

International student rotation: comparing US and Philippine pharmacy education

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Abstract

Introduction: To introduce University of Florida (UF) students to pharmacy education in the Philippines, a one month advanced pharmacy practice experience (APPE) rotation was conducted out of country.

Course Description: The objectives of all study abroad programmes at UF include global awareness and intercultural competency. The study abroad APPE rotation structure is a blended-learning format that combines independent study, reflection writing, student-led presentations, group discussions, and face-to-face instructions and interactions.

Evaluation: While in country, the UF students were responsible for various activities. At the end of the APPE rotation, the students reported updates to assess their achievements in meeting their set goals and also reflected upon the differences between the United States (US) and Philippines' pharmacy education.

Future plans: The experience of exploring the pharmacy education and practice in the Philippines was eye-opening and informative for both the US students and the Philippine colleges of pharmacy. The Philippine colleges of pharmacy have future plans to amend their curriculum.

Keywords: education, pharmacy, Philippines, Unites States

Introduction

The University of Florida (UF) College of Pharmacy students complete 11 months of advanced pharmacy practice experience (APPE) rotations from March of their third year to March of their fourth year as part of the curriculum. Of these rotations, five are required: hospital practice, internal medicine, community practice, ambulatory care, and a specialty population (*i.e.*, geriatrics, paediatrics, or oncology). Other electives occur in various areas of pharmacy practice (University of Florida College of Pharmacy, 2011). One elective opportunity available in past years is an international practice experience. Locations have included Italy, China, Thailand, and the United Kingdom.

Description of the programme

The study abroad APPE rotation was from April 10 to April 30, 2013. This experience, named "PharmPhilippines", is the first rotation held in the Philippines. Four APPE students and a preceptor, a clinical assistant professor, were responsible for transportation and daily costs.

The objectives of all study abroad programmes included a) global awareness whereby students, at the end of the rotation, are able to comprehend trends, challenges,

opportunities and communities worldwide; and b) intercultural competency in which students are able to interact effectively with members of other cultures.

The rotation structure is a blended-learning format that combines independent study, reflection writing, student-led presentations, group discussions, and face-to-face instructions and interactions. The activities were organised between one of the UF APPE students and a representative from the University of the Philippines (UP) College of Pharmacy. The schedule was comprised of visiting multiple colleges of pharmacy, learning about different areas where a pharmacist is involved in practice, discovering various topics of pharmaceutical research currently underway, participating in health outreach programmes, and more.

Comparison of United States and Philippines pharmacy programmes

The Philippine and United States (US) programmes have some similar courses comprising of basic science, advanced science, basic pharmacy, and practical rotations (Table I).

In the US, doctor of pharmacy programmes seek to prepare student pharmacists to provide pharmaceutical care to patients over the course of four years. Prior to

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Table I: Comparison of Curricula of University of Florida College of Pharmacy and Colleges of Pharmacy in the Philippines.

Semester	University of Florida	University of the Philippines Manila	University of Santo Tomas
Year 1, Semester 1	Clinical Biochemistry (4) Dosage Forms I (3) Fundamentals of Medicinal Chemistry (1) Physiological Basis of Disease I (5) Intro to Pharmacists, Pharmaceuticals, and the Health Care System (3) Introductory Pharmacy Practice Experience I (1)	Communication Skills I (3) Natural Science (3) History I (3) Elementary Botany (5) Algebra and Trigonometry (5) Perspectives in Pharmacy (1) Physical Education I (2) National Service Training Programme (3)	Introduction to Pharmacy (3) Communication Skills I (3) Debate (3) Contextualized Salvation History (3) General Inorganic Chemistry ^a (5) Pharmaceutical Botany with Taxonomy (5) Algebra and Trigonometry (5) Physical Education I (2) National Service Training Programme I (1.5)
Year 1, Semester 2	Dosage Forms II (2) Structure and Function of Nucleotides: Basis for Therapy (2) Basic Principles of Pharmacology (1) Physiological Basis of Disease II (5) Microbiological and Immunological Basis for Therapy (4) Pharmacotherapy I (2)	Communication Skills II (3) Social Science (3) General Education ^b (GE) (3) Fundamentals of General Chemistry I with Lab ^a (4) Introduction to Calculus (4) Pharmaceutical Calculations and Techniques (3) Physical Education (2) National Service Training Programme (3)	Pharmaceutical Calculations (3) Pharmaceutical Chemistry (5) Communication Skills II (3) General Concepts of Health Care System (4) Philippine History (3) Creative Writing (3) Church and Sacraments (3) Logic (3) Physical Education II (2) National Service Training Programme II (1.5)
Summer	Introductory Pharmacy Practice Experience II (1)		
Year 2, Semester 1	Introduction to Quantitative Methods in Pharmacy (3) Basic Principles of Dose Optimization I (2) Medicinal Chemistry I (3) Pharmacological Basis of Therapeutics I (4) Pharmacotherapy II (5) Introductory Pharmacy Practice Experience III (1)	Natural Science (3) 2 GE ^b (6) General Physics I ^a (3) General Chemistry with Qualitative Analysis with Lab ^a (4) Pharmaceutical Organic Chemistry I with Lab ^a (3)	Introduction to Computer with Applications (3) Pharmaceutical Dosage Forms (5) Christian Ethics (3) General Psychology (3) Organic Chemistry (5) Human Anatomy, Physiology and Pathophysiology (5) Physical Education III (2) Internship I: Community Pharmacy (2)
Year 2, Semester 2	Basic Principles of Dose Optimization II (2) Medicinal Chemistry II (3) Pharmacological Basis of Therapeutics II (4) Professional Communications in Pharmacy Practice (2) Pharmacotherapy III (5)	GE ^b (3) Fundamentals of Zoology (5) General Physics II (3) Inorganic Pharmaceutical Chemistry ^a (3) Pharmaceutical Organic Chemistry II with Lab ^a (3) Pharmaceutical Dosage Forms (4) Physical Education (2)	General Physics (5) Biostatistics (3) Pharmaceutical Biochemistry (5) The Social Teaching of the Church (3) Pharmaceutical Microbiology and Parasitology (5) Hospital Pharmacy (4) Physical Education IV (2)
Summer	Introductory Pharmacy Practice Experience IV (1)		
Year 3, Semester 1	Dosage Forms and Contemporary Pharmacy Practice (2) Pharmaceutical Skills Laboratory I (2) Personalized Medicine (2) Evidence-Based Pharmacy (4) Pharmacotherapy IV (3) Pharmaceutical Law and Ethics (3) Electives (2)	GE ^b (3) Introduction to Physical Chemistry (3) Introduction to Pharmacy Informatics (2) Human Anatomy, Physiology, and Pathophysiology I (3) Pharmaceutical Biochemistry with Lab ^a (3) Pharmaceutical Analysis I (3) Pharmaceutical Statistics I (3)	Physical Pharmacy (4) Pharmacognosy and Plant Chemistry (5) Biopharmaceutics and Pharmacokinetics (3) Public Health (4) Professional Deontology and Bioethics (3) Philosophy of Man (3) Filipino Literature in English (3) Socio-Anthropology (3)
Year 3, Semester 2	Pharmacotherapy V (3) Critical Appraisal of Pharmacoeconomic Studies (1) Pharmaceutical Skills Laboratory II (1) Advanced Pharmacy Practice Experience (8)	Philippine History (3) Human Anatomy, Physiology and Pathophysiology II (3) Medicinal Chemistry I (5) Pharmaceutical Analysis 2 (3) Physical Pharmacy (3) Pharmaceutical Statistics II (3)	Pharmacy and Chemistry of Organic Medicinals (4) Quality Control I (5) Pharmaceutical Manufacturing (5) Pharmacology I and Therapeutics (4) Communication & Interpersonal Skills (3) Health Economics (3) Technical Writing (3)
Summer	Advanced Pharmacy Practice Experience (12)	Community Pharmacy Internship	
Year 4, Semester 1	Advanced Pharmacy Practice Experience (16)	GE ^b (3) Pharmaceutical Accounting (2) Pharmaceutical Microbiology (4) Complementary and Alternative Medicine (2) Pharmacology for Pharmacy Students I (3) Pharmaceutical Analysis III (3) Pharmaceutical Manufacturing and Quality Control (3)	Quality Control with Instrumentation (4) Dispensing and Medication Counselling (5) Principles of Pharmacy Administration and Management I (3) Marriage and Family ^c (3) Research and Thesis Writing I (3) Pharmacy Informatics (3) Pharmacology II and Therapeutics (4) Internship III: Manufacturing Pharmacy (2)

Semester	University of Florida	University of the Philippines Manila	University of Santo Tomas
Year 4, Semester 2	Advanced Pharmacy Practice Experience (8) Pharmacotherapy VI (2) Herbal Medicines (2) Electives (4)	Pharmaceutical Management (2) Pharmacology for Pharmacy Students II (3) Dispensing and Incompatibilities (3) Hospital Pharmacy (4) Medicinal Chemistry II (3) Biopharmaceutics (3)	Philippine History and Constitution (3) Pharmaceutical Marketing & Entrepreneurship (3) Health Ethics ^c (3) Pharmaceutical Jurisprudence and Ethics (3) Clinical Pharmacy I (4) Clinical Toxicology (3) Immunology ^d (4) Professional Deontology (3) Research and Thesis Writing II (1)
Summer		Hospital Pharmacy Internship (5) Manufacturing Pharmacy Internship (5)	
Year 5, Semester 1		GE ^b (3) Legal Pharmacy I (1) Pharmacotherapeutics for Pharmacy Students (3) Research Methods (3) Pharmaceutical Marketing (2) Elective I (3) Elective I (3) Elective I (2)	Drug and Disease Management III Clinical Pharmacy II ^d (3) Adverse Drug Reaction ^d (4) Clinical Toxicology ^d (3) Health Ethics ^d (5) Principles of Pharmacy Administration and Management I ^d (3)
Year 5, Semester 2		Legal Pharmacy II (1) Pharmacoeconomics (2) Public Health Pharmacy (3) Pharmacy Seminar (1) Pharmacy Undergraduate Thesis (3) General Toxicology (3) Elective II (2) Elective II (3)	Patient Medication Assessment ^d (3) Radiopharmacy ^d (3) Pharmaceutical Jurisprudence and Ethics ^d (3) Hospital Clerkship ^d (8) Pharmaceutical Marketing and Entrepreneurship ^d (3)

a: Course (Hours: lecture + lab)

b: General education courses are drawn from three domains: arts and humanities, social sciences and philosophy, and mathematics, sciences, and technology

c: Moved to alternate semester in clinical track

d: Clinical track only

UPM Electives

First Semester

Clinical Pharmacy Practice (3)

Patient Medication Counselling (2)

Introduction to Drug Discovery (2)

Production Planning and Inventory Control (3)

Second Semester

Pharmacoepidemiology (2)

Pharmaceutical Biotechnology (3)

Biological Assays of Natural Products (2)

Assay Validation (2)

enrolment to a doctor of pharmacy programme, a minimum of two years of basic science courses are required. These include courses such as biology, calculus, chemistry, organic chemistry, physics, and human anatomy and physiology. At UF College of Pharmacy, the first year of the curriculum focuses on foundational pharmacy courses including medicinal chemistry, physiological basis of diseases, and dosage forms. During the second and third years, students build upon this knowledge as they matriculate in courses such as pharmacology, pharmacotherapy, dose optimisation, and pharmacogenomics. Students begin APPE rotations towards the end of their third year and continue until the end of their fourth year.

The UP College of Pharmacy offers two five-year undergraduate degrees (Bachelor of Science in Pharmacy and Bachelor of Science in Industrial Pharmacy) in addition to three two-year Master of Science in Pharmacy programmes (Hospital Pharmacy, Pharmaceutical

Chemistry, and Industrial Pharmacy) (University of the Philippines Manila, 2012). The University of Santo Tomas (UST) offers two undergraduate degrees, a four-year Bachelor of Science in Pharmacy and a five-year Bachelor of Science in Clinical Pharmacy, which incorporates an additional year of clinical coursework (University of Santo Tomas, 2012). Both pharmacy programmes include introductory courses in their curriculum comparable to the courses required for entry to pharmacy schools in the US in addition to basic math and science courses. Beginning in the Philippine students' third year, students study medicinal chemistry and pharmacology and complete internships. Some courses unique to the pharmacy programmes in the Philippines are Philippine history, physical education, and botany with a focus on herbal medicine. During the fifth year of the Philippine universities' curricula of the two pharmacy programmes, the courses diverge. The industrial pharmacy programme incorporates study of the

production of drug products whereas the general pharmacy programme focuses on pharmacotherapeutics.

Although drug knowledge and pharmacology are the focus of the pharmacy programmes in both the US and the Philippines, evidence-based clinical practice is more heavily emphasised in the US curriculum. Another difference is the option to pursue industrial pharmacy at UP Manila. Courses related to manufacturing and processing that are critical to industrial pharmacy overseas are similar to the US programmes, specifically materials or chemical engineering. The UF curriculum addresses drug development through dosage forms and compounding courses. However, production in these courses occur on a smaller scale within a laboratory setting, while at the Philippine universities, laboratories feature large-scale manufacturing machineries. Drug manufacturing in the Philippines involves a pharmacist at every checkpoint during formulation and packaging, whereas in the US, pharmacists are more involved in research and discovery of novel medications prior to the manufacturing process.

Clinical practice

The clinical practice in the US' pharmacy programme includes introductory pharmacy practice experience (IPPE) and APPE. Both of these clinical programmes include exposure to both hospital and community practice. However, during the APPE year, the students are further exposed to other practices including clinical rounding, drug information and medication safety, ambulatory care, and more (University of Florida College of Pharmacy, 2011/2012).

At UP, both the Bachelor of Science in Pharmacy and Bachelor of Science in Industrial Pharmacy programmes require the students to take five credit hours of community pharmacy during a summer semester and ten credit hours in a hospital and industrial pharmacy during the following summer semester. The students must complete 200 minor internship hours in each area of practice (hospital, industrial, and community) and 160 additional hours during a major internship in a setting selected by the student. The industrial pharmacy rotations are centred on the manufacturing of various medications and nutritional supplements. At UST, the clinical pharmacy students rotate through one-week rotations at different wards at the university-affiliated hospital. Licensed pharmacists counsel patients and make clinical recommendations to physicians with pharmacy students observing.

The community pharmacy rotation in the Philippines may take place in either the outpatient pharmacy of a hospital or in a stand-alone retail pharmacy. One such community pharmacy in the Philippines, Generika Drugstore, was established in 2003 to address the need for quality and affordable generic medications in response to rising medication costs throughout the country. A unique aspect Generika Drugstore offers is working in conjunction with a physician to conduct patient assessment. Daily responsibilities of students on the community practice

rotation include patient counselling, preparation of medications, and topic discussions with their assigned preceptors.

There are significant challenges to community pharmacy practice in the Philippines. For example, a licensed pharmacist does not need to be present during the working hours of a pharmacy as long as a valid license is kept in the pharmacy, leading to the widespread problem of "ghost" pharmacists that is currently being addressed by the country's regulatory agencies. Moreover, continuing education courses for pharmacists are rare due to the commodity-like perception of healthcare in the Philippines. Finally, there is no need for pharmacist verification upon filling a prescription.

The inpatient pharmacy rotations in the US and the Philippines also differ in the amount of exposure to patient care and pharmacy operations. At UP Manila, students must complete two weeks of clinical pharmacy, one week of patient counselling training, and participate in aseptic technique training. Philippine General Hospital (PGH), affiliated with UP Manila, is one of the academic hospitals visited. It includes two satellite pharmacies, oncology and critical care. At PGH, and most hospitals in the Philippines, there is no advanced training required of clinical pharmacists. Pharmacists and students are involved mainly with distribution and preparation of medications. A multidisciplinary approach is not well-practiced and physicians are the primary decision makers on patient care plans. However, the incorporation of clinical pharmacists is beginning to make progress in some hospitals in the Philippines. For example, at St. Luke's Medical Centre Global City, pharmacists are encouraged to undergo several months of clinical training at the hospital to ensure their clinical competency in different sectors of the hospital, including the intensive care units.

Future plans in pharmacy practice

The Philippine Association of Colleges of Pharmacy (PACOP) is the governing body responsible for the integrity and growth of pharmacy education in the Philippines. The Philippine Pharmacists Association (PPhA) has been an active organisation since the 1920s and in recent years has been advocating a reform of pharmacy practice in the Philippines.

Every year, a PPhA National Convention is held to discuss changes to clinical guidelines and new, relevant topics in pharmacy practice. In addition, the convention addresses changes that can be adopted with the help of the American College of Pharmacy Practice (ACCP). Some of the highlights of the 2013 PPhA National Convention, which was incorporated into the PharmPhilippines itinerary, were globalisation of Philippine pharmacy education, strengthening pharmacy law, and addressing the shortage of pharmacists in the Philippines. Leaders at the convention also spoke out for need to develop an outcomes-based pharmacy curriculum, an approach which is an objective of the UF programme. To achieve these goals, PPhA emphasised a

model of education that leads to the development of skilled pharmacists and the role of quality assurance in pharmacy education, practice, and regulation.

PPhA also works in conjunction with PACOP to recommend curriculum revisions for colleges of pharmacy. Discussions are underway to change the programme level to a higher education to discourage students from using the Bachelor of Science in Pharmacy solely as a stepping-stone to other higher-education programmes, such as medicine or dentistry.

Conclusion

The experience of exploring the pharmacy education and practice in the Philippines was eye-opening and informative for both the US students and the Philippine colleges of pharmacy and clinical practices. There are future plans to modify the pharmacy curriculum and to elevate the involvement of pharmacists in patient care and more.

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