especially for education, because one major reason for migration is the search for better educational opportunities and situations.” In the future, additional research on the causes of brain drain should be used to develop strategies aimed at keeping intellectuals and scientists in the country.

Trend 11: Use of new diagnostic and therapeutic techniques

Continuing advancements in diagnostic and therapeutic techniques are expected to accelerate in the future and will impact medical systems. For example, studies have shown that magnetic resonance imaging (MRI) and interferon beta-based therapies have spread rapidly throughout Iran.^{27,28} Thus, medical professionals will require skills in the correct and timely use of such technologies. These skills need to be taught at various levels, ranging from managerial to healthcare levels, and should be included in the relevant curricula. Conversely, the inappropriate use of these techniques may impose heavy costs on patients and the health system. One discussion participant said, “*The improper use of technology could seriously threaten our health system.*” Thus, physicians should also be taught to consider the evidence and the related economic and social aspects when making decisions regarding the application of new techniques.

Trend 12: Patterns of education

The education process is expected to undergo many changes in the future, including the increased use of innovative educational techniques, the recognition of relevant community needs, and the consideration of the above-described trends. Other aspects that could greatly affect medical education are

potential changes in the procedures for admitting and evaluating students.²³

Discussion

Notably, the trends identified in our panel discussions were consistent with those found in other studies of factors influencing medical education. Some of these studies also included proposed solutions, as discussed below.

Bragg et al. (2005) studied medical curricula and various specialties in the context of assessing students’ familiarity with the specific problems of elderly patients, and the prevention and cure of these problems. Ultimately, the researchers recommended that updated information on geriatric issues should be included in all educational curricula.²⁹ In another study, researchers examined the educational curricula of internal specialists and concluded that although the curricula included information on geriatric medicine, the material should be improved.³⁰ In 1997, the WHO announced that NCDs were turning into a major worldwide health dilemma and were outnumbering infectious diseases.¹⁹ The WHO further predicted that by the year 2020, NCDs will be the leading cause of mortality and morbidity in three out of four cases in developing countries. This pattern is already being seen in many countries and is developing rapidly in others.¹⁹ Various solutions have been put forth for confronting the increased burden of NCDs, including general education of the public and an enhanced focus on disease prevention and risk factors within the medical education system. Furthermore, shifting from inpatient to outpatient services for chronic diseases could help reduce the burden on the health system. Finally, providing additional training to family physicians, as recommended in Iran’s Health System Review,¹⁸ could also help improve the burden of NCDs.

One solution for the inpatient to outpatient shift that has yielded good results in some countries is the education of community healthcare nurses who deliver in-home healthcare services to patients, in addition to interviewing and educating patients and their families.³¹

Given the rising number of psychiatric patients and ongoing developments within the field, Rubin et al. have forecasted that there will be a shortage of psychiatrists in the future. As possible solutions, the authors suggested that it might be useful to provide primary care physicians with training in the field, and to take advantage of non-physician psychiatric personnel.³²

The evidence shows that patients increasingly expect to be involved in their diagnostic and therapeutic decisions, and that this trend is on the rise.³³ However, a study conducted on the communication skills of medical interns in Iran showed that these skills were weak and needed to be improved.³⁴ Ethical principles have been studied worldwide, too; for example, Fox et al. studied medical ethics education across a 25-year period and found three trends, the most im-

portant of which was the growing importance of ethical concerns in the daily practices of physicians.³⁵ In Iran, MOHME has designed a strategic plan for assessing medical ethics in Iran in terms of its strengths, weaknesses, opportunities and threats.³⁶ In the future such plans could be further enhanced and medical students should be familiarized with these issues from the onset of their educations.

Although remarkable developments have been achieved in modern medicine, the practice of traditional medicine has been maintained and is increasing in many countries, with people turning towards natural treatments for preventing and curing various conditions. The practice of traditional medicine is very popular in developing countries and it is steadily growing in industrial and developed nations.³⁷ Now the question is whether (or how) this concept should be considered in the context of medical education.

At present, information and communication technologies are emerging and growing with striking speed. These technologies have significantly influenced medical research, medical education, and healthcare delivery, and their influence is on the rise.^{38,39} Therefore, medical schools should engage specialists in these fields to educate students and tutors alike.⁴⁰ In the future, these technologies are likely to become increasingly important in healthcare delivery (e.g., for telemedicine). Such shifts will require changes in various aspects of medicine (e.g., ethics), necessitating corresponding alterations in medical education.^{41,42}

In many countries, lack of integration between basic and clinical sciences has been identified as an aspect of medical education that has resulted in “fragmented learning”.⁴³ Therefore, future planning for medical education should seek to integrate basic and clinical sciences and explore new methods of teaching basic sciences.⁴³⁻⁴⁶

Overall, the medical education system in Iran is poised to undergo multiple changes. The spirits of research, scientific thinking and problem solving should become part of the educational domain. The role of tutors should be emphasized and tutors should be encouraged to facilitate their students’ educations by increasing their motivation, directing them towards critical appraisal and objective learning, and encouraging life-long learning.¹¹

In the near future, medical education in Iran will need to undergo major changes. When planning for these changes, decision-makers should consider the various trends that affect education. The end goal should be the development of students who can promote community health and improve the international position of Iran’s medical universities through their use of cutting-edge techniques and their spirit of research, creativity and innovation. Examining the relevant trends over different time courses should allow us to forecast the future of a community’s health and educational needs. Given our finding that many trends in medical education are comparable worldwide, an examination of the policies and strategies used by other countries may facilitate

policy planning for the future of medical education in Iran.

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