The Impact of Natural and Social Science on Pharmacy

Albert I. Wertheimer

The absorption of new knowledge has always been important. In the past, new knowledge that filtered down into the curricular revisions at pharmacy schools almost always fell within the domain of the physical sciences. New compounds, analytical devices, catalysts, and reagents were generally understood and were mere evolutionary additions to the basic physical sciences. Until the mid-twentieth century, pharmacy education was based almost solely upon the natural or physical sciences–the systematized knowledge of nature and the physical world which includes chemistry, physics, zoology, anatomy, and the other subjects that we study and classify as biomedical. There is nothing inherently wrong with this orientation, and, of course, the natural sciences are a prime aspect of pharmacy education and pharmacy practice.

Yet, I would estimate that for the past 40 years there has been a quiet revolution under way. Progress has been slow and steady, even unpalpable to some. Nevertheless, the orientation in pharmacy education and practice toward the exclusive study of the natural sciences, and thus the product, has been altered by an ever-growing focus on the patient.

The development of the social sciences has been partially responsible for this change in orientation. The social sciences involve the study of people and how they behave alone; how people interact

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with others in various social settings such as the family; the development of community culture; and how attitudes, opinions, and beliefs are formed, then related to behaviors and transmitted to new members of a culture. Leading pharmacy educators, probably trained as natural scientists, have labeled these new areas of study as worthless rubbish. There has been every incentive for academic administrators to do so. They have had no one on their staffs who could teach these new areas and, obviously, no one to conduct research in these realms. Moreover, those schooled in the natural sciences would be inclined to feel that since pharmacy has prospered for hundreds of years by applying physical science principles alone, it is not necessary that massive changes be undertaken to satisfy a minority of complaints regarding the established system.

What the majority of those who have thought this way have not realized is that an invisible revolution is taking place. The mysticism of health care professionalism has evaporated. Blind faith in our healers rarely exists today. Consumerism is alive and well. Consumer advocates challenge the authority of governments and firms when that authority tolerates devious practices that place the consumer/patient at a disadvantage.

Furthermore, advances in quantitative methods have permitted us to quantify values in the social sciences. Today, we can scale attitudes and opinions, measure behavioral intentions, and correlate attitudes with behaviors. These abilities enable us to make reasonably accurate projections and predictions. Through such techniques, we have come to have at least an elementary understanding of some of the basic mechanisms involved in the concepts of placebo use, compliance, patient education, drug abuse, risk taking, self-medication, preventive behaviors, information overload, stigma, communications, and socialization processes. Moreover, progress in data processing has made it possible to scan massive quantities of data in search of patterns. Today, computers can record, access, and analyze millions of bits of data. Integrated networks for drug use studies are as feasible as the airline reservation computer systems that are used on all continents simultaneously.

Throughout the nineteenth century, the fields of pharmacy practice and pharmacy education were virtually synonymous with the field of chemistry. In England, the title "chemist" was applied to

the profession–an accurate term at the time. In the United States, pharmacy graduates in the beginning of this century received the Ph.C. (Pharmaceutical Chemist) degree. Yet even this chemical orientation was the product of change.

About 1500 B.C., the Ebers Papyrus listed roughly 700 medicinal substances used by the ancient Egyptians. Experts then had knowledge about plants and preparing plant products. Around 1,000 years B.C., medicine and health were related to omens. The Egyptians and the Greeks believed in gods who were responsible for healing. During that time, one who chose to work in this area had to learn the current religious teachings about health, illness, and medical cures.

Hippocrates lived around 400 B.C., and, while he wrote mostly about regulation of the diet, he did describe about 200 natural drugs, primarily of plant origin. Pharmaceutical botanists came into being. The classic treatise on materia medica was prepared by Dioscorides in 60 A.D. Botany was then the principal basis of pharmacy. In the second century A.D., Galen began the chemical orientation of drug use. During the first through the seventh centuries A.D., the Romans continued what was basically Greek medicine.

Many works in Arabic attest to a progressive stance in the Middle Ages of combining Greek and Oriental schools of thought. There were numerous contributions in subsequent centuries by early pharmacists in Italy, France, Germany, Britain, and, later, throughout Europe and North America.

The message, though, could not be any clearer. As science or new technology has brought improvements, the old features and components of pharmacy have changed. This has occurred multiple times over the past centuries. Pharmacy has changed from a religious orientation to one of the natural substances, to botany, and, later, to organic chemistry and biotechnology.

The next change is already upon us. Historians will surely speak of the 1970s and 1980s as the time of the birth of the social science approach to pharmacy. Perhaps the change is so slow and steady that many of us do not even perceive its growing presence, or perhaps it has not affected all of us yet. More and more articles and reports are appearing in the professional and scientific journals that are devoted to social science topics, and there are chapters and

books written for health science and health care practitioner audiences. Social science courses are included in the lists of continuing education/distance courses. In fact, curricula at pharmacy schools all over the world are changing to include ever-greater quantities of social science based course work.

Actually, the proposition that social science material be included in a pharmacy curriculum is anything but new. In 1950, Dr. John C. Elliott, in his review of U.S. pharmacy education, strongly urged that pharmacy students be taught more civics so they could be valuable consultants to their neighbors (1). The study, commissioned by the American Council on Education, suggested that pharmacy education offer more humanities and other subject matter to help graduates be of greater value to those who depend on them.

The Canadians studied pharmacy in 1969 and 1970 and published their findings in 1971 (2). The report recommended that pharmacists be better prepared to aid with consumer protection and to provide health education to the public.

One of the 14 recommendations of the Millis Commission Report is that:

> pharmacy is a knowledge system in which chemical substances and people called patients interact. Needed and optimally effective drug therapy results only when drugs and those who consume them are fully understood. We suggest that one of the first steps in reviewing the educational program of a college of pharmacy should be weighing the relative emphasis given to the physical and biological sciences against the behavioral and social sciences in the curriculum. (3)

The Commission went further, stating:

> In the future the knowledge and skill must be of drugs and of people. The essence of dispensing is the interface between a chemical material and a patient. Knowledge about the substance and about the person who is to consume the substance is essential. The action of a drug upon the patient depends upon his physiology and other biological functions, upon the status of his health or his illness, upon his social, cultural, and emotional nature. If the pharmacist is to be responsible for facili-

> tating and monitoring drug therapy of a patient he must possess knowledge about that patient as a biological, social, cultural and emotional being. The knowledge required of the pharmacist of the future must encompass not only the physical and biological sciences but also the behavioral and social sciences as well. The skills required of the future pharmacist must be those of dealing with a drug as a biologically active chemical and those of dealing with the complexities of a living and behaving human individual. These are skills of observation and communication, of data gathering, recording, and interpretation; these are skills of synthesis and judgement; these are skills of interpersonal relations, of management, and of collaboration and cooperation. (3)

These views were stated specifically in the observations section of the report:

> The present curriculum seems to be out of balance. Knowledge about drugs appears to be much more heavily stressed than knowledge about people. An inspection of the catalogue of almost any college of pharmacy reveals that departments of chemistry, medicinal chemistry, pharmacology, and pharmaceutics have sizable rosters. The course offerings in physical and biological science are numerous and extensive. In sharp contrast there are no departments of behavioral, social, economic and managerial sciences. Frequently there is only a department called "Pharmacy Administration"–a traditional term which originally had a narrow connotation but has now broadened to be a catchall for the behavioral and social sciences. The course offerings in the sciences other than physical and biological are few in number and frequently of limited extent even in universities with a full offering in those disciplines. One must conclude that the present day pharmacy graduates have much greater knowledge of drug products and their effects on the human organism than they have of human behavior, cultural determinants, health service systems and their economics. Clearly pharmacists must have ready knowledge about drugs, but they also must have ready knowledge about

> people, about relationships and communication with them, and about systems and costs of service. (3)

In 1984, a conference was held in the United States; its theme was "Pharmacy in the 21st Century." Numerous speakers offered their views about what developments they expected to see in the field of pharmacy in the next century. The speakers predicted a call for greater attention to alternative future planning, social policy, consumer behavior, aging, wellness, self-care, ethics, computers, technology, and other topics (4). Yet, there is minimal or no attention paid to most of these areas in contemporary pharmacy education. While not all of these areas come from the social sciences, the implication is clear, as it was with the Millis Commission recommendations: pharmacy education cannot afford to focus solely on the physical sciences and still be viable in the next century.

A recent review of the profession and its educational characteristics in the United Kingdom further supported this contention (5). The Nuffield Commission concluded that attention should go to:

> those areas of science which would improve pharmacists' capacity to perform their advisory role in the community and their clinical role (as we have used the term) in hospitals. These should include not only the sciences of pathology and therapeutics linked to pathophysiology, but also the behavioral sciences. We consider that there is sufficient time to include within the core course a study of management science though an introduction to this could be a specialist option. It would be inappropriate for us to specify, within the behavioral sciences, the precise areas to be covered. There could be an advantage in one school in concentrating on social administration and the social services, whereas in another it would be more advantageous to concentrate on social psychology and medical sociology. At this stage of development within the profession both diversity and experimentation are called for. It is, however, important that those parts of the course devoted to the behavioral sciences should be seriously academic, of appropriate length and constitute an integral part of all three years of the course. They could be helped, at the appropriate points, by making use of vacation experience gained by students of the

> environment in which pharmacy is practiced: students would be precluded from taking responsibility themselves but this need not prevent their being employed in ancillary roles while observing and then reporting on their experience.
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> We consider it important that problem solving should assume a greater role in the undergraduate course. Many of the problems with which pharmacists are confronted in practice are stochastic in character, and they need to be equipped to deal with them.

Moreover, the Commission laid out a model curricula and divided the curricula into seven constituent components. The following is an excerpt from the seventh section, which was labeled the "Social Context":

> Social administration, especially the analysis and study of the provision of health care. The social services, formal structures and actual behavior. The social analysis of the role of the pharmacist. The study of special groups: the aged, ethnic minorities, the mentally handicapped.
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> Social psychology, especially in relation to the behavior of health care professionals and patients. The problem of compliance. The determinants of prescribing practice. The determinants of self-medication. (5)

The major areas that constitute the social sciences are psychology, sociology, anthropology, management, education, communications, and economics. Psychology offers us insight into individual human behavior and the relationships among attitudes, beliefs, opinions, and behavior. The study of the placebo effect, compliance, and substance abuse is of particular importance. Sociology provides us with a perspective on interactions between individuals and groups. It helps us understand social class differences, life-style correlates, and how to deal with conflict. Knowledge of anthropology enables us to better comprehend culturally determined and transmitted health beliefs, myths, and utilization differences among different ethnic groups and within various subcultures in a society.

Management teaches us how to organize our professional activities; to seek efficiencies; to motivate, develop, and perfect organiza-

tional entities; and to optimize and evaluate services and features. Education gives us skills to teach disease prevention, health promotion, wellness, and health and drug education subject matter and to select optimal strategies to achieve compliance with prescribed regimens. Knowledge of communications theory allows us to select the best strategies and to use the most successful techniques to make ourselves understood by other parties. This involves dealing with patients as well as physicians. With an understanding of economics, we can select the best avenues for delivering care to patients and defend ourselves as a profession. The environment around the world is requiring us to document and prove our value and worth in a health care delivery system. Cost-effectiveness and cost-benefit studies can document our value and also warn us when expectations are not being met.

Other domains related to the social sciences are marketing, statistics, epidemiology, ethics, and history. Discussion of biomedical ethics as an entity separate from but related to law can be valuable, as can an understanding of history to promote an appreciation of the noble and lengthy heritage that we must sustain.

Such realms are an important part of our curriculum and our society. Yet, there are those who will, inevitably, say that pharmacy education has done fine without these areas for centuries. Resist the temptation to remain stagnant. Once the appropriate courses are established, make the knowledge contained in them available to our practitioner colleagues who have already graduated. We owe them the insight and direction that will assist them in their lifelong learning, planning, and implementation efforts.

Let us hope that Havelock Ellis was incorrect when he said, "What we call progress is the exchange of one nuisance for another nuisance."

REFERENCES

1. Elliott JC. Report of the Pharmaceutical Survey. Washington, DC: American Council on Education, 1950.
2. Canadian Pharmaceutical Association. Pharmacy in a new age, report of the Commission on Pharmaceutical Services. Toronto, Canada: Canadian Pharmaceutical Association, 1971.

3. Millis Commission. Pharmacists for the future. Ann Arbor, MI: Health Administration Press, 1975.
4. Bezold C, Halperin J, Binkley H, Ashbaugh RR, eds. Pharmacy in the 21st century: planning for an uncertain future. Alexandria, VA: Institute for Alternative Futures, 1985.
5. Nuffield Foundation. Pharmacy: a report to the Nuffield Foundation. London, England: 1986.