

Pharmacy Practice

Pharmacy is a science and art concerned with the preparation and standardization of drugs. Its scope includes the cultivation of plants that are used as drugs, the synthesis of chemical compounds of medicinal value, and the analysis of medicinal agents. Pharmacists are responsible for the preparation of drug dosage forms such as tablets, capsules, and sterile solutions for injection. They compound physicians', dentists', and veterinarians' prescriptions for drugs. The science that embraces the knowledge of drugs with special reference to the mechanism of their action in the treatment of disease is pharmacology.

History of Pharmacy

The beginnings of pharmacy are ancient. When the first person expressed juice from a succulent leaf to apply to a wound, this art was being practiced. In the Greek legend, Asclepius, the god of healing art, delegated to Hygieia the duty of compounding his remedies. She was his apothecary or pharmacist. The physician-priests of Egypt were divided into two classes: those who visited the sick and those who remained in the temple and prepared remedies for the patients.

In ancient Greece and Rome and during the Middle Ages in Europe, the art of healing recognized a separation between the duties of the physician and those of the herbalist, who supplied the physician with the raw materials from which to make medicines. The Arabian influence in Europe during the 8th century AD, however, brought about the practice of separate duties for the pharmacist and physician. The trend toward specialization was later reinforced by a law enacted by the city council of Bruges in 1683, forbidding physicians to prepare medications for their patients. In America, Benjamin

Franklin took a pivotal step in keeping the two professions separate when he appointed an apothecary to the Pennsylvania Hospital.

The development of the pharmaceutical industry since World War II led to the discovery and use of new and effective drug substances. It also changed the role of the pharmacist. The scope for extemporaneous compounding of medicines was much diminished and with it the need for the manipulative skills that were previously applied by the pharmacist to the preparation of bougies, cachets, pills, plasters, and potions. The pharmacist continues, however, to fulfill the prescriber's intentions by providing advice and information; by formulating, storing, and providing correct dosage forms; and by assuring the efficacy and quality of the dispensed or supplied medicinal product.

The Practice of Pharmacy

Education

The history of pharmaceutical education has closely followed that of medical education. As the training of the physician underwent changes from the apprenticeship system to formal educational courses, so did the training of the pharmacist. The first college of pharmacy was founded in the United States in 1821 and is now known as the Philadelphia College of Pharmacy and Science. Other institutes and colleges were established soon after in the United States, Great Britain, and continental Europe. Colleges of pharmacy as independent organizations or as schools of universities now operate in most developed countries of the world.

The course of instruction leading to a bachelor of science in pharmacy extends at least five years. The first and frequently the second year of training, embracing general education subjects, are often provided by a school of arts and sciences. Many institutions also offer graduate courses in pharmacy and cognate sciences leading to the degrees of master of science and doctor of philosophy in pharmacy, pharmacology, or related disciplines. These advanced courses are intended especially for those who are preparing for careers in research, manufacturing, or teaching in the field of pharmacy.

Since the treatment of the sick with drugs encompasses a wide field of knowledge in the biological and physical sciences, an under-

standing of these sciences is necessary for adequate pharmaceutical training. The basic five-year curriculum in the colleges of pharmacy of the United States, for example, embraces physics, chemistry, biology, bacteriology, physiology, pharmacology, and many other specialized courses. As the pharmacist is engaged in a business as well as a profession, special training is provided in merchandising, accounting, computer techniques, and pharmaceutical jurisprudence.

Licensing and Regulation

To practice pharmacy in those countries in which a license is required, an applicant must be qualified by graduation from a recognized college of pharmacy, meet specific requirements for experience, and pass an examination conducted by a board of pharmacy appointed by the government.

Pharmacy laws generally include the regulations for the practice of pharmacy, the sale of poisons, the dispensing of narcotics, and the labeling and sale of dangerous drugs. The pharmacist sells and dispenses drugs within the provisions of the food and drug laws of the country in which he practices. These laws recognize the national pharmacopoeia (which defines products used in medicine, their purity, dosages, and other pertinent data) as the standard for drugs. The World Health Organization of the United Nations began publishing the Pharmacopoeia Internationalis in the early 1950s. Its purpose is to standardize drugs internationally and to supply standards, strengths, and nomenclature for those countries that have no national pharmacopoeia.

Research

Pharmaceutical research, in schools of pharmacy and in the laboratories of the pharmaceutical manufacturing houses, embraces the organic chemical synthesis of new chemical agents for use as drugs and is also concerned with the isolation and purification of plant constituents that might be useful as drugs. Research in pharmacy also includes formulation of dosage forms of medicaments and study of their stability, methods of assay, and standardization.

Another facet of pharmaceutical research that has attracted wide medical attention is the "availability" to the body (bioavailability) of various dosage forms of drugs. Exact methods of determining

levels of drugs in blood and organs have revealed that slight changes in the mode of manufacture or the incorporation of a small amount of inert ingredient in a tablet may diminish or completely prevent its absorption from the gastrointestinal tract, thus nullifying the action of the drug. Ingenious methods have been devised to test the bioavailability of dosage forms. Although such in vitro, or test-tube, methods are useful and indicative, the ultimate test of bioavailability is the patient's response to the dosage form of the drug.

Licensing systems for new medicinal products in Europe and North America demand extensive and increasingly costly investigation and testing in the laboratory and in clinical trials to establish the efficacy and safety of new products in relation to the claims to be made for their use. Proprietary rights for innovation by the grant of patents and by the registration of trademarks have become increasingly important in the growth of the pharmaceutical industry and its development internationally.

The results of research in pharmacy are usually published in such journals as the *Journal of Pharmacy and Pharmacology* (London), the *Journal of the American Pharmaceutical Association* and the *Journal of Pharmaceutical Sciences* (Washington, D.C.), the *American Journal of Pharmacy* and the *American Journal of Hospital Pharmacy* (Philadelphia), and the *Pharmaceutica Acta Helvetiae* (Zürich).

Organizations

There are numerous national and international organizations of pharmacists. The Pharmaceutical Society of Great Britain, established in 1841, is typical of pharmaceutical organizations. In the United States the American Pharmaceutical Association, established in 1852, is a society that embraces all pharmaceutical interests. Among the international societies is the *Fédération Internationale Pharmaceutique*, founded in 1910 and supported by some 50 national societies, for the advancement of the professional and scientific interests of pharmacy on a worldwide basis. The Pan American Pharmaceutical and Biochemical Federation includes the pharmaceutical societies in the various countries in the Western Hemisphere.

There are also other international societies in which history, teaching, and the military aspects of pharmacy are given special emphasis.

Learning About Your Pharmacist

Pharmacists are the principal resource to patients and other health professionals in assuring appropriate use of and optimal therapeutic outcomes from medications.

Pharmacists provide what has come to be known as pharmaceutical care. The principal goal of pharmaceutical care is to achieve positive outcomes from the use of medication that improves patients' quality of life. These outcomes include: 1) cure of a disease; 2) elimination or reduction of symptoms; 3) arresting or slowing a disease process; 4) prevention of disease; 5) diagnosis of disease; and 6) desired alterations in physiological processes, all with minimum risk to patients. Pharmacists are professionals, uniquely prepared and available, committed to public service and to the achievement of this goal.

Pharmacists are a vital part of a complete health care system. The number of people requiring health care services has steadily increased, and this trend will likely continue due to:

- increases in average life span and the increased incidence of chronic diseases;
- the increased complexity, number, and sophistication of medications and related products and devices;
- increased emphasis on primary and preventive health services, home health care, and long term care; and
- concerns about improving patients' access to health care, controlling its cost, and assuring its quality.

Nearly everyone is familiar with community pharmacists and the pharmacy in which they practice. Six out of every ten pharmacists provide care to patients in a community setting. You probably visit the community pharmacist more often than you do any other

member of the health team. Pharmacists talk to people when they are healthy and when they are sick, when they are "just browsing," or when they are concerned with an emergency; when they have specific needs as well as when they are seeking advice or information. Pharmacists practice in a number of other health care settings as well, including hospitals, clinics, nursing homes, health maintenance organizations, and others.

Pharmacists also are playing an increasing role in the "wellness" movement, especially through counseling about preventive medicine. Pharmacists serve patients and the community by providing information and advice on health, providing medications and associated services, and by referring patients to other sources of help and care, such as physicians, when necessary. Likewise, advances in the use of computers in pharmacy practice now allow pharmacists to spend more time educating patients and maintaining and monitoring patient records. As a result, patients have come to depend on the pharmacist as a health care and information resource of the highest caliber. - *Wanga*

Pharmacists, in addition to the variety of tasks performed in and out of the community pharmacy, are specialists in the science and clinical use of medications. They must be knowledgeable about the composition of drugs, their chemical and physical properties, and their manufacture and uses, as well as how to test for purity and strength. Additionally, a pharmacist needs to understand the activity of a drug and how it will work within the body. More and more prescribers rely on pharmacists for information about various drugs, their availability and their activity just as patrons do when they ask about nonprescription medications.

Remember that your pharmacist is there to help you -- do not hesitate to ask him or her for advice and counsel.

Education and Training

Most pharmacists have a professional degree (BS Pharm) that required, including pre-pharmacy study, at least five academic years of study and clinical experience. However, a growing number of pharmacists have elected to get the more advanced Doctor of Pharmacy (PharmD) degree. The PharmD degree requires four years of professional study, following a minimum of two years of pre-pharmacy study, for a total of six academic years following high school.

Both the B.S. in Pharmacy and the Pharm.D. curricula are designed to produce a scientifically and technically competent pharmacist who can apply this training to provide maximum health care services to patients. Pharmacy students are provided with the opportunity to gain greater experience in patient-centered learning experiences and in working in close cooperative relationships with health practitioners. It is the goal of all pharmacy schools to prepare pharmacists who can assume expanded responsibilities in the care of patients and assure the provision of rational drug therapy.

