

Pharmacy Education in Iran

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The changes in Iran during the past 25 years, in addition to the global evaluation of pharmaceutical practice and sciences (with changes in the patient's needs and the pharmacist's place in the primary healthcare system), have prompted a re-evaluation of pharmaceutical education at the Universities of Medical Sciences in Iran. The main intention of this new curriculum includes the creation of pharmaceutical care lectures and seminars, new courses, basic sciences examination, increased research and workshops during pharmacy study and an increased quality of education, research and skills amongst the faculty.

Keywords: Pharmacy education; Iran; Curriculum; Research

INTRODUCTION

Healthcare systems worldwide are in a state of rapid change as the roles of health professionals, including pharmacists, continue to evolve in response to both global trends and local needs (Shaw, 2000). Iran's history of pharmacy and pharmacy education is no exception in this trend.

Iran has a very honourable past in traditional medicine and pharmacy. Some famous figures such as Avisenna, Rhazes, Gorgani, Ahwazi, etc. made this country the cradle of science and civilization of that time. Almost 150 years ago, the foundation of Dar-ul Fonoon (house of skills, polytechnics) in Tehran marked the emergence of modern training. Dar-ul Fonoon hired an Austrian pharmacist to launch its pharmacy education system and, in 1922, a pharmacy department was set up at the school of medicine. In 1926, the first group of Iranian students who had completed pharmacy programmes in France returned home. It was this that ushered in

introduction of the French method, a system that featured 90 credit courses to be completed in 3 years. In 1939, the number of credits to be taken in a new 4-year programme jumped to 140. Twelve years later, the number of degree years rose to five; under new arrangements, all students were now required to go through the 4-year programme, while those with better averages could take an extra 1-year of courses in which they prepared a dissertation and secured a doctorate degree in pharmacy.

During all these years, pharmacy programmes were offered at the medical faculty. This ended in 1956, when a pharmacy faculty independent of the medical faculty came into being. In the 17 years that followed in the formation of the pharmacy school, small changes were introduced. The French method was replaced by a new one and each academic year was divided into two semesters. In 1973, new regulations were offered in two semesters during each academic year, while students now got their doctorate degree after writing a thesis and taking an oath (Mosaddegh, 2002). Since 1990, some of the faculties of pharmacy in Iran now offer Ph.D. programmes in the fields of medicinal chemistry, radiopharmacy, pharmaceuticals, pharmacognosy, toxicology and pharmacology to the students holding a Pharm. D. and interested in pursuing higher studies. At present there are ten faculties of pharmacy in Iran.

In recent years, the Universities of Medical Sciences in Iran, including Mazandaran University of Medical Sciences, has set up an Education Development Centre (EDC) as an essential strategy for maintaining the effectiveness and high quality performance in all health personnel disciplines. Teacher-training and educational development of all health personnel are the chief functions of the Centre;

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teaching evaluation and scoring were developed by the EDC accordingly. This integration of health services and health manpower development has yielded fresh educational and health services research, continuing education, the development of health teaching/learning materials and their production and distribution.

The EDC's role in Iran is expanding. Universities of Medical Sciences in Iran are now supported by the Centre for Educational Development. The Ministry of Health also holds a close relationship with the Centre for its own educational development. We believe that this integration of the perspective, values and resources of health manpower education will continually allow us to increase the quality of our pharmacy education programmes in the future.

THE CURRICULUM

The Mazandaran University of Medical Sciences in Sari comprises the Faculties of Medicine, Pharmacy, Health, Nursing & Midwifery and Allied Medical Sciences. The Faculty of Pharmacy was established at Sari in 1995. There are five departments including medicinal chemistry, pharmaceuticals, pharmacology-toxicology, pharmacognosy and clinical pharmacy.

At present, the programme at the faculty of pharmacy lasts 5–6 years, depending on each Student's thesis. Everybody who wants to study in the faculty of pharmacy must hold a high school diploma majoring in experimental sciences or mathematics and physics and also must successfully pass Sixth Form (year one) and the Nationwide Entrance Examination administered annually by the Ministry of Sciences, Research and Technology. The students must attend all seminars and practical classes in which they are enrolled during the course of their study. Taking examinations proves their knowledge of the subjects.

Passing the thesis concludes the pharmacy study programme. The best students, who successfully pass the Entrance Examination, can continue studying in postgraduate studies, primarily consisting of theoretical and practical lectures. The academic year begins on September 23 (the first day of autumn in the Iranian calendar) and consists of the autumn, winter and summer terms. The autumn and winter semesters last 17 weeks and summer semesters last 8 weeks followed by the examination period.

The pharmacy students' curriculum is similar in all the faculties of pharmacy in Iran, consisting of the following phases:

1. General courses and courses in basic sciences and
2. Specialized courses.

The students take a basic sciences examination including all the passed credits after the fourth semester. There are a total of 206 credits, including eight credits of thesis. Their thesis proposal can be recorded after 140 credits.

The basis structure of the curriculum is shown in Table I. It consists of new aspects and study areas, such as clinical pharmacy, biotechnology, birth control, advanced biostatistics in pharmacy, quality control of drugs, poisoning control, etc. The pharmacy training lectures, seminars and research have been designed to inculcate in students the pharmaceutical care elements taught in other courses of pharmacy study. The seminars in some courses, for example clinical pharmacy, drug information, drug therapy, etc. depend on Teachers' ideas. The students participate annually in seminars composed of Iranian pharmacy students (in an Iranian city) in which they present their research and learn about the research of others. Elective subjects (Table II) depend on the Students' thesis; at least eight credits of these subjects must be passed during pharmacy study. The teachers and students participate separately in the workshops in order to increase the quality of education, research and skills.

The World Health Organization and the Conseil de l'Europe, 2001, recommend that pharmacist be more involved in solving healthcare problems. Consequently, a reorientation in pharmacy education has become necessary in the faculty and in postgraduate learning; the product of a pharmacy curriculum should now be a practitioner who has the skills and knowledge to provide pharmaceutical care (Popa *et al.*, 2002). Pharmacy training should be oriented towards ensuring appropriate, effective, safe and convenient drug therapy for patients. It should be specifically designed to meet the patient's drug-related needs. It should further provide for a systematic, rational, comprehensive approach to drug therapy decisions.

Therefore, since 1998, a new 34-week pharmacy training programme, consisting of lectures, seminars and practical practice, was designed at the faculty of Pharmacy in Sari. Lectures and seminars consist of indications, administration and dosage, contraindications, warning, precautions, drug–drug interactions, food–drug interactions, adverse reactions, over-dosage and patient information about therapeutic classes. In pharmacy training, the teachers and students talk about therapeutic classes as follows:

1. Teachers' lecture (1 h)
2. Students' seminar (1 h)
3. Conversation (30 min) and
4. Dispensing prescriptions, communication with the patients and presenting drug information (three and a half hours).

TABLE I The Doctor of Pharmacy programme at the Mazandaran University of Medical Sciences, Faculty of Pharmacy

Semester 1		Semester 2	
Course title	Credits	Course title	Credits
Year 1			
Sport 1	1	Analytical Chemistry	2
Physics	3	Analytical Chemistry Lab	2
Physics Lab	1	Parasitology	3
General Chemistry 1	3	Parasitology Lab	1
General Chemistry Lab 1	1	Anatomy	2
English Language 1	2	English language 2	3
Biology	3	General Chemistry 2	3
Biology Lab	1	General Chemistry Lab 2	1
Mathematics	3	Islamic Ideology 1	2
Islamic Resources	2	Sport 2	1
<i>Total</i>	20	<i>Total</i>	20
Year 2			
Organic Chemistry 1	3	Organic Chemistry 2	3
Organic Chemistry Lab 1	1	Organic Chemistry Lab 2	1
Physiology 1	4	Biochemistry	5
Virology	1	Biochemistry Lab	1
Bacteriology	3	Physiology 2	4
Bacteriology Lab	1	Physiology Lab	1
Immunology	2	Persian Literature 1	3
Immunology Lab	1	About the Islamic Revolution of Iran	2
Islamic Ideology 2	2	History of Islam	2
Ethics	2		
<i>Total</i>	20	<i>Total</i>	22
Year 3			
Introduction to Pharmacy	2	Pharmacology 2	3
Pharmacology 1	3	Pharmacology Lab	1
Biostatistics	2	Dosage Forms 1	3
Medicinal Chemistry 1	3	Physical Pharmacy 1	2
Specialized English Language 1 (including Medical Terminology)	3	Analytical Instruments 1	3
First Aid	2	Medicinal Chemistry 2	2
Medicinal Plants	2	Specialized English Language 2	3
Medicinal Plants Lab	1	Nutrition	2
Computer	2	Foods	1
<i>Total</i>	20	<i>Total</i>	20
Year 4			
Dosage Forms 2	3	Industrial Pharmacy 1	3
Dosage Forms Lab	2	Drug Information 2	2
Physical Pharmacy 2	2	Pharmacy Training 1	2
Drug Information 1	2	Principles of Health	2
Toxicology	2	Pharmacognosy 2	3
Toxicology Lab	2	Pharmacognosy Lab	2
Analytical Instruments 2	3	Drug Therapy 1	3
Pharmacognosy 1	2	Biopharmacy	3
Birth Control	2		
<i>Total</i>	20	<i>Total</i>	20
Summer Semester			
Pharmacy Training 2	2		
Thesis 1	2		
<i>Total</i>	4		
Year 5			
Industrial Pharmacy 2	3	Microbial Control of Drugs	2
Industrial Pharmacy Lab	2	Microbial Control of Drugs Lab	2
Physicochemical Control of Drugs	2	Thesis 3	4
Physicochemical Control of Drugs Lab	2	Elective Subject 2	2
Thesis 2	2	Elective Subject 3	2
Drug Therapy 2	3	Elective Subject 4	2
Elective Subject 1	2	Biological Products	2
Medicinal Chemistry 3	4	Management	2
<i>Total</i>	20	<i>Total</i>	18
Summer Semester			
Industrial Training 1	2		
<i>Total</i>	2		

A theoretical credit is equal to 1 h per week; a practical credit is equal to 2 h per week; a training credit is equal to 3 h per week; Lab: Laboratory/practical.

TABLE II Elective Subjects

Course title	Credits
Hospital Pharmacy Training	2
Industrial Training 2	2
Radiopharmacy	2
Phytochemistry	2
Advanced Biostatistics in Pharmacy	2
Cosmetics and Toiletries	2
Quality Control of Drugs	2
Biotechnology	2
Poisoning Control	2
Industrial Health	2

The basic issues for the lectures and seminars in Pharmacy Training 1 and 2 are summarized in Table III.

Up to now, more than 80 pharmacists have graduated with Pharm. D. certificates and, at present, more than 100 students (about 20 students-per-year) are pursuing their studies at the faculty of Pharmacy in Sari. Some of the pharmacy graduates favour community pharmacy while others prefer to work in the hospital. Additionally, the pharmaceutical industry offers opportunities in research and development, production, management and information.

CONCLUSION

This short paper describes the development of the pharmacy education curriculum in Iran. In recent years, a number of professors at EDC have helped to reform the pharmacy education programme in a national plan to develop human resources, rendering it more in line with social needs. This plan ultimately aims at a health manpower educational strategy to promote teaching quality, professional skills and research in different faculties and increased awareness of teaching-learning strategies in health personnel. It additionally endeavours to raise the quality of education at the university level, enhance Teachers' and Students' satisfaction, support health personnel to obtain the resources they need for their professional development and ensure that health personnel receive the learning-teaching process they need.

There are four key values complementing the above-mentioned vision that underline any successful approach to health personnel education implemented by the Centre for Studies and Education Development. These values mandate this plan to emphasize community needs, use and

TABLE III The basic issues for lectures and seminars in Pharmacy Training 1 and 2

Column A: Pharmacy Training 1	Column B: Pharmacy Training 2
Introduction to the Principle of Rational Prescribing	Central Nervous System Agents 1 (Antipsychotic Agents, Antianxiety Agents and Sedative/Hypnotics)
References	Central Nervous System Agents 2 (Antiemetic/Antivertigo Agents, Agents for Migraine, Agents for Gout and Anorexiant)
OTC Medicines	Central Nervous System Agents 3 (Antidepressants and Antiparkinson Disease Agents)
Narcotic Analgesics	Central Nervous System Agents 4 (Anticonvulsants and Skeletal Muscle Relaxants)
Nonsteroidal Anti-Inflammatory Agents	Endocrine and Metabolic Agents 1 (Estrogens, Progestins and Androgens)
Local Anesthetics	Endocrine and Metabolic Agents 2 (Contraceptives and Adrenal Cortical Steroids)
Gastrointestinal Agents 1 (Antacids and Anticholinergics/Antispasmodics)	Endocrine and Metabolic Agents 3 (Antidiabetics, Thyroid Hormones and Antithyroids)
Gastrointestinal Agents 2 (Histamine H2 Antagonists and Proton Pump Inhibitors)	Respiratory Agents
Gastrointestinal Agents 3 (GI Stimulants, Laxatives, Antidiarrheals and Mouth & Throat Products)	Antineoplastic Agents
Systemic Anti-Infective Agents 1 (Penicillins, Cephalosporins, Carbapenems and Monobactams)	Biological and Immunological Agents
Systematic Anti-Infective Agents 2 (Aminoglycosides, Sulfonamides, Macrolides, Lincosamides and Tetracyclines)	Nutrients and Nutritional Agents
Systematic Anti-Infective Agents 3 (Fluoroquinolones and Urinary Anti-Infectives)	Ophthalmic and Otic Agents
Systematic Anti-Infective Agents 4 (Antituberculous Drugs, Leprostatics, Antimalarial Agents, Amebicides and Miscellaneous Anti-Infectives)	Dermatological Agents
Systematic Anti-Infective Agents 5 (Antifungal Agents, Antiviral Agents and Anthelmintics)	Haematological Agents
Antiseptics and Disinfectants	Herbal Drugs
Cardiovascular Agents and Renal and Genitourinary Agents	Cosmetics, Toiletries and Medical Equipment
Antihyperlipidemic Agents	Pharmaceutical Compounding
Theoretical and Practical Examinations	Theoretical and Practical Examinations

expand the scientific basis (decision-making must be based on the information obtained through research, thus enhancing a scientific approach), seek educational equity and build up team-work (to ensure united and coordinated efforts, the health personnel should build up a strong sense of partnership).

The general goal of this plan is to stimulate and strengthen a coordinated campaign aiming at the promotion of quality education in the university. Specific objectives are to promote the basic knowledge of curriculum development, increase the teaching staff awareness of evaluation and its effects, improve teacher training programme content, update continuous education programmes and do research in education.

This new curriculum has provided scientific knowledge regarding the preparation, synthesis, formulation, testing, quality control, storage and use of drugs to students. In this process, students will now not only become expert members of the pharmacy community but, in addition, fulfil a critical role in the healthcare system. The academic staff have also developed a sense of responsibility and professional integrity in the new curriculum, as

they are now responsible for the control and supply of drugs and the giving of advice on their use.

The main intention of our new curriculum design, including the creation of pharmaceutical care lectures and seminars, new courses, Basic Sciences Examination and research and workshops during pharmacy study, is to increase the quality of education, research and skills at the faculties of pharmacy. Pharmaceutical care lectures are also necessary for the pharmacists (delivered as post-graduate lectures) in order to marshal a continuous educational connection between academic professionals and the practitioners.

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