

# Pharmacy Education in Zimbabwe

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Zimbabwe is a country of approximately eleven million people located in south central Africa. In some respects, pharmacy education at the University of Zimbabwe is similar to that in the United States; the development of communication skills and the role of the pharmacist as the drug expert are both emphasized. Compounding continues to be a major focus of study since bulk compounding is more economical than purchasing pre-packaged drugs from a manufacturer for a developing country. The pharmacy curriculum at the University of Zimbabwe has an emphasis on pharmacy practice in rural settings. As in the U.S., attracting health care workers to rural areas remains problematic. Curricula designed to provide exposure to practice in rural settings early during their education may influence some students to practice in underserved locations following graduation or at some point in their careers.

## INTRODUCTION

The African nation of Zimbabwe, formerly Rhodesia, unilaterally declared independence from Great Britain in 1965, with black majority rule established in 1980. It is a country of 11 million people, located in south central Africa and bordered by Mozambique, Botswana, Zambia, and South Africa. Pharmacy education and clinical practice in Zimbabwe share some notable features with counterparts in a rural state like West Virginia. At the University of Zimbabwe Department of Pharmacy, as at the School of Pharmacy of West Virginia University, designed curricula provide students and postgraduates with exposure to practice settings in rural underserved areas. The three year program offered in Zimbabwe can be considered comparable to the last four years of American pharmacy education(1). This review will outline some of the differences in pharmacy education between programs in the U.S. and Zimbabwe while highlighting the emphasis on practice in rural settings found both in Zimbabwe and many parts of this country.

## PRE-PHARMACY EDUCATION

Primary and secondary education is based upon the British education system of "O" and "A" level examinations. Students are permitted to list three professional programs (e.g., law, medicine, engineering, etc.) in order of preference when selecting a college. To be considered for pharmacy school, "pharmacy" must be listed as the first choice. Prerequisites for admission into the pharmacy program at the University of Zimbabwe, located in the capital city of Harare, includes chemistry plus two courses selected from mathematics, physics, or biology.

## PHARMACY EDUCATION

The Department of Pharmacy at the University of Zimbabwe (formerly the University of Southern Rhodesia) was established in 1974 as a department within the Faculty of Medicine. Presently, the Department offers a three-year professional degree program that currently enrolls 30 students in each class. The staff consists of ten lecturers and one professorial chair.

Approximately two-thirds of the faculty have obtained PhD degrees; the remaining faculty hold MSc degrees and one faculty member has a PharmD degree. Most have received their graduate training in the U.S. or the United Kingdom. The curriculum emphasizes communication skills to ensure that graduates are able to interact fully with other health care providers and patients. The academic year is divided into three terms; a total of 33 weeks. Each term is approximately the equivalent of 20 semester hours in the U.S. Required courses for the three-year curriculum are listed in Table I. Major curricular differences in pharmacy education between U.S. and Zimbabwean pharmacy schools are summarized in Table II.

### Program of Study

**Year One.** The first year curriculum is comprised of pharmaceuticals, chemistry, physiology, and dispensing. In contrast to the U.S., the pharmaceuticals course content at the University of Zimbabwe consists of physical microbiology and pharmacognosy, and is of particular relevance in a country where traditional medicine continues to be practiced to a great extent. Zimbabwe is rich in flora and fauna and as a result, indigenous plants are studied for their

**Table I. Pharmacy education in Zimbabwe<sup>a</sup>**

Year One	Year Two	Year Three
Pharmaceutics	Pharmaceutics	Pharmaceutics
Physical microbiology	Medical microbiology	Pharmacy technology
Chemistry	Pharmaceutical chemistry	Nonprescription drugs
Dispensing	Forensic pharmacy	Clinical pharmacy
Physiology	Pharmacy management	Drug information
	Biostatistics	Experiential training
	Clinical introduction	Research project
	Essential drug concepts	
	Sterile product manufacture	
	Community medicine	

<sup>a</sup>Each academic year consists of three terms for a total of 33 weeks. Each term is approximately 20 U.S. semester hours.

**Table II. Curricular differences between Zimbabwe and U.S. pharmacy education**

Course	U.S.	Zimbabwe
Chemistry	Taken as a pre-pharmacy course	Taken Year One of program
Pharmacognosy	Not present in all schools' curricular	A required course
Essential drug concepts	Not offered	A required course
Biostatistics	Not present in all schools' curricular	A required course
Community medicine	Not present in all schools' curricular and when available is usually offered during the last year of the program	A required course in the second year of the program
Research	Not required for a BS degree	Required

medicinal potential. The Department of Pharmacy presently has a \$1.1 million United Nations International Development Organization (UNIDO) Medicinal Plant Product Research project in progress. Indigenous healing practices incorporate herbal remedies and animism (ancestral spirit worship) and many patients use traditional medicine along with "western" medicine(2). The Zimbabwe National Traditional Healers Association is recognized by the government of Zimbabwe and cooperates with the government by periodically submitting samples of traditional medicines to the Zimbabwe Drug Research Laboratory in Harare to be assayed.

Chemistry is taken as a basic course with other undergraduate students from the university and is taught by the Faculty of Science. Dispensing, like pharmaceutics, is also taught as a separate course during the first year. Compounding is an important component of the dispensing course; in Zimbabwe it is more economical to compound products than to purchase pre-packaged drugs from manufacturers, and thus emphasis is placed on teaching compounding skills to pharmacy students.

**Year Two.** Coursework during the second year includes pharmaceutics, pharmaceutical chemistry, pharmacology, biochemistry, forensic pharmacy, pharmacy management, biostatistics, clinical introduction, essential drug concepts, and community medicine. There are practicals in sterile product manufacture, pharmaceutical chemistry, and pharmacology.

Pharmaceutical chemistry encompasses similar content as medicinal chemistry in the American curriculum. Pharmaceutics consists of biopharmaceutics, (which includes pharmacokinetics), and microbiology. Forensic pharmacy, which is taught by a government worker, includes pharmacy law and regulations and ethics. The pharmacy management course is taught by a local practitioner. Clinical introduction

integrates pharmacology and the basic sciences into what can be considered a therapeutics course. The course on essential drug concepts details the theory, function, and logistics of an essential drug list used by many developing countries like Zimbabwe(3). The rational use of drugs in clinical practice is emphasized in this class. The course is currently taught by the Chairman of the Department of Pharmacy who is also the Zimbabwean representative of the International Network for Rational Use of Drugs (INRUD). INRUD is a multinational consortium of academic institutions, health care educators, private organizations, and national governments with a goal towards developing, evaluating, and promoting rational drug use in developing countries(4).

Approximately 80 percent of the population of Zimbabwe resides in rural areas where health care facilities are typically government-operated. Most health care professionals, however, including pharmacists, work in urban and private sector jobs because of better salaries and working environments. As at West Virginia University, where pharmacy students are required to complete three of four months experiential training at designated rural sites, the educational precept at the University of Zimbabwe is that early introduction to rural health care may encourage future pharmacists to practice in these underserved areas. The course entitled community medicine has a didactic section which focuses on public health and environmental issues, followed by a two-week rural attachment where students interact with a rural health care team at a clinic or hospital. There is on-site supervision by both a local clinician and a faculty member who, like the students, travels to and resides in the community during the two-week rotation. During this experience small groups of students investigate public health-related problems, identify causative factors and formulate solutions, and make recommendations to on-site authorities. Oral presentations of group projects are made to phar-

macy faculty upon return to the university.

During the second year students are also given the opportunity to participate in one-day visits to different pharmaceutical manufacturing industries located in Zimbabwe. Efforts are underway to increase the industry attachment time to a period of one to two weeks.

**Year Three.** Pharmaceutics (pharmacy technology), pharmaceutical chemistry, nonprescription drugs, and clinical pharmacy (advanced therapeutics) are required courses during the third year of education. One week is spent taking a drug information course. The national Drug and Toxicology Information Service (DATIS), operating 24 hours a day, is located at the School of Medicine and is run by members of the Department of Pharmacy. Most queries are generated by physicians and researchers, but government and retail pharmacists frequently use the services of DATIS as well(5).

The experiential portion of the final year of education differs somewhat from most U.S. curricula but shares common features with the rural emphasis at West Virginia University. Twice weekly throughout both semesters, students make rounds at local teaching hospitals as part of a health care team comprised of physicians, nurses, and pharmacists. There is also a required retail practice attachment module consisting of two hours per week during the second and third terms. The major outreach experience, however, takes place at the W.K. Kellogg Foundation-funded educational project site in the periurban city of Chitungwiza and involves students in the pharmacy services at a clinic in an underserved off-campus site outside Harare(6). The goals of this project are to: (i) coordinate pharmaceutical services in both management and clinical areas; (ii) establish a site for community-based clinical pharmacy attachments for student training; and (iii) engage in community-based pharmacy research projects in Chitungwiza. Students are involved in drug ordering, storage, distribution and operational research at this clinic site. This multidisciplinary activity is strikingly similar to the Kellogg Community Partnerships project of West Virginia University, part of a statewide Rural Health Initiative (RHI) aimed at developing provider networks and clinics and at which health professional students do part of their training. Both the Chitungwiza and West Virginia Kellogg/RHI projects were designed to bring health care professionals to underserved areas, and to provide adequate health care to the communities while empowering them to address their own health care needs.

Perhaps the most obvious difference between pharmacy education in the U.S. and Zimbabwe is the compulsory research component. At the conclusion of the final year, each student must defend a thesis of his/her clinical or epidemiologic research project before a panel of examiners. The panel consists of the academic pharmacy faculty, two external examiners from outside Zimbabwe appointed by the University on the Department's recommendation, and other members of the Faculty of Medicine. Successful defense of the research thesis earns the student a BPharm (Hons.) degree rather than the standard BPharm designation.

**Pre-registration Year.** Unlike the U.S., there is no pharmacy licensing exam in Zimbabwe. The first postgraduate year is

called the pre-registration year and is analogous to an American internship. This year is coordinated by the Health Professions Council of Zimbabwe which is the regulating and licensing body for all health care workers in the country. Throughout this training year, graduates must be supervised by a pharmacist who has been licensed for at least three years. A pre-registrant may spend six to 12 months working in a hospital, industry, or retail/ community setting; he or she may spend only six months at an academic pharmacy site. Following successful completion of one full year of work, the graduate is qualified to register for a pharmacy license. In the future the Department of Pharmacy plans to jointly coordinate this pre-registration year with the Council.

#### FUTURE DIRECTIONS

Presently, pharmacy is taught in the Department of Pharmacy within the Faculty of Medicine at the University of Zimbabwe. The Department is moving forward with a proposal to become a full-fledged Faculty of Pharmacy. If successful, the school will be re-structured into five departments: (i) Pharmaceutics and Pharmaceutical Technology; (ii) Pharmaceutical Chemistry; (iii) Pharmacognosy; (iv) Clinical Pharmacy and Pharmacology; and (v) Pharmacy Practice. Within a new curriculum, postgraduate programs will be developed to allow for specialization in various disciplines. There is also keen interest on the part of the Department of Pharmacy to develop in bilateral international faculty and student exchanges with other universities, including schools of pharmacy in the U.S.

#### PHARMACY PRACTICE

Most health care needs of the country are provided by the Zimbabwean government(2). A private medical system exists for those who can afford the costs. There are four central referral hospitals, each of which have approximately 800-1000 beds. There are also 62 provincial and district hospitals having at least one physician post; half are mission hospitals staffed primarily by non-Zimbabwean physicians. The majority of health care needs are served by 643 rural health clinics run by state certified nurses(2). Drugs in Zimbabwe are distributed through government medical stores under the Ministry of Health and through a privately-owned central agency(7).

Approximately 80 percent of the 350 pharmacists registered in Zimbabwe practice in the private retail pharmacy sector in addition to privately-operated hospitals, serving about 10 percent of the total population(2). Retail pharmacists working in the private sector earn the U.S. equivalent of approximately \$13,000 per year. Government pharmacists on average earn 30-40 percent less than this per year. Community pharmacy practice within the private sector is very similar to that in the U.S. Unlike many developing countries, Zimbabwe's drug-regulatory policy for community pharmacy prohibits the sale of certain products (antibiotics, diuretics, etc.) without a prescription(2). However, there are relatively limited restrictions on over-the-counter product labeling. For example, products compounded in the pharmacy can be sold without ingredient labeling.

There are essentially four categories of drugs sold in Zimbabwe: (i) pharmacy-only nonprescription (P); (ii) pharmacy-initiated drugs (PID); (iii) household remedies (HR) and; (iv) drugs prescribed by physicians (PP). The PID category includes some topical preparations. There is also a

PP10 category which includes prescription drugs for chronic conditions such as hypertension and diabetes. A pharmacist can supply these agents to a patient once a diagnosis is made(7). Most pharmacies maintain patient profiles and the use of computers is growing.

Each of the four central hospitals employ approximately seven or eight pharmacists and an equal number of technicians. Dispensing is on a general ward stock system. Expensive or unusual drugs are filled on a five-day supply. Many products are routinely manufactured by the pharmacies: syrups, antacids, eye drops, and irrigation solutions. It has been noted that unit-dose systems and intravenous admixture programs will not likely be instituted in the near future because of the small staffs, vacancies in current posts, and lack of funds for equipment(2). Provincial and district hospitals provide a more basic level of inpatient and outpatient care. There are approximately 15 pharmacist posts for all the district hospitals. Where positions are filled, district pharmacist duties include patient education and clinic nurse education regarding rational drug use and the application of the essential drug concept(2). Pharmacy technicians assume a very important role at these rural sites that have no pharmacist; they have a training program distinct from pharmacists, regulated by the Zimbabwe Health Professions Council and conducted at Harare Polytechnic or Bulawayo Technical College.

As mentioned previously, formal clinical pharmacy services are available from the national DATIS. This includes pharmacokinetics consults. Drug assays are performed by faculty members from the Department of Pharmacy on an Abbott TDx instrument. Ward rounds and continuing education for medical and health professionals in the two central teaching hospitals in Harare are also conducted by the Department of Pharmacy faculty.

A limited number of government positions are available at the country's Drugs Control Center (DCC) or the Zimbabwe Drug Research Laboratory (ZDRL). The DCC is analogous to the Food and Drug Administration in the U.S. with the exception that only drugs, not food, fall within its jurisdiction. The safety and efficacy of drugs are evaluated by these organizations. This includes the evaluation of the quality of drugs imported from other countries. Limited

job opportunities also exist at several pharmaceutical companies located in Zimbabwe.

The Pharmaceutical Society of Zimbabwe and the Department of Pharmacy are very active in promoting the role of the pharmacist in patient care. Both groups play a major role in evaluating drugs for the Essential Drug List for Zimbabwe as well as developing and revising guidelines for drug use in the country.

## SUMMARY

The Department of Pharmacy of the School of Medicine at the University of Zimbabwe is a progressive department that has kept pace with scientific and technologic changes in the modern practice of pharmacy. There is an emphasis on the role of the pharmacist as a member of the health care team and drug expert. As in the U.S., there is a shortage of pharmacists in the geographic areas of greatest need. The Department of Pharmacy is addressing this problem by exposing students to rural practice early in their education.

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