

IMPORTANCE OF INTERPROFESSIONAL EDUCATION, PRACTICE AND RESEARCH IN THE PHARMACY CURRICULUM IN THE ERA OF GLOBALIZATION

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Abstract

The profession of pharmacy has evolved gradually for more than a century and has seen many educational challenges and reforms. The pharmacy curriculum is science-based and varies widely in different parts of the world in both content and outcomes. The global pharmacy curriculum could be broadly categorized as product/industry-focused or patient-focused. In the United States (US), the baccalaureate degree has been replaced with the entry level Doctor of Pharmacy (Pharm.D.) curriculum. This change was designed to enable practicing pharmacists to provide patient care services that optimize medication therapy outcomes and promote health, wellness and disease prevention. This shift from a product-centered to a patient-centered curriculum has offered tremendous benefits to patients, society and healthcare. It has further been realized that working as a collaborative team with an inter-professional approach produces effective patient-centered outcomes. Implementation of inter-professional education (IPE), practice and research was recognized by pharmacy educators and accreditation authorities in the US in the early part of 21st century. IPE is now considered a standard for pharmacy accreditation. This review will compare some of the pharmacy curriculums of the world and the difficulty in harmonization of pharmacy curricula. The factors that facilitate and hinder IPE, practice and research in the curriculum will be discussed.

Keywords: Inter-professional, Education, Research, Pharmacy Curriculum, Globalization

Introduction

Pharmacy, as a profession, dates back to the ancient Sumerian population living in today's modern Iraq (1). The profession is grounded in science, research and scholarship. The word "pharmacist" was first used in England in 1834.

Globally, the level of recognition and respect for pharmacists, as healthcare professionals, varies widely. This is due in part to the country and culture as well as how pharmacists practice their professional duties for the public. Likewise, the pharmacy curriculum, training, and professional expectations vary widely. These factors create the large discrepancy in knowledge, skills and expertise that exists among pharmacists globally. The pharmacy curriculum in particular has experienced a dramatic change over the past three decades. Advancements in drug manufacturing and dosage forms, the sheer number of drug products, and the increasing geriatric population have driven some of these changes experienced by pharmacy over this timeframe. The purpose of this manuscript is to provide a comprehensive review of the current global pharmacy curriculum and the changes and challenges faced by the pharmacy academy today.

Key Periods Relative to the Pharmacy Curriculum in Different Parts of the World

- Pharmacy education, globally, has closely followed medical education. The first pharmacy/drug store was reported in 754 in Baghdad, Iraq. The practice of pharmacy in the United States (US) dates back to the founding days of the country. At that time, there was no single curriculum to train a pharmacist. Pharmacy was considered an art and no theoretical knowledge was required to practice this art. Practitioners were trained through apprenticeship. The first college of pharmacy in the US began in 1821 as the Philadelphia College of Pharmacy.
- An important law relative to drug products in the US was the Pure Food and Drug Act of 1906. This legislative act prescribed penalties for misbranded or adulterated drugs. However, this piece of legislation did not address drug product efficacy. The unfortunate deaths in 1937 from sulfanilamide elixir consumption forced the implementation of the Food and Cosmetic Act of 1938 and allowed greater authority to the Food and Drug Administration (FDA). These legislative actions influenced subsequent pharmacy curricula.
- Pharmacists are accessible and frequently visited by patients. In most rural areas, they are generally considered as the first source of entry into the healthcare system. This is becoming more and more apparent especially in underserved areas by physicians. These facts influenced

pharmacy curricula in the areas of patient-centered care, necessitating the addition of physical assessment and drug therapy monitoring.

- The period from 1910-1965 is generally considered as the era of academic reform for pharmacy in the US. The state of New York passed a law requiring all pharmacists registered after 1910 to have a pharmacy school diploma. The educational reformer Abraham Flexner in 1915 called pharmacy a non-profession and the War Department refused to commission pharmacists as officers in the Great War. This was a turning point for pharmacy education. Pharmacy leaders pushed the educational requirement for pharmacy and by the 1940s, colleges of pharmacy agreed to institute a mandatory 4-year baccalaureate (BS) degree as the minimum for graduation (2). Professional organizations, such as the American Association of Colleges of Pharmacy (AACP), also pushed for a required a 4-year baccalaureate degree program for all colleges of pharmacy.
- In the 1990s, the BS degree program was completely replaced by an entry level Pharm.D. program in all US pharmacy schools. The goal of the entry level Pharm.D. curriculum is to produce practicing pharmacists who have the abilities, attitudes and skills to accomplish the following professional outcomes:
 - Provide pharmaceutical care to patients
 - Ability to manage a pharmacy
 - Develop and manage medication distribution and control
 - Promote public health
 - Provide drug information and education

The pharmacy profession has thrived in the US and is considered a highly respected profession. Public trust and benefits for this profession has seen a steady growth over the past few decades. However, this professional experience is not shared by pharmacists in other parts of the globe.

A Comparative Look at Some of the Major Pharmacy Curricula Globally

Throughout the world, pharmacy education does not use a single curriculum. It varies from country to country and continent to continent. Overall, pharmacy curriculums in the world may be classified into two major focus areas. The first curriculum is one that is product/industry-centered, and the second one is the patient-centered curriculum. In the US, the product-oriented curriculum such as the BS in pharmacy has been transformed into a patient-focused Pharm.D. curriculum. Such a change took more than three decades to accomplish. Such a dramatic shift in the curriculum has not yet been seen in other parts of the world. However, there is a global move for

such curricular reform. It is not practically feasible to compare the pharmacy curriculums of the entire world. Therefore, an attempt has been made to compare a few curriculums as shown in Table 1(3-6).

Current Challenges in the Pharmacy Education

Globally, pharmacy education faces many challenges. Even though these challenges vary from country to country, there are some common themes. Interschool competition, pressure from accreditation organizations and governments, demand from rapid healthcare changes, pressure from within the profession and other healthcare professions, students' demand and need for professional recognition and placement in the work force are some of the common challenges faced by this profession in many countries. A shortage of well-trained faculty and clinical mentors to train future clinical pharmacists is also a challenge faced by many. The most striking difference in the pharmacy curriculum is to meet the societal needs of a country, which varies widely. The minimum professional degree requirement to practice pharmacy also varies extensively from country to country. This creates a challenge for workforce distribution to meet the global and societal need and shortage. One such challenge as described earlier is the older product/industry-focused pharmacy curriculum versus the newly developed patient-centered pharmacy curriculum. Even though the world has seen a dramatic shift toward this curricular change, there still exist many barriers and challenges in terms of pharmacy practice being patient-centered rather than product-centric.

Product/Industry versus Patient Focused in the Pharmacy Curriculum

Comparing the pharmacy curriculums globally, one can see two distinct differences between the BS degree and the clinical pharmacy (Pharm.D.) degree. The BS and Pharm.D. curricula place different emphases on Basic Sciences, Pharmaceutics, Pharmacy Practice and Therapeutics. The BS degree curriculum is more product-oriented and drug distribution-centered, and suits the needs of community pharmacy where little direct patient care services are provided. On the other hand, the Pharm.D. curriculum focuses not only on product distribution, but also on the provision of patient care and medical therapy management (MTM) and is more focused on patient health outcomes. In the Pharm.D. curriculum, the pharmacist works with other healthcare personnel to improve patient medication outcomes.

Recent advances in medicine and therapeutics, the explosion in drug products available, the pharmacokinetic and pharmacodynamic aspects of these medications, the understanding of pharmacogenomics, the increased costs of drug products, and the greater understanding of the complexities of

treatment options available to a patient of the 21st century have forced societies to examine how medications may be used more effectively, safely and reliably. These changes in therapeutics have provided the opportunity for today's pharmacist to prove that the profession can improve medication therapy and patient health outcomes. Pharmacy is now at a crossroads – pharmacy can address many of the issues facing healthcare systems such as costs, therapeutic complexities and medication safety. Overall, the opportunity to be recognized as a key healthcare provider responsible for patient outcomes now exists. This public recognition as well as that by other healthcare providers is fundamentally more important to the profession before attempting to achieve curricular harmonization. In highly populated countries of the world, shifting the pharmacy curricular and practice focus to a clinical, patient-centered focus may have a tremendous impact on overall patient care and outcomes. With proper planning and development for clinical pharmacy education, improvements in both patient care and overall healthcare costs can be realized.

Global Trend in Curricular Changes in Pharmacy Education

Curricula belong to faculty and any change in existing curriculums is not a simple task. Substantial curricular changes are usually stimulated by external drivers, including standards drafted by accrediting organizations and societal needs. When one thinks about the dramatic shift from a product-centered curriculum to a patient-centered one in an underdeveloped country, the task becomes more daunting. Such challenges are faced by many countries and these challenges are some of the greatest barriers for harmonization of pharmacy curricula globally. In order to make such a shift, one has to take a grassroots approach, and the US can serve as a model since there is a proven track record of successful change over the past three decades.

Inter-professional education (IPE), inter-professional practice (IPP) and research can also serve as stepping stones for such a change. Working with other healthcare professionals in a team-oriented approach (e.g., IPP) to patient care can improve patient outcomes and reduce healthcare costs. The clinical pharmacist, as a member of this team, can maximize medication therapy, improve medication safety, and reduce medication costs. Going to a team approach breaks down professional silos that exist among healthcare professionals in most parts of the world today. Working together, towards the common goal of improving patient outcomes while understanding both the strengths and limitations of each profession's contribution to the team, will enhance mutual respect and appreciation for each team member. Inter-professional education is aimed at achieving just such a goal. By educating healthcare students side by side, professional barriers and misunderstandings

among all parties should dissipate. Further, IPE should lead to IPP, where a healthcare team is used to maximize patient health while minimizing healthcare costs.

What are Inter-professional Education, Inter-professional Practice and Inter-professional Research in the Pharmacy Curriculum?

Inter-professional Education (IPE)

IPE is a concept based on a multi-professional approach, building teamwork and becoming a critical part of a healthcare team. IPE and its importance in healthcare education were first recognized by the Institute of Medicine (IOM) in 2003 (7). The IOM report on “Health Professions Education: A Bridge to Quality” first identified both the importance of integrating inter-professional experiences into healthcare education and developing core competencies for IPE. This was based on a hypothesis that inter-professional collaboration may have a positive impact on patient care outcomes (8). The IOM report developed five core competencies for health professional education that include (i) provide patient-centered care, (ii) work in inter-professional teams; cooperate, collaborate, communicate and integrate care into teams to ensure that the care is continuous and reliable), (iii) employ evidenced-based practice (iv) apply a quality improvement approach, and (v) utilize informatics (9). These five core competencies were also recognized by both AACP’s CAPE Educational Outcomes 2004 and ACPE standards 2007 (10-12).

Aside from IOM, the World Health Organization (WHO) also recognizes the importance of inter-professional collaboration in education and practice and hope this will mitigate the global health workforce crisis. WHO, with its partners, has defined Inter-professional education and collaborative practices as follows (13):

“Inter-professional education occurs when students from one or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes.”

Inter-professional Practice

“Collaborative practice happens when multiple health workers from different professional backgrounds work together with patients, families, caregivers and communities to deliver the highest quality of care. It allows health workers to engage any individual whose skills can help achieve local health goals.” WHO’s 50 years of data have identified that inter-professional education allows effective collaborative practice that leads to improved health outcomes (13). Collaborative practice can be seen in these six important building blocks of health systems that include health workforce,

device delivery, medical products, vaccine and technology, health system financing, health information system and leadership and governance (14).

Inter-professional Research

According to Richard D. Kahlenberg, one of the important purposes of higher education is “to advance learning and knowledge through faculty research and by giving students the opportunity to broaden their minds even when learning does not seem immediately relevant to their careers (15).” Research and scholarship are part of the pharmacy academy’s standards in the US and Canada. They are built into the accreditation standards for pharmacy education and curriculum. This inclusion in the accreditation standards ensures that pharmacy continues to be recognized as a research-oriented and evidence-based health profession. The terms *research* and *scholarship* have been viewed as synonymous in the pharmacy academy, but in general, scholarship is considered a much broader concept that includes research (16). According to Boyer, scholarship can be classified into four groups that include (i) the scholarship of discovery (traditional research), (ii) the scholarship of integration (connecting information across disciplines and fitting one’s own research into larger contexts); (iii) The Scholarship of application (Translational Research); and (iv) the Scholarship of Teaching (studies of student learning and advancement) (17). Lack of funding and limited financial resources for research are becoming more and more a reality in academic pharmacy today. Research partnerships with multiple professions may be an alternative approach to address these funding issues. Multi-professional collaborative research can address complex research areas in which each collaborator’s research strength more efficiently addresses the research question and maximizes talents and resources.

Efficient data collection, research and dissemination become more evident from such collaborations. Recently, the National Institutes of Health (NIH) has recognized the importance of inter-professional research collaboration and translational research. NIH’s new initiation of the Clinical and Translational Award (CTSA) is an attempt to encourage inter-professional research to support collaborative partnerships between academia and community centers to enhance clinical research. Some graduate programs and post graduate programs in clinical translational sciences have been developed to facilitate and advance inter-professional research. The Association of Academic Health Centers in their 2004 report have recommended that the US federal government should create new funding opportunities to create and test various models of IPE and practice (18).

Why and How It Helps

Evidence-based research over many years has shown the benefit of collaborative practice. Collaborative practice has been shown to improve access and coordination of health services, better utilization of the clinical specialist, better health outcomes of chronically ill patients and overall improved patient care and safety. It has also been documented that collaborative practice can decrease patient complications, total hospital stay, conflict among care givers, clinical errors and mortality rates. Collaborative practice in community mental health settings has shown increased patient satisfaction, greater acceptance of treatment options, reduced duration of treatment and cost, reduced outpatient visits and suicidal attempts. Health systems have also experienced benefits from collaborative practices. IPP reduces the cost of primary care for elderly and chronically ill patients, minimizes redundant tests and overall costs. IPP also improves cardiac care, as well as costs for total parenteral nutrition in the hospital setting (19,20).

Integration of IPE in the Curriculum

The educational outcomes that need to be incorporated into the learning objectives for IPE should include team work, understanding one's role and responsibilities in team dynamics, effective communication among team members, learning and critical reflection, ethical practice and how to work collaboratively for the best interests of patients. ACPE standards (Standard 11) now identify the implication of IPE in pharmacy education. With all of the initiatives on the horizon for integration of IPE into pharmacy curricula, many barriers still exist (21). This ACCP White Paper clearly identifies these barriers and provides some solutions and alternative approaches. These barriers may be organizational, operational, cultural, communicational, or personal. In order to overcome these barriers and to change the learning culture, one has to understand clearly the root cause of these barriers. Once identified, this can be minimized and IPE can be implemented and benefits can be drawn from such implementation (21).

Conclusion and Closing Remarks

The profession of pharmacy has evolved gradually for more than a century and has seen many educational challenges and reforms. The major change in the USA educational system is a move from a product/industry focus to a patient-centered focus. This change was designed to enable practicing pharmacists to provide patient care services that optimize medication therapy and promote health, wellness and disease prevention. This shift from a product-based to a patient-based curriculum has offered tremendous benefits to patients, society and healthcare. It has further been realized that working as a collaborative team with an inter-professional

approach, including pharmacists, produces effective patient-centered outcomes. This team approach to healthcare will contribute to improvements in healthcare with reduced costs. Future pharmacists will have the knowledge and skills needed to take up their new role and responsibilities and to function as collaborative members of the healthcare team. Besides core content knowledge in the curriculum, the future curriculum will include education and training that prepares them to meet the healthcare needs of society. More emphasis on critical thinking, real word problem solving, working as a team, and adapting to the new opportunities and challenges will be included. For future pharmacy educators, what they teach in the classroom will be equally important as how they teach it. The linear curriculum based on classroom lectures will be supplemented with students learning through direct patient care, service learning, leadership opportunities, and hypothesis-driven research or quality improvement-driven inquiry.

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Table 1: Highlights of a comparison of Pharmacy Curriculum (3-6) *

Criteria	USA	UK	Canada	Australia	Middle East	India
Registrable Degree Awarded	Pharm.D.	M.Pharm.	B.Sc.Pharm.	B.Pharm. or M.Pharm.	BSc, MSc, Ph.D., BSc-PD, PD	D.Pharm. B.Pharm. M.Pharm. Pharm.D. (Some)
Average Age at Entry	24-25	19	20	19	19	<19
Admission Criteria	GPA, prerequisite, PCAT, essay, reference, and Interviews	A levels and interviews	GPA, prerequisite, PCAT, (some Interviews	BPharm: ATAR, pre-req, UMAT MPham: GPA, pre-req, interview	GPA	Varies Grades in HS Exam Entrance Exam GATE (for M.Pharm.)
Curriculum	Different emphasis on Basic Sciences, Pharmaceutics, Pharmacy Practice and Therapeutics					
Compulsory pre-registration	None	52 weeks after graduation	12 weeks after graduation	48 weeks after graduation	Requires an internship (unstructured)	500 hrs (D.Pharm.)
Undergraduate Experimental Component	300 hrs IPPE 36 weeks APPE	2-22 days in undergraduate course	16 weeks as undergraduate	12 weeks in undergraduate courses	10-36 weeks	1 yr internship Six months (Gen Medicine) 2 months x3 other specialty Dept
Degree Awarded for Registration as a Pharmacist	Pharm.D.	M.Pharm.	B.Sc.Pharm.	B.Pharm. or M.Pharm.	BSc, BSc-PD	D.Pharm. B.Pharm. M.Pharm
Entry Requirements	Entry after minimum 2 years university	Entry from secondary school	Entry after one year university	Entry from secondary school	Entry from secondary school	Entry from secondary school
Duration	4 year courses	4 year courses	4 year courses	4 year courses	5 year courses	2 year courses D.Pharm. 4 years

						course B.Pharm. 6 yrs Pharm.D.
Research Projects	Possible but not mandatory	Mandatory	Possible but not mandatory	Possible but not mandatory	Possible but not mandatory	Not Mandator y
Challenges					Shortage of well-trained faculty and clinical mentors	

* This is a partial list of the Pharmacy Curricular Comparison.