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ABSTRACT

The third in a series of international conferences on the problems of coping with the information explosion in the biomedical literature, this conference was held to explore certain aspects of the small core libraries recommended at previous meetings. Such libraries would be set up in developing countries and contain highly selective materials relevant to the information needs of each country. The 15 papers in this collection are grouped as: (1) the historical background of the connection between medical education and libraries; (2) the current state of medical school libraries in developing countries and the problems they face; (3) methods and technologies appropriate for selectivity in libraries; (4) global networks and other information services in support of health science libraries; (5) the education and training of medical librarians; and (6) the suggestions of participants for a project (or projects) for the establishment of selective libraries in a number of medical and other health science schools in developing countries. A brief introduction and a list of the participants are included. (LMM)

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# SELECTIVE LIBRARIES FOR MEDICAL SCHOOLS IN LESS-DEVELOPED COUNTRIES

A Bellagio Conference

October 3 to November 3, 1979

Edited by

Tefko Saracevic

The Rockefeller Foundation

September 1980

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# PREFACE

The effectiveness of all activities related to health depends in a fundamental way on the availability and skillful use of the proper information at the proper time. Hence, the vital importance of considering health activities in close conjunction with health information; the two are inseparable. It therefore follows that education for the health sciences in general and medicine in particular must be closely involved with literature and with libraries.

But what types of information and literature are needed? What procedures and systems ought to be deployed in order to select, secure, and communicate this literature in an effective and efficient manner? Ideas, situations, and practices differ widely. Moreover, as the phenomenal growth of the literature continues, the problems of coping with the so-called information explosion keep increasing and changing. There is an urgent need to reexamine the problems associated with the health literature, to study solutions that have been proposed, and to develop mechanisms by which this literature can be effectively communicated and utilized.

The Rockefeller Foundation has long been concerned with all aspects of health, including literature and libraries. Since 1978 the Foundation has carried on a renewed program in health sciences communication, concentrating on exploring and developing new approaches to the above problems. A number of exploratory studies have been conducted and three conferences held, with the result that specific proposals have been developed for such new approaches.

The first conference, "Coping with the Biomedical Literature Explosion: A Qualitative Approach," was held at Pocantico Hills, New York, in May 1978; its proceedings were published in December of that year.[1] At that conference it was emphasized (and demonstrated with a wealth of data) that the literature is of uneven quality and that, in fact, only a small percentage of it may be of value to specific users.

Increased selectivity was accordingly suggested as a potentially fruitful approach for coping with the literature explosion.

Since the notion of quality and selectivity is very imprecise, participants at the Pocantico Hills conference further suggested that research in this area be intensified. As a result, another conference ("Research in Biomedical Communication--The Problem of Selectivity," held at Bellagio, Italy, October 23-27, 1979) was planned to explore the theoretical and experimental aspects of the problem.

Another recommendation of the Pocantico Hills conference was that further studies be conducted on the proposal that small core libraries be set up in developing countries, such libraries to contain highly selective materials that would be relevant to the information needs of each country. To explore certain aspects of such small core libraries, a third conference was held at the Bellagio Study and Conference Center from October 30 to November 3, 1979. This very practically oriented conference followed closely on the heels of the one oriented toward the more basic aspects of theory and experimentation. This coupling represented a deliberate effort to bring together theoretical and experimental work and practical solutions.

The conference was based on the premise that health science libraries throughout the world, and especially those in educational institutions in developing countries, are faced with a number of serious problems. Some of these are:

1) Available resources have not kept pace with the explosive growth of literature.

2) The selection of relevant literature has become more difficult as the literature has grown. In fact, it is not always possible to be aware of what is available. Consequently, existing information resources may be underutilized while demands for information are increasing.

3) The acquisition of materials is difficult and their delivery uncertain, particularly in less-developed countries. As a result, many collections are incomplete.

4) The deployment of new computer and telecommunication systems and associated networks is not always fully effective or even relevant, particularly where a local library infrastructure does not exist.

5) Resources for educating and training competent health science librarians are meager.

The aims of the conference and the papers presented were to explore new approaches to the above problems, approaches based on notions of quality and selectivity, and to focus on the efficiency and effectiveness of establishing small selective libraries containing materials relevant to the educational needs of various medical and other health science schools in less-developed countries. While most of the papers deal specifically with medical school problems and solutions, the recommendations are valid and analyzable for schools in all areas of health science.

The proceedings are organized into six parts, with papers which explore:

1) The historical background of the connection between medical education and libraries.

2) The current state of medical school libraries in developing countries and the problems they face.

3) Methods and technologies appropriate for selectivity in libraries.

4) Global networks and other information services in support of health science libraries.

5) The education and training of medical librarians.

6) The suggestions of participants for a project (or projects) for the establishment of selective libraries in a number of medical and other health science schools in developing countries.

The participants are particularly pleased to acknowledge the efforts of Mr. Roberto Celli and his staff at the Bellagio Study and Conference Center, whose excellent arrangements allowed the meeting to progress smoothly and enjoyably. Miss Esther Taylor provided valuable suggestions during the copyediting of the papers; her contribution is

gratefully acknowledged. And, since none of this would have come about were it not for the enthusiastic support of Kenneth S. Warren, M.D., director, Health Sciences Division, The Rockefeller Foundation, and the ideas and advice of William Goffman, Ph.D., professor at the School of Library Science, Case Western Reserve University, we offer them our special thanks.

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March 1980

NOTE

1. Coping with the Biomedical Literature Explosion: A Qualitative Approach. Working Papers. New York: The Rockefeller Foundation, 1978.

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# INTRODUCTION

Kenneth S. Warren and John T. Bruer

It is difficult to envision a health science school without a library. Yet in Latin America 60 percent of the medical schools are without libraries, and the majority of the rest have incomplete collections.* What are the implications of such statistics? Health science is a rapidly developing area. Thus, while students may be able to learn through lectures, handouts, or a syllabus prepared by instructors, the instructors themselves must be in a position to keep abreast of the rapid flow of new information. And, if students are to be able to continue their education after leaving school, they must be given some experience with the major sources of information. Neither of these educational tasks can be adequately executed without a library.

There are many factors, such as delivery of materials, maintenance of materials, and training of librarians, which make it extremely difficult to start and maintain libraries in the developing countries. Recent research on the quantitative and qualitative aspects of the biomedical literature suggests a strategy to minimize these difficulties.

Both libraries and users of libraries generally believe that the bigger the library is, the better it must be. But the intuition that bigger is better for all libraries is rapidly leading to self-destructive library and information policies, a situation brought about by the current information explosion. In considering the significance of this explosion, it is useful to think of it metaphorically in terms of a primordial "big bang" which results in an ever-expanding universe. For example, 70 years ago there were approximately 1,000 biomedical serials, 50 years ago 1,500, 30 years ago 4,000, 10 years ago 14,000,

*See the papers of Abraam Sonis and Gilda Braga in this volume.

and now more than 20,000. At present, the U.S. National Library of Medicine collects virtually all of these journals and indexes 3,200 of them from 73 countries and in three languages in the MEDLARS computerized system. Approximately 1 million articles from these journals are so indexed annually. There have been comparable increases in other information sources, including books and indexes.

Technological advances, particularly the computer, have enabled us to store and retrieve this vast amount of information, and intensive indexing has greatly increased its availability. This exponential information increase, aided and possibly exacerbated by technological innovations, has resulted in libraries being subjected to severe economic strains and in users being inundated with information. Thus "bigger is better" is no longer feasible as a general policy, and may not be desirable or necessary.

Quantitative and qualitative studies indicate that other approaches may be preferable. Almost 20 years ago, a survey at the British Lending Library for Science and Technology revealed that of the 9,120 journal titles then held by the library, 900 titles covered 80 percent of the requests, and 40 titles covered 50 percent of the requests.[1] User studies of the major biomedical libraries in the United States have shown similar results. Bibliometric investigations of one major subject of biomedical literature, schistosomiasis, have further substantiated these findings. Papers published on schistosomiasis over a period of 110 years were dispersed among 1,738 different journals, but 80 percent of the papers appeared in 286 journals and fewer than 50 journals contained one-half of the articles.[2]

Qualitatively, if one assumes a correlation between utility and quality, Garfield's studies of the Science Citation Index have shown that 50 percent of all scientific papers are never cited,[3] and Price has reported that the number of papers cited $n$ times in a year follows an inverse power law with an exponent in the range of 2.5 to 3.0.[4] Again, bibliometric analyses of the schistosomiasis literature over 110 years confirms this result. When 47 experts were asked to pick the

significant contributions to the field from the entire corpus of 10,000 articles, 30 percent of the articles were selected one or more times and 15 percent were selected two or more times; 70 percent of the literature remained in the limbo of the unselected.[5]

On the basis of such data, one can consider designing selective libraries in which criteria for selection are quality and potential use by the clientele. Of course, such a selective approach to collections is feasible only if one has access, by means of an efficient interlibrary loan system, to major collections, such as the National Library of Medicine in the United States, Biblioteca Regional de Medicina (BIREME) in Latin America, and other comprehensive research collections. Where such access is available or can be made available, selective libraries are a practical and economical alternative to "bigger is better." Where libraries are nonexistent and funds are circumscribed, a selective library may be a necessity. Selection can be based on reasonably objective criteria, such as user studies, expert consensus, citation indexing, citation patterns in review articles, and other relevant characteristics of papers, as discussed by Professor William Goffman on page 99 of this working paper.

One should, of course, consider whether the use of a selective strategy as a basis for practical and economical information policies would have other unforeseen and undesirable consequences. Is emphasis on use and quality inimical to the values of the research community? The purpose of selectivity, from the intellectual perspective, is to identify and amplify the impact of high-quality research. The objective criteria mentioned above act as quality filters to isolate significant contributions to the literature. It is sometimes feared that such filtering might result in elitism and conformism, traits antithetical to scholarly forbearance and intellectual egalitarianism. However, consideration of the scientific method and the norms of scientific behavior reveals that critical selectivity and scholarly forbearance are complementary rather than competing values.

The scientific method can be viewed as having two components:

design and filtration. The design component consists of individual researchers engaged in studies for the purpose of generating a variety of alternative theories and hypotheses. If the purpose of science is to discover true or reliable theories about the world, then some device must be employed to separate the true or reliable alternatives from all those generated. We do not know a priori which of the alternatives are the most reliable, nor do we know a priori what the ultimate theory for a class of phenomena would be like. Under such circumstances, filtration devices are particularly useful, because filters can be constructed using what limited knowledge we do have to eliminate those alternatives that we know we do not want. As we learn more about a given set of phenomena, we can use that knowledge to construct increasingly selective filters. One could attribute the success of science to its use of a sophisticated filtration system wherein increasingly selective filterings on a steadily improving set of alternatives result in a high-quality end product.

Filtration occurs in the scientific community when researchers' views are substantiated, criticized, or refuted by their peers. The description of the scientific community given by sociologists indicates that scientists do, or should, behave in accordance with the dictates of a filtering strategy. The norms of scientific behavior include freedom of inquiry and an obligation to disclose professionally relevant information. In the early stages of research, scientists should be free from invasions of privacy; eventually, however, it is incumbent on scientists to publish their work. Upon publication, the work is subjected to stringent evaluation in the professional journals.

Freedom of inquiry and obligatory disclosure are norms of the scientific community correlated with both design and filtration. In the design phase, scientists should be given maximal freedom and privacy to pursue their interests. This is only prudent, given our relative ignorance of from where and from whom the most useful ideas might come. However, if filtration is to occur, researchers must disclose their findings. Without disclosure, filtration could not take place, and

the entire process would be nullified. Similarly, members of the scientific community have the duty to engage in criticism, substantiation, and refutation of published work. All scientists are obliged to contribute to the formulation of the consensus in their area of expertise.

Hence, one can easily reconcile selectivity and tolerance. Tolerance and scholarly forbearance are values that predominate at the design stage; selectivity and critical judgment predominate at the filtration stage. The design stage might be called the democratic, egalitarian basis of the scientific process. Filtration results in a meritocratic superstructure founded on this egalitarian base.

Selectivity, with regard to the scientific literature, follows immediately from such a view of the structure of science. The scientific literature is both the forum and archive of the filtration process. A selective approach to the literature, and to libraries, consists of no more than finding traces of the filtration process in this public record, of finding and using the properties of the literature which are correlated with the selective judgments of the scientific community. A selective approach to the literature is not inimical to the values of science, because selectivity is intrinsic to the values and purpose of science.

Increasing the efficiency and efficacy of scientific communication is a desirable goal. A selective approach to the literature is a prudent strategy in pursuit of that goal. It offers a practical, economical, and principled alternative to "bigger is better."

## NOTES

1. Urquart, D. S. 1958. "The Use of Scientific Periodicals." In: International Conference on Scientific Information. Washington, D.C.: National Academy of Sciences, pp. 277-90.

2. Warren, K. S., and Goffman, W. 1978. "Analysis of a Medical Literature: A Case Study." In: Coping with the Biomedical Literature Explosion: A Quantitative Approach. Working Papers. New York: The Rockefeller Foundation, p. 37.

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# I. HISTORICAL OVERVIEW

# THE HISTORY OF MEDICAL EDUCATION AND OF BIOMEDICAL LIBRARIES

John Z. Bowers

Any discussion of biomedical literature and libraries should recognize that one of the world's greatest public libraries with rich medical resources was inspired and founded by a physician. I refer to Sir Hans Sloane (1660-1753) and the British Museum.

Of Scotch-Irish descent, Sloane spent several years studying medicine in London and visiting the hospitals of Paris. A Protestant, Sloane could not be accepted at a recognized French medical school, so he enrolled at a seventeenth-century medical diploma mill in the principality of Orange, north of Avignon in southern France, where in 1683 he was awarded a medical degree--the "Orange Blossom."

Early in Sloane's career he served for 15 months as physician to the Duke of Albemarle on the island of Jamaica. A shrewd Scotsman, Sloane purchased a large stock of Jesuits' bark, the bark of the cinchona tree, a popular and efficacious febrifuge. In those days, crafty traders in search of profits often peddled as Jesuits' bark the bark from a variety of trees which, unlike cinchona, contained no quinine.

After Sloane's return to London, he became a physician of such note that his patients included the King and Queen of England and other members of the royal family. He was the only person who ever served simultaneously as president of the Royal Society and the Royal College of Physicians. His income from the sale of Jesuits' bark, his many affluent patients, and his marriage to a rich widow made Sloane a man of great wealth as well.

It was fashionable in this period to develop "cabinets," or "collections," and because of Sloane's deep interest in natural history and his international circle of scientific acquaintances, he became a leading collector of specimens and documents on medicine, botany, and

natural history. When he died in 1753 he willed his collection to the country with the specification that the British people contribute £20,000. Parliament enacted a bill to raise £100,000 by a lottery, and the British Museum was opened on January 15, 1759. In 1972 the museum's library was established as a separate institution, the British Library. Today organizations in Britain and America are working to maintain its superb medical resources.

Alexandria, the seat of ancient Hellenic culture, was the home of two of the most renowned ancient libraries, one in the Temple of Zeus and the other in a museum. Together, they held some 700,000 rolls in their collections, and were affiliated with a great university that included a medical faculty. The Alexandrian libraries were gradually destroyed, beginning with Caesar's invasion in 30 B.C.

With the rise of the Arabs and Islam in the seventh century, Arabic became the language of fresh and original medical works. Medical wisdom was gathered from ancient Greek and Roman texts. Cordova in Moorish Spain gained ascendancy as the seat of medical scholarship, and a great medical library was developed there by the ruler Abd-er-Rahman, whose agents ransacked the bookshops of Alexandria, Damascus, and Baghdad for texts. A principal emphasis was placed on collecting works on botanicals and other drugs; the first pharmacopoeia was produced by the Arabs. The main depository today for the Arab medical classics is the famed Escorial palace and monastery near Madrid, built in the sixteenth century by Philip II.

## Background of Medical Education

Medical education as we know it began over a thousand years ago in Salerno, a small town south of Naples, where the first medical college in Christendom was founded. Unfortunately, our information on this school is wanting in completeness, clarity, and substance. It is believed, however, that Salerno, a secular school with no clerical ties, was the first school to grant the medical degree after a specified course of study followed by examinations.

It was by way of a long detour through the Near and Middle East, beginning in the ninth century in Baghdad that Greco-Roman medicine returned to Western culture through Arab translators in the Near East, Sicily, and Spain. The major translator for Salerno, Constantinus Africanus (1020-87), worked at the cloister of Monte Cassino and in Salerno, while other material flowed from Arab translators in Sicily. The Salernitan school reached its peak in the eleventh century.

From Salerno, the center of Western medical education moved westward to Montpellier, a cosmopolitan resort and trade center in Aragon, now southern France. Established in 1181, Montpellier became the oldest continuing faculty of medicine and the first within a university.

While Salerno was influenced by Arabic medicine from Arab-held Sicily, Montpellier benefited from its proximity to Moorish Spain and the great library centers of translation at Cordova and Toledo, the latter led by Gerard of Cremona (1114?-87). Medical teaching consisted chiefly in reading Latin translations from Arabic versions of Greek authors, with commentaries by Arabian doctors.

The foundation of the great school of scientific medicine at Bologna in 1260 is associated with the name of Taddeo di Alderotti, or Thaddeus (1223-1300), a physician of such wealth that he refused to go to Rome to attend the Pope for less than a fee of 100 golden ducats. To Taddeo is owed a new form of medical literature, the Consilia, a collection of clinical cases. In the medieval period, with its emphasis on scholarly discussions, Taddeo's Consilia introduced practical observations and continued to be in considerable vogue until the end of the seventeenth century.

At his death, Taddeo willed his collection of Arabic and Greek masterpieces to the medical school. Among these works were those of the great Persian physician Avicenna (980-1037), and they became the basis of medical teachings, although at times the professors consulted the original Greek texts as well as the Arabic versions of the Greek physicians.

Similarly, the earliest collections at the Paris medical school

were generally Arabic translations from Greek sources. The libraries of Oxford and Cambridge, as well as the medieval library in Paris, were primarily lending libraries, with only a small part of the collection held in reserve status. Thus, at the library of the Sorbonne, the collection totaled 1,722 books, but only 330 were kept apart in the library proper. The others were distributed to a group of electionis (selected persons). The medieval libraries at the colleges of Oxford were major instruments in preparing the way for the men of the Renaissance.

Because they were in short supply, medical manuscripts were zealously guarded in most libraries. The records of the faculty at Paris, which are the most complete in Europe, show an inventory of only 12 volumes in 1395, practically all of which were written by Arab scholars. William Osler cites an amusing example of the difficulty that even a powerful ruler faced in obtaining manuscripts: "Louis XI, always worried about his health, was anxious to have in his library the works of Rhazes.* The only copy available was in the library of the medical school. The manuscript was lent, but on excellent security, and it was nice to know that it was returned."[1]

In the thirteenth century the goddess of medical education moved her temple to the flourishing city states of northern Italy--Padua and Bologna.

Padua was a unique and superb medical school--probably the greatest the world has ever known--to which students from Western and central Europe came to study. Padua had a special advantage as the intellectual seat of the wealthy Venetian maritime republic. Three of the founders of modern science, Vesalius, Harvey, and Galileo, studied or taught there; only Isaac Newton, the fourth, did not.

*Rhazes (850-925), a Persian physician regarded as the chief of practical physicians of his time. His most important works: Liber medicinalis and Liber continens--the first an encyclopedia of practice and therapy; the second a collection of his 10 treatises on medical subjects, including surgery.

Andreas Vesalius (1514-64) from Brussels, the founder of the scientific study of anatomy, published his immortal treatise De humani corporis fabrica in 1543 while he was at Padua. William Harvey (1578-1657), an Englishman, began his studies of the circulation of the blood at Padua under Fabricius ab Aquapendente, the first to describe the valves in the veins; Harvey published Exercitatio anatomica in 1628. Galileo Galilei (1564-1642), astronomer, mathematician, and physicist, taught mathematics at Padua for 18 years; Harvey probably learned the fundamentals of fluid dynamics from him.

In the late sixteenth and early seventeenth centuries, the center of medical education crossed the Alps from northern Italy to Leiden in The Netherlands. The opening of the great university medical center in Leiden in 1575 led to major advances in medicine and to new or reborn schools in Edinburgh, Vienna, and Moscow.

There was no religious discrimination at the University of Leiden, which reflected the permissiveness of the Dutch republic, and Protestants from across Europe who had been barred from the universities of Roman Catholic France and Italy enrolled at Leiden. The first university medical laboratory was created for the founder of the so-called school of iatrochemistry, Franciscus Sylvius (1614-72), who first applied the then fragmentary knowledge of chemistry to medicine. The first university press, begun in Leiden in 1580 under Louis Elzevir, reached its pinnacle between 1622 and 1652.

Hermann Boerhaave (1668-1738), the master of clinical teaching and one of the greatest figures in the history of medicine, taught at Leiden from 1701 until 1738. For a period of 10 years he held the chairs of medicine, chemistry, and botany.

Leiden played a unique role as the mother of medical schools. One offspring was the University of Edinburgh, whose first four professorial appointments in 1726 were graduates of Leiden. A second, in Vienna under Gerard Van Swieten (1700-72), perfected clinical teaching, and its influence spread throughout Europe.

Edinburgh, in turn, was the parent of the first medical school in

the United States, founded in 1765 as the College of Philadelphia, now the University of Pennsylvania.

During the years of Leiden's supremacy, the establishment of medical libraries surged in Western Europe. G. M. Lancisi founded the Biblioteca Lancisiana in Rome in 1711, and in 1733 the library of the Faculté de Médecine of Paris, which had only 32 books, acquired a collection of 2,300 volumes. This became the nucleus of a massive collection which by 1930, with 240,000 volumes, had become one of the three largest medical libraries in the world; the second was the Surgeon General's library in Washington, D.C., with 239,000 volumes; and the third, the Lenin Medico-Military Academy, in Leningrad with 180,000 volumes. John Radcliffe (1650-1714), an affluent London practitioner, donated his collection with a substantial benefaction to establish the Radcliffe Library at Oxford.

The ascendancy of Paris at the beginning of the nineteenth century was based on the excellence of clinical medicine in its schools. The basic sciences, largely undeveloped, were ignored as "accessory" sciences. The student spent every morning, from the first to the last day of medical school, in the hospital wards. The French system of education was followed in the Latin world, including Central and South America, until after World War II, when the American influence began to expand.

Historically, except for Oxford and Cambridge, English medical schools, both in London and elsewhere, have been hospital-based institutions. As in France, the emphasis was on practical clinical teaching at the bedside, with the basic sciences playing a secondary role. It was not until the latter half of the nineteenth century that biochemistry and physiology began to assume importance throughout England. They flourished first at Oxford and Cambridge, and later at the University of London.

The rapid progress in Germany in chemistry, histology, physiology, and experimental pathology during the first half of the nineteenth

century placed the basic sciences in a position of major importance; and in mid-century, supremacy in medical education moved across the Rhine from France to Germany.

The German system emphasized a university base, in contrast to the hospital base in England and France. The basic sciences were "laboratory" sciences; clinical teaching emphasized the lecture and the outpatient clinic. Germany continued as the leading seat of medical education until World War I, when the economic and cultural depredations of the war, compounded by a feudalistic university structure, led to stagnation.

At the turn of the century when German medical education was near its zenith, medical education in the United States was in an abysmal state. Only a few medical schools such as Harvard and Johns Hopkins had moved away from proprietary domination to introduce a university approach and a graded curriculum.

Abraham Flexner's 1910 study of Medical Education in the United States and Canada,[2] sponsored by the Carnegie Foundation for the Advancement of Teaching, precipitated the reform of American medical schools. The implementation of Flexner's report was made possible by the General Education Board, which was founded in 1908 by John D. Rockefeller to strengthen education in the United States and its territories. Between 1914 and 1960, the board gave $94 million to institute reforms in 25 medical schools.

As are many other aspects of our culture, American medical education is a mixture of foreign systems. The Flexner-Rockefeller reform followed the German pattern of a university base and a strong emphasis on research in all departments. In clinical teaching, however, we turned to the English system of clerking at the bedside, instead of the German lecture and demonstration. Postgraduate/residency training, with its emphasis on continuity of training and increased responsibility for the care of the patient, is distinctly American.

## The Rockefeller Foundation and Biomedical Libraries

The Rockefeller Foundation was the first American philanthropy to demonstrate an interest in medical libraries in developing countries. At a meeting in January 1914, nine months after the Foundation was established, the trustees decided to investigate public health and medicine in China. The following November, the China Medical Board (CMB), financed and operated by the Foundation, was established to implement a medical program in China. The first and major step was the development of the Peking Union Medical College (PUMC)--"the Johns Hopkins of China"--the most influential and successful international program in medical education up to that time. The first premedical students enrolled in 1917, and medical classes began in 1919.

Since PUMC was established with standards equal to the best medical schools in America or Europe, a first-rate library developed from the time the school opened. In the summer and fall of 1919, George E. Vincent, president of the Foundation, visited PUMC and other medical schools in China and the Far East. In a brief note to Wallace Buttrick of CMB, dated January 28, 1912, he wrote that medical libraries were "not functioning as they should."[3] In July of that year, Vincent conferred with Buttrick on the problems of medical libraries--the inadequacy of the libraries and the librarians' lack of training, poor salaries, and low status, which they described as no better than that of a routine clerk. No program evolved, however.

The poor condition of medical libraries in Europe in the 1920's was recognized by the Foundation. In 1923 Richard M. Pearce, director of the Division of Medical Education, suggested that the Foundation establish a program to develop libraries at the medical schools in England, Wales, Scotland, Belgium, and France that were receiving Foundation assistance for physical plants, education, and faculty development. In 1926 Pearce proposed a unified program of medical library assistance for Europe, but again no action was taken.

Beginning in the 1950's, the Foundation's library program for developing countries emphasized professional training for librarians,

direct assistance to libraries, and funds for the acquisition of biomedical holdings.* When a trained librarian was not available in a school receiving support under the Foundation's Educational Development Program, one was recruited from the United States.

I have selected some leading examples of these efforts in countries and regions represented at this conference:

LATIN AMERICA

Inter-American School of Librarianship (Escuela Interamericana de Bibliotecologia), Universidad de Antioquia, Medellín, Colombia

The school was founded to train librarians for Central and South America and Mexico; it has a working relationship with the Organization of American States (OAS). Beginning in 1955, Rockefeller funds have made possible seminars and summer courses in bibliotechnology for librarians from 10 countries in Latin America. The Foundation has also made grants for the acquisition of books and journals. In the 1950's the University of Antioquia was considered to have the best medical school library in Colombia.

Universidad del Valle, Cali, Colombia

Since 1953, the Foundation, which had a major program at the medical center of the university, has contributed to the development of the medical library. The funds are designated for the purchase of basic reference and teaching texts.

A library consultant from the United States surveyed library resources at the university for the Foundation in 1961. He recommended that the Foundation award funds to expand the medical school and the university libraries, and to recruit a professional from the United States to serve as acting librarian and to supervise procedures. John G. Veenstra of Purdue University Library spent from 1963 to 1965

*The program was headed by Miss Dorothy Parker, Division of Agriculture.

in Cali as a visiting professor and acting librarian, with support from the Foundation. During that period, the medical school became probably the most innovative in Latin America.

AFRICA

Kenya

The Rockefeller Foundation's major regional effort in Africa has been at the Muguga Library in Kitsuyu on the outskirts of Nairobi, Kenya, in a joint program with the East African Agricultural and Forestry Organization. In 1963 the Foundation supported the development of the Muguga Library as a regional information center for biological research. Its major impact has been felt in Kenya, Uganda, and Tanganyika, but the effects have been diffused to other countries in the region as well. The library has a special liaison with Makerere Medical College in Kampala, Uganda.

Ibadan

The British Asquith Commission, organized in 1943 to consider the advance of higher education in the colonies, led to the establishment of University College (now the University of Ibadan) in Ibadan in 1947. The first medical faculty members were appointed the following year. The Rockefeller Foundation has had a longstanding interest in the progress of the university and its medical school.

In 1963 and again in 1964, a medical librarian, C. E. Reynolds of the University of Pittsburgh, surveyed the library resources of the University of Ibadan and was instrumental in creating suitable library space. The basic medical science departments were separated from the teaching hospital by a distance of several miles, however, and the need for a hospital library was urgent. The Foundation contributed funds for the renovation of hospital space to establish a library; it also awarded a fellowship to a Nigerian, C. Bankole, to train at Syracuse University.

## Japan

Keio University's medical school in Tokyo is the leading private--and most Western-oriented--medical school in Japan. Since the demise of Peking Union Medical College, Keio's Kitasato Memorial Medical Library has been ranked as the best in the Far East. The Rockefeller Foundation has had a close association with Keio, beginning in 1921, when it gave funds to support an Institute of Hygiene.

The Japan Library School of the Japan Medical Library Association opened at the Kitasato library in April 1915, with a capacity of 60 students. The Foundation recruited an American librarian to initiate the program and supplied financial support for student scholarships. It gave a major boost to medical librarianship in the Orient by awarding a traveling fellowship to Yoshinari Tsuda, who became the region's leading librarian.

In 1958 the China Medical Board and the Foundation jointly sponsored the construction and equipment of a combined science and medical library at Osaka University.

## Thailand

Thailand's Chulalongkorn University Faculty of Medicine was established in 1923 through The Rockefeller Foundation's program to advance medical education around the world.

In the 1960's the Foundation became interested in the new University of Medical Science in Bangkok, which had faculties of tropical medicine, public health, medical sciences, and graduate medical education. In 1965 the Foundation gave funds to the university for the construction and equipment of a central library.

## China Medical Board

Harold H. Loucks, M.D., director of the China Medical Board (CMB) and a graduate of Western Reserve University, joined the staff of

the Peking Union Medical College in 1921. He advanced to a professorship of surgery, and was the last director of the college before it closed, shortly after the outbreak of World War II. In 1952 Loucks decided that the CMB should give major assistance to the improvement of biomedical resources in the Far East. The program developed under three categories: acquisition of publications, furnishings, and equipment; construction of new buildings; and the distribution of publications acquired by the board.

After the takeover of PUMC by the Communists, the CMB continued to purchase publications for the library in the hope that the school would at some point become accessible to Americans. The vision of a new effort in China broadened in 1951 with the reestablishment of communications, and the board began to buy 20 copies of 64 American and European medical journals for distribution to the leading medical schools in China. The publications were stored in the United States, and in October 1952, as prospects for a détente with China grew dim, the distribution intent was revised from medical schools of China to medical schools of the Far East.

In 1959, however, the board concluded that the gate to China was sealed, and in the following year, some copies were donated to the National Seoul University; National Taiwan University; National Defense Medical Center, Taiwan; Siriraj Medical School in Bangkok; and the University of Indonesia in Djakarta. In that same year, the massive collection of publications intended for Peking was given to the library of the medical school of the University of the Philippines.

Assistance for acquisition became the most extensive program of the CMB; grants were renewed for a number of years and increased as the cost of publications mounted. The first grants in February 1952 went to schools in Japan, Thailand, Taiwan, Burma, and Indonesia, and in the ensuing years were extended to Ceylon, Korea, the Philippines, Vietnam, and Hong Kong. In 1954 a modest grant was awarded to the Nursing College on the island of Ponape (formerly Ascension) in the Caroline Trust territories of the western Pacific.

Over the years, all seven medical schools in Korea received assistance. The school that held top priority in the board's efforts in Korea, however, was the Severance Medical College in Seoul, which had been established in 1899 with a gift from L. H. Severance of Cleveland. It subsequently became Yonsei University, and received additional CMB assistance for building, staff, and fellowships, as well as a grant of $25,000 to restore the library, which had been heavily damaged by bombing in the Korean war.

In addition to its major support for the University of the Philippines, the CMB assisted two private medical schools. The University of the East in Manila opened during the wave of new and expanding schools immediately following World War II, received grants in 1956 to purchase publications and furnishings and to equip a new library building. The University of Santo Tomas, the oldest university in the Orient, founded by the Spanish Dominican Friars in 1611, opened a medical school in 1871, the second Western-type school in the region. Beginning in 1968, the CMB gave Santo Tomas acquisition grants and one of its collections originally intended for China.

In 1956 the board decided that, despite the turbulence in Vietnam, assistance should be given to the National University of Vietnam, which had moved to Saigon from Hanoi in 1950.

The ancient kingdom of Chiang Mai in the teak forests of northern Thailand was the site of that country's third medical school in a program assisted by the University of Illinois medical school. The CMB made an acquisition grant to Chiang Mai in 1964.

All of the medical schools of the Orient had suffered damage to or deterioration of their physical plants during World War II, and the CMB's largest and most important contribution was through major construction grants to build modern libraries in the leading institutions.

The first such contribution, in 1952, went to the National Defense Medical Center in Taipei, formerly the Army Medical College in Shanghai under Generalissimo Chiang Kai-shek. In the same year, the CMB gave $200,000 for the construction of a new library at the University of the

Philippines, to replace the facility that had been totally destroyed during the liberation of Manila in 1944.

Japan had officially adopted the German medical system in 1870, and its philosophy and pattern continued to be followed closely. Each professor had his institute, there was no departmental structure, and library resources were concentrated in the institutes. When, in 1952, the CMB awarded a grant for construction to the medical school of Tokyo University, there was not a single adequate central library in any medical school in Japan. Further, the bureaucratic Department of Education in Tokyo considered the construction of hospitals and laboratory facilities to be priority items. A matching grant of $250,000 to Tokyo in 1958 marked the 100th anniversary of the establishment of the precursor of the medical school. Subsequently, the CMB gave a remodeling and equipment grant to Keio to provide adequate space and facilities for courses in librarianship financed by The Rockefeller Foundation. In another joint effort, the CMB financed the purchase of equipment, including an elevator, library stacks, and air conditioning at Osaka University medical school, while the Foundation made a $100,000 matching grant for construction. A grant of $50,000 to Nagasaki University supported the addition of a library in the medical school building. In all, the China Medical Board made possible the establishment of modern central libraries in seven leading medical schools in Japan.

In Korea grants facilitated the construction of libraries at Yonsei University (formerly Severance) and Seoul National University. In Thailand, Siriraj medical school was able to build a modern library through a grant from the board. In a significant number of the schools that I have listed, the CMB also gave grants to train librarians in America and Britain.

Biomedical literature for the medical schools of the Orient continues to be a top priority of China Medical Board. In 1978 and 1979 the CMB made endowment grants of $400,000 to Siriraj, Hong Kong University, the University of Malaya, the University of the Philippines,

and the University of Singapore. Of the total, $250,000 was earmarked for the purchase of books and monographs written by the staff, audiovisual teaching equipment and supplies, and continuing medical education.

NOTES

1. Osler, W. 1923. The Evolution of Modern Medicine. New Haven: Yale University Press, p. 117.

2. Flexner, Abraham. 1910; reprint ed. Medical Education in the United States and Canada. New York: Arno Press, 1972.

3. Letter, G. E. Vincent to W. Buttrick, January 28, 1912. Rockefeller Archives, Pocantico Hills, N.Y.

# II. STATE, PROBLEMS, AND NEEDS

# THE GROWTH OF MEDICAL SCHOOLS IN DEVELOPING COUNTRIES

Tefko Saracevic

The World Directory of Medical Schools (WDMS),[1] currently in its fifth edition, is the most comprehensive listing of medical schools in the world. Analysis of data from various editions of WDMS can provide an insight into the growth of medical schools worldwide in the past quarter of this century.

The data in WDMS are extracted from questionnaires submitted to the World Health Organization (WHO) by member countries. Although they may not be fully accurate or complete in a number of instances, they still provide an excellent picture of global trends.

An analysis of growth was performed with particular attention to less-developed countries (LDC's). The fifth edition (1979) lists a total of 1,116 medical schools in 113 countries; 79 of these countries were considered to be LDC'S; no European country was included in this group. For the purpose of comparison, figures for these 79 countries were taken from only the last four editions of WDMS; the first edition was not considered because of its incompleteness. The time periods covered by the various WDMS editions are as follows: the second edition, published in 1957, contains data mostly for 1955; the third edition (1963), data mostly for 1960; the fourth edition (1973), data mostly for 1970; and the fifth edition (1979), data mostly for 1975, although for a large number of LDC's there was an appended listing of new schools up to 1978.

Table I shows the number of medical schools in the 79 LDC's, as listed in the last four editions of WDMS. The 1979 edition did not list 10 schools that were included in the previous (1973) edition, probably because questionnaires were not returned. In our calculations, we have assumed that all of these 10 schools are still in existence (we know positively that some of them are).

TABLE I

MEDICAL SCHOOLS IN 79 LESS-DEVELOPED COUNTRIES

| | No. of Medical Schools in WDMS Edition | | | | No. of Graduates in 1979 Edition | English Instruction in 1974 Edition |
|---|---|---|---|---|---|---|
| | '57 | '63 | '73 | '79 | | |
| Afghanistan | 1 | 1 | 2 | 2 | 148 | 1 |
| Algeria | | 1 | 3 | * | * | |
| Angola | | | 1 | * | * | |
| Argentina | 6 | 9 | 9 | 9 | 8,300 | |
| Bangladesh | | | 7 | 8 | 748 | 8 |
| Benin | | | | 1 | | |
| Bolivia | 3 | 3 | 3 | 3 | 302 | |
| Brazil | 23 | 30 | 76 | 75 | 8,260 | |
| Burma | 2 | 2 | 3 | 3 | 393 | 3 |
| Cameroon | | | 1 | 1 | 49 | 1 |
| Chile | 4 | 4 | 5 | 10 | 546 | |
| China | * | * | 61 | 87 | 30,686 | |
| Columbia | 7 | 7 | 9 | 15 | 637 | |
| Congo | | | 1 | | | |
| Costa Rica | | 1 | 1 | 2 | 54 | |
| Cuba | 1 | 1 | 3 | 7 | 823 | |
| Yemen | | | | 1 | | |
| Dominican Republic | 1 | 1 | 3 | 6 | 384 | |
| Ecuador | 3 | 3 | 5 | 5 | 885 | |
| Egypt | 3 | 4 | 7 | 8 | 1,620 | 8 |
| El Salvador | 1 | 1 | 1 | 1 | 100 | |
| Ethiopia | | | 1 | 2 | * | 2 |
| Fiji | 1 | 1 | 1 | 1 | 17 | 1 |
| Ghana | | | 1 | 1 | 56 | 1 |
| Grenada | | | | 1 | | 1 |
| Guatemala | 1 | 1 | 1 | 1 | 272 | |
| Guinea | | | 1 | 1 | * | |

TABLE I (cont.)

| | No. of Medical Schools in WDMS Edition | | | | No. of Graduates in 1979 Edition | English Instruction in 1974 Edition |
|---|---|---|---|---|---|---|
| | '57 | '63 | '73 | '79 | | |
| Haiti | 1 | 1 | 1 | 1 | 122 | |
| Honduras | 1 | 1 | 1 | 1 | 38 | |
| Hong Kong | 1 | 1 | 1 | 1 | 149 | 1 |
| India | 44 | 60 | 94 | 106 | 11,364 | 106 |
| Indonesia | 6 | 6 | 11 | 12 | 824 | |
| Iran | 6 | 6 | 7 | 10 | 455 | 1 |
| Iraq | 1 | 2 | 3 | 3 | 276 | 3 |
| Ivory Coast | | | 1 | 1 | 9 | |
| Jordan | | | | 1 | 42 | 1 |
| Kampuchea | 1 | 1 | 1 | * | | |
| Kenya | | | 1 | 1 | 72 | 1 |
| Korea(s) | 6 | 6 | 14 | 14 | 1,250 | |
| Kuwait | | | | 1 | | 1 |
| Laos | | | 1 | 1 | 23 | |
| Lebanon | 2 | 2 | 2 | 2 | 51 | 1 |
| Liberia | | | 1 | 1 | 12 | 1 |
| Libya | | | 1 | 2 | 204 | 2 |
| Madagascar | 1 | 1 | 1 | 1 | 384 | |
| Malaysia | | | 1 | 2 | 113 | 2 |
| Mexico | 18 | 22 | 24 | 52 | * | |
| Mongolia | | | 1 | 1 | 242 | |
| Morocco | | | 1 | 1 | 83 | |
| Mozambique | | | 1 | 1 | 23 | |
| Nicaragua | 1 | 1 | 1 | 1 | 30 | |
| Niger | | | | 1 | | |
| Nigeria | 1 | 1 | 5 | 13 | 312 | 13 |
| Pakistan | 15 | 15 | 7 | 14 | 745 | 14 |
| Panama | 1 | 1 | 1 | 1 | 58 | |

TABLE I (cont.)

| | No. of Medical Schools in WDMS Edition | | | | No. of Graduates in 1979 Edition | English Instruction in 1974 Edition |
|---|---|---|---|---|---|---|
| | '57 | '63 | '73 | '79 | | |
| Papua New Guinea | | | 1 | 1 | 8 | 1 |
| Paraguay | 1 | 1 | 1 | 1 | 54 | |
| Peru | 1 | 3 | 6 | 7 | 620 | |
| Philippines | 6 | 7 | 7 | 15 | 1,700 | 15 |
| Rwanda | | | 1 | 1 | 12 | |
| Saudia Arabia | | | 1 | 3 | | 3 |
| Senegal | 1 | 1 | 1 | 1 | 34 | |
| Singapore | 1 | 1 | 1 | 1 | 107 | 1 |
| Somalia | | | | 1 | | |
| Sri Lanka | 1 | 1 | 2 | 2 | 228 | 2 |
| Sudan | 1 | 1 | 1 | 2 | 175 | 2 |
| Surinam | 1 | 1 | * | 1 | 14 | |
| Syria | 1 | 1 | 2 | 3 | 322 | |
| Tanzania | | | 1 | * | * | |
| Thailand | 2 | 3 | 4 | 7 | 430 | |
| Togo | | | | 1 | | |
| Tunisia | | | 1 | 3 | 56 | |
| Turkey | 3 | 3 | 7 | 16 | 1,100 | |
| Uganda | 1 | 1 | 1 | * | * | |
| Uruguay | 1 | 1 | 1 | 1 | 456 | |
| Venezuela | 3 | 6 | 7 | 7 | 239 | |
| Vietnam | 2 | 2 | 2 | 5 | * | |
| Zaire | 2 | 2 | 3 | * | * | |
| Zambia | | | 1 | 1 | 11 | 1 |
| Totals | 197 | 238 | 440 | 578 | 76,727 | 198 |
| Not listed in '79 edition | | | | 10 | | |
| Estimated total 1979 | | | | 588 | | |

*Indicates no data available in the given edition.

The table also includes the number of graduates listed in the 1979 edition. However, different countries seem to have taken different criteria and/or time periods for inclusion of these data. Thus the figures given are not strictly comparable. For some countries the number of graduates shown by each university does not add up to the total number of graduates cited in the summary, but no explanation is given for the discrepancy. (It may be that different questionnaires and time periods were used for summary data.)

Finally, the number of schools that employ English as the predominant language of instruction are listed, primarily for reasons of comparison in the ease of use of widely available medical literature in English.

Table II shows the totals and the accompanying ratios and rates of growth as follows:

Column A--total number of medical schools for all countries listed in given editions of WDMS.

Column B--number of medical schools in 79 LDC's.

Column C--ratio of the schools in 79 LDC's to the total number of schools (B/A).

Column D--rate of growth of A from edition to edition.

Column E--rate of growth of B from edition to edition.

## Discussion

The number of medical schools in the less-developed countries is increasing much more rapidly than in the world as a whole. While the total in the 113 WHO member countries that have such schools almost doubled for the period 1955 to 1978 (from 603 to 1,126), the number in the 79 LDC's almost tripled (from 197 to 588). In 1955 the LDC's had a third of all medical schools; by 1978 that figure had grown to one-half the total.

The majority of medical schools in the LDC's are young. Only about one-third of them (approximately 200 schools) existed 20 years ago; 200 more were added in the 1960's and another 189 between 1971 and 1978.

TABLE II

MEDICAL SCHOOLS IN THE WORLD AND IN DEVELOPING COUNTRIES: NUMBERS AND GROWTH

| WMDS | A | B | C | D | E |
|---|---|---|---|---|---|
| Edition | Total No. of Schools | | Percentage of LDC's (B/A) | Rate of Growth | |
| | All Countries | LDC's | | of A | of B |
| Second ed. 1957 | 603 | 197 | 33% | | |
| Third ed. 1963 | 651 | 238 | 37% | 8% | 21% |
| Fourth ed. 1973 | 962 | 440 | 46% | 48% | 85% |
| Fifth ed. 1979* | 1,126* | 558* | 52% | 16% | 31% |
| Increase from 1957 to 1979 editions | 523 | 391 | 74% | 185% | 293% |

*This figure includes the 10 schools not actually listed in the fifth edition, but which were listed in the fourth edition.

This is a very high rate of growth; one might say that there has been an explosion of medical schools in the developing world. Whether such a high rate of growth can be sustained is open to question. Actually, it already appears to be declining, for while the number of new schools established in the 1970's is equal to if not greater than the number established in the 1960's, since the base had doubled by the end of that period, the rate of growth in the 1970's was actually smaller. Even so, it is still at a level that can be considered explosive.

The data obtained in this study have raised a number of questions that are not really within its realm but are interesting to contemplate. For instance, to what extent does this growth mirror the population growth? Is the number of doctors in the LDC's per unit of population increasing, stagnating, or decreasing? Has it begun to catch up with that of the developed countries?

To what extent are the educational facilities of the newly established medical schools adequate in general and with respect to libraries in particular? From all indications (including other papers presented at this conference), it seems that little attention has been paid to the libraries and that the resources allocated to them have been meager.

It is extremely difficult to build up new medical schools, and newly established schools face a great many problems--e.g., setting up and maintaining an adequate library. The high rate of growth of these new schools emphasizes the need for increased attention to their problems. And since their explosive growth appears to be continuing, immediate massive action is urgently needed.

NOTE

1. World Health Organization. World Directory of Medical Schools (2nd ed., 1957; 3rd ed., 1963; 4th ed., 1973; 5th ed., 1979). Geneva, Switzerland: WHO.

# STATUS AND NEEDS OF THE LIBRARIES OF LATIN AMERICAN MEDICAL SCHOOLS

Abraam Sonis

## Introduction

Information for this report has been collected from work published by noteworthy professionals who have specialized in the subject, from proposals they have presented in several conferences and meetings, and from discussions and recommendations of such meetings. We have also consulted with prominent medical librarians and with agencies that furnish publications to libraries, and have had an exchange of opinions with distinguished professionals of the region*--investigators, practitioners, professors and specialists in medical education, and those in charge of health care programs--in order to obtain their viewpoint as users. Thus the work does not reflect a representative survey but rather a highly specialized response from professionals that has provided an exhaustive exploration of all aspects of the current status of biomedical libraries. In this way we have tried to overcome the difficulties of developing a survey in the traditional manner.

As a matter of fact, from late 1977 to early 1978, the 75 schools of Brazil served in a pilot program to develop a questionnaire for later distribution to the 180 medical schools of the region. This survey was proposed to the United Nations Development Programme (UNDP) as the first step of a program to promote and strengthen health information in Latin American countries, a goal that led to the creation of the Biblioteca Regional de Medicina (BIREME) and has guided its development since then. Constraints of time and funding required that the scope of this program be reduced. Instead, having in mind the requirements of this report, we

*For the purposes of this report, "region" or "Latin America" refers specifically to the Portuguese- and Spanish-speaking countries.

decided to ask these Latin American libraries, with which BIREME has frequent contact, to supply the minimum data needed to describe the status of the region's medical school libraries.

The experience of collecting and analyzing such data, as well as the difficulties encountered in the process, proved to be a most elucidating exercise. Had we set out to devise realistic strategies and new alternatives for solving the existing problems no better approach could have been programed. Thus, although our sole purpose was the preparation of this report, we have acquired information which illustrates the trends, circumstances, and difficulties that go to the core of the biomedical library situation and provides us with a clear picture of the basic structure of the system.

Moreover, when the data supplied by other libraries are compared with data from previous years and combined with the results of an epidemiological analysis of BIREME's activities in a rationalization program carried on by our library, we are led to a new conceptualization of the problem. Thus, even if funds became available, we now believe that it would not be useful or realistic to carry out this survey in the traditional way in which it was planned. We might even say that we have had a practical demonstration of how one can be favored by chance, as were Horace Walpole's three princes of Serendip in the anecdote W. B. Cannon used 200 years later to describe chance as a basic element of scientific research.[1]

I therefore offer special thanks for your invitation to attend this meeting and the opportunity to prepare this report.

## Panorama of the Libraries of the Latin American Schools of Medicine

Although medical school libraries in general constitute the most powerful institutions in the biomedical information field, the panorama they present is not encouraging. With the possible exception of some highly specialized research center or social security institution, there is no doubt that the most important collections are found in medical

school libraries. Studying them thus affords a fairly realistic picture of the current situation and practically guarantees that we have not omitted significant libraries. One complicating factor in conducting any regional survey is that Latin America is not a monolithic entity. The countries are not homogeneous, and they display significant differences economically, socially, and culturally. Even within a given country there are substantial variations in technological and socio-economic development levels as well as in cultural characteristics. In discussing health information on a regional basis, this element must be taken into account.

We have said that, with some possible exceptions, the panorama presented by medical school libraries at this time is not encouraging. This is most obvious as we go geographically farther from the central countries, particularly to countries whose economy is fundamentally linked to the production of raw materials which constitute their largest source of income. In the past 20 years, many of these raw materials have undergone a gradual but permanent devaluation in the world market. According to the 1978 report of the International Development Bank (IDB), "Socio-Economical Progress in Latin America," 9 of the 13 most important primary exporting products of Latin America (9 out of 12, excluding petroleum) have fallen in price in the international market. To give an idea of the Latin American countries' dependency on the exportation of raw materials, it might be useful to point out that the industrial export trade is basically concentrated in three countries, which account for 75 percent of that trade. At the same time, the cost of imported manufactured products and equipment has risen steeply. This point is particularly relevant to the acquisition of journals. Most of the medical schools are government-run and receive funds either directly from their government or through the education ministries. When public expenditures must be cut because of serious national economic crises, the acquisition of journals is threatened; governmental austerities are almost invariably reflected in university and library budgets. Further aggravating the problem, biomedical publication prices have one of the

highest percentage increases among the "elaborated products" that the developing countries must import. Should these publications be considered "sumptuary articles"--to use an economist's term--which can be dispensed with because only an elite can acquire and benefit from their use?

Such a conclusion would be discouraging. We hope this will not be viewed as a criticism made by a specialist who furnishes solutions anyone could supply (for instance, an increase in the medical library's budget). The situation is an important part of the information problem and will be discussed later in this report.

Moreover, if we analyze the fields to which medical information constitutes a subsystem--health care, medical education, clinical and laboratory research, and continuing education for health personnel--the panorama will probably be similar. Whether the present situation is viewed pessimistically or with optimism for the future depends on the psychology or interest of the observer, and the degree of his belief in the possibility of developing realistic and intelligent approaches that stand a reasonable chance of being implemented.

## Some Fundamental Problems

### Buildings

Two outstanding Latin American medical librarians studied the status of the medical libraries in their countries 10 years ago. In relation to buildings, one of them states: "In this aspect many of the libraries suffer from lack of space, inadequate environmental conditions, insufficient ventilation and, even worse, illumination, with precarious sanitary facilities and no heating system. We can even say that some buildings are really in a dangerous condition and the materials accumulated in the libraries are in jeopardy."[2] From the report of the second librarian, we extracted the following phrases: ". . . most of the library's facilities are inadequate. . . . The location, in most cases, is not ideal; the space is not sufficient to help the users, to store publications, or to allow free movement of the personnel.

Furniture is also insufficient. There is a lack of shelves, typewriters, cabinets, card reproduction and audiovisual equipment among others."[3]

To what extent is this true in other countries? How many of these problems have been solved during the past years? Obviously, they are related to the condition of the medical school buildings in which the libraries are located, and probably the deficiencies described are equally valid for other facilities--laboratories, classrooms, etc. Thus any solution must be based on a general approach to the medical schools' resources and will be linked, to a great extent, to the prestige of each school's library and the degree of usefulness the faculty attaches to the library.

The problem is somewhat different in new schools, where library activities will be established in new buildings. The problem varies, too, depending upon the size of the school; but whether a school is large or small, the facilities designed for library use should be adequate to its needs.

During the past two decades, several universities have been created in Brazil with a comprehensive concept differing from the usual Latin American university, which is only a group of schools of different and independent disciplines formally called a university. Within these universities, located in new buildings, grouped in a campus, the libraries usually have been given space in the rector building, where they have many physical conveniences and are in direct contact with the authorities of the university, thus facilitating the solution of problems. This tendency to gather the libraries of different schools in one central library has been encouraged in recent years, even in those universities established years or even centuries ago.

Centralization or decentralization? Each presents advantages and disadvantages, and is the subject of recurring discussions. The issue of central or sectorial libraries is hotly debated, and a categorical solution is very difficult from a theoretical point of view. The problem has nuances that require careful analysis for each situation.

Each university should carry out a study without parti pris to determine the structure best suited to it.

What must certainly be recommended, whatever the physical and administrative infrastructure adopted by the university for its libraries, is the coordination of their activities, starting with a rational program for the purchase of journals, since that activity accounts for a large portion of the funds allotted to the libraries. This concept should also be extended to personnel and to the normal operation of the library. Universities must develop their own information network as a first step for coordination with other institutions.

## Holdings

Table I contains a listing of the number of periodicals received by some Latin American medical school libraries in 1978 and 1979. Our interest was centered on purchased subscriptions, since exchange and donation are practically confined to Latin American publications. Some of the fundamental factors in determining the periodicals each library receives by exchange or gift are the geographical area covered, the dimension of the medical market of the country (most of the periodicals are supported by advertisements from drug laboratories and medical equipment firms), and the interest and enthusiasm of librarians for collecting such periodicals. It is not easy to evaluate their quality.

Thus the publication of the Latin American Index Medicus (IMLA) marks a significant event. With an overall view of the bibliographic output of the countries of the region, the IMLA will permit an evaluation of the quality of the publications and their authors as well as their relevance to the reality of health problems peculiar to Latin America. It seems reasonable to predict that within approximately two years (four issues of the IMLA), when sufficient information has been accumulated, its retrieval will offer an objective vision of our bibliography. Perhaps the future will bring us a pleasant surprise as to its quality.

With regard to purchased subscriptions, there is no doubt that the

TABLE I

SEVENTY-EIGHT MEDICAL SCHOOL LIBRARIES IN LATIN AMERICA--JOURNALS, PERSONNEL, ANNUAL NO. OF REQUESTS

(Countries listed by GNP per capita. Schools listed by number of purchased subscriptions 1978-79.)

| Countries (1) | No. of Medical Schools (2) | Journals (3) | | Personnel (4) | | No. of Annual Consultations (5) | Ratio (5):(4) |
|---|---|---|---|---|---|---|---|
| | | Subscr. | Exch. & Gift | Prof. | Non-Prof. | | |
| A | 7 | | | | | | |
| ($2,083*) | School 1** | 601 | 338 | 5 | 7 | 177,740 | 14,800 |
| | School 2 | 450 | 400 | 1 | 20 | 60,000 | 2,850 |
| | School 3 | 400 | 300 | 2 | 12 | 66,000 | 4,700 |
| | School 4 | 309 | - | 1 | 6 | 11,000 | 1,570 |
| | School 5 | 212 | 60 | 2 | 20 | 35,000 | 1,600 |
| B | 9 | | | | | | |
| ($1,720.9) | School 1 | 301 | 219 | 10 | 21 | 125,000 | 4,050 |
| | School 2** | 186 | 381 | 25 | 18 | 72,000 | 1,700 |
| | School 3 | 174 | 1,678 | 4 | 21 | 30,000 | 1,400 |
| | School 4 | 80 | 263 | 3 | 14 | 53,500 | 3,100 |
| | School 5 | 77 | 217 | 2 | 4 | 3,565 | 600 |
| | School 6 | 38 | 85 | 5 | 2 | 33,100 | 4,700 |
| C | 1 | | | | | | |
| ($1,330) | School 1 | 392 | 354 | 23 | 11 | 80,000 | 2,352 |
| D | 7 | | | | | | |
| ($1,313) | School 1** | 414 | 110 | 4 | 9 | 6,500 | 500 |
| | School 2** | 367 | 25 | 23 | 15 | 15,000 | 400 |
| | School 3 | 218 | 5 | 2 | 1 | 36,000 | 12,000 |
| | School 4** | 210 | 29 | 3 | 8 | 115,000 | 11,000 |
| | School 5** | 180 | 20 | 3 | 2 | 22,000 | 4,200 |
| | School 6** | 170 | 20 | 3 | 4 | 12,700 | 1,700 |
| | School 7 | 60 | 83 | 2 | 4 | 17,600 | 2,900 |
| E | 1 | | | | | | |
| ($1,270.8) | School 1 | 164 | 46 | 2 | 4 | 23,500 | 3,900 |

Note: The figures that represent the number of medical schools in each country were obtained from different sources. The fifth edition of the OMS's World Directory of Medical Schools, recently published, shows considerable differences in some countries, due to the recent creation of new medical schools. Country E has increased from 1 to 2 schools; country H from 28 to 53, and country N from 8 to 15.

TABLE I (cont.)

| Countries (1) | No. of Medical Schools (2) | Journals (3) | | Personnel (4) | | No. of Annual Consultations (5) | Ratio (5):(4) |
|---|---|---|---|---|---|---|---|
| | | Subscr. | Exch. & Gift | Prof. | Non-Prof. | | |
| F | 75 | | | | | | |
| ($1,091) | School 1 | 924 | 244 | - | - | - | - |
| | School 2 | 798 | 35 | - | - | - | - |
| | School 3 | 741 | 222 | - | - | - | - |
| | School 4 | 650 | 563 | - | - | - | - |
| | School 5 | 644 | 118 | - | - | - | - |
| | School 6 | 613 | 193 | - | - | - | - |
| | School 7 | 527 | 713 | - | - | - | - |
| | School 8** | 406 | 458 | - | - | - | - |
| | School 9 | 353 | - | - | - | - | - |
| | School 10 | 295 | 244 | - | - | - | - |
| | School 11 | 234 | 614 | - | - | - | - |
| | School 12 | 200 | 25 | - | - | - | - |
| | School 13 | 180 | 100 | - | - | - | - |
| | School 14 | 168 | 48 | - | - | - | - |
| | School 15 | 117 | 164 | - | - | - | - |
| | School 16 | 99 | 522 | - | - | - | - |
| | School 17 | 82 | 46 | - | - | - | - |
| | School 18 | 80 | 126 | - | - | - | - |
| | School 19 | 54 | 942 | - | - | - | - |
| | School 20 | 40 | 928 | - | - | - | - |
| | School 21 | 37 | 38 | - | - | - | - |
| | School 22 | 36 | 74 | - | - | - | - |
| | School 23 | 29 | 49 | - | - | - | - |
| | School 24 | 25 | 52 | - | - | - | - |
| | School 25 | 21 | 163 | - | - | - | - |
| | School 26 | 17 | 53 | - | - | - | - |
| | School 27 | 11 | 71 | - | - | - | - |
| | School 28 | 11 | 11 | - | - | - | - |
| | School 29 | 8 | 85 | - | - | - | - |
| | School 30 | 6 | 9 | - | - | - | - |
| | School 31 | 4 | 107 | - | - | - | - |
| | School 32 | 4 | 31 | - | - | - | - |
| | School 33 | 3 | 276 | - | - | - | - |
| | School 34 | 1 | 43 | - | - | - | - |
| | School 35 | - | 540 | - | - | - | - |
| | School 36 | - | 240 | - | - | - | - |
| G | 1 | | | | | | |
| ($1,048) | School 1** | 282 | 153 | - | - | - | - |

TABLE I (cont.)

| Countries (1) | No. of Medical Schools (2) | Journals (3) Subscr. | Journals (3) Exch. & Gift | Personnel (4) Prof. | Personnel (4) Non-Prof. | No. of Annual Consultations (5) | Ratio (5):(4) |
|---|---|---|---|---|---|---|---|
| H ($991) | 28 School 1** | 600 | - | - | - | - | - |
| I ($898) | 1 School 1** | 365 | 82 | 11 | 40 | 60,000 | 1,200* |
| J ($889) | 6 School 1** | 68 | 30 | 4 | 13 | 45,000 | 2,600 |
| K ($856) | 1 School 1 | 97 | 60 | 3 | - | 3,000 | 1,000 |
| L ($837) | 4 School 1** | 80 | 190 | 2 | 5 | 38,000 | 5,000 |
| | School 2** | 10 | 40 | 2 | 12 | 17,000 | 1,200 |
| | School 3** | - | 2 | 2 | 2 | 2,000 | 500 |
| M ($618) | 3 School 1 | 282 | 549 | - | - | - | - |
| N ($611) | 9 School 1 | 325 | 30 | 1 | 15 | 2,500 | 150 |
| | School 2 | 306 | 202 | 3 | 10 | 50,000 | 3,800 |
| | School 3** | 200 | 400 | 10 | 30 | 22,000 | 550 |
| | School 4 | 159 | 55 | 1 | 4 | 90,000 | 18,000 |
| | School 5 | 52 | 105 | - | 2 | 36,000 | 18,000 |
| | School 6 | 31 | 270 | 1 | 2 | 12,000 | 4,000 |
| | School 7 | 30 | 8 | 23 | - | - | - |
| | School 8 | 27 | 90 | 1 | 2 | 28,000 | 9,000 |
| O ($603) | 1 School 1** | 349 | 140 | 1 | 15 | 66,000 | 4,100 |
| P ($520) | 1 School 1** | 10 | 50 | 1 | 3 | - | - |
| Q ($514) | 1 School 1 | 120 | 27 | 1 | 6 | 41,000 | 5,800 |

TABLE I (cont.)

| Countries (1) | No. of Medical Schools (2) | Journals (3) | | Personnel (4) | | No. of Annual Consultations (5) | Ratio (5):(4) |
|---|---|---|---|---|---|---|---|
| | | Subscr. | Exch. & Gift | Prof. | Non-Prof. | | |
| R ($485) | 3 School 1** | - | 40 | 1 | 2 | 5,300 | 1,800 |
| BIREME*** | EPM | 1,212 | 571 | 8 | 16 | - | - |

*Gross National Product per capita in dollars.
**Located in the capital of the country.
***Due to BIREME's position as an information center, the staff works at several programs at the same time and not exclusively in local services.

primary considerations are price and availability. As Table I indicates, the number of subscriptions even at major Latin American medical schools is low. The problem acquires real dimension if we recall that we are not dealing solely with a recent difficulty but with an established trend. To facilitate the analysis, we have judged it best to separate Brazil from the rest of the Latin American countries, because the number of medical schools in Brazil is almost equivalent to the total in the Spanish-speaking countries. Except for Brazil, there are only two libraries in all of Latin America with 600 subscriptions; three with 500 to 400 subscriptions; and eight with 400 to 300. In Brazil there is one library with more than 1,000 purchased journals; four have more than 700, eight more than 500, and ten more than 300. Thus in all of Latin America only 23 medical schools--a little over 10 percent of the total--have more than 300 publications. Even taking into consideration the libraries that did not answer BIREME's questionnaire, those who know the ecology of the Latin American schools of medicine will easily note that most libraries in the region have fewer than 300 subscriptions. This low number of purchased subscriptions explains the constant pressure of medical library personnel for larger budgets to expand their collections. Their efforts, we believe, deserve encouragement and support.

But poor funding is not the only problem encountered by medical libraries; administrative and bureaucratic difficulties due to currency exchange problems are equally frequent. Foreign subscriptions (from outside Latin America) must usually be paid for in a "strong" currency (most often U.S. dollars). Payments in dollars, however, require the approval of various government agencies, typically a slow and complicated process. Very often approval is not given until after the renewal period for the subscription has already expired.

Sometimes the regulations for subscription renewals require bidding by several dealers, via pro forma invoices, as is done for purchases of local supplies. Because of the time and administrative procedures involved, this complicates the acquisition process significantly. One

subscription agent has stated that he must compete in open bidding approximately 40 percent of the time. This procedure introduces further bureaucratic delays, of course. When one realizes that the acquisition of serials is an ever-changing situation requiring constant attention from librarians, it is apparent that the additional requirement of bids involving the university's administrative departments creates even more difficulties.

The continuing and accelerating devaluation of many Latin American currencies relative to the dollar or other currencies adds to these problems. Often, the amount approved by the government (in the local currency) is insufficient to cover payment by the time it reaches the supplier and has been converted to dollars. Thus the librarian is obliged to cut out certain publications. By the time this is done and the dealer is informed, the currency may have undergone another devaluation, and the vicious circle continues. This Kafkaesque game is neither a joke nor a boutade, but a reality that librarians and their suppliers must continually deal with in their efforts to arrive at a satisfactory solution.

On occasion, in the course of one of these devaluation cycles, there is a change of university administration. When the situation is finally resolved, time and publications have been lost. Some agents have told BIREME that medical school funds may even accumulate from one year to the next and are sometimes forgotten for several years. With good reason, Gunnar Myrdal pointed out more than 20 years ago that underdevelopment is scarcity and waste at the same time.

The need to pay air-mail and insurance costs to maintain satisfactory service drives costs up still higher. Surface mail entails at least a two-month delay. It also makes claiming virtually impossible--another serious hindrance to library maintenance.

In addition to some of the economic and administrative complications already mentioned, there are certain political and cultural considerations which impede the acquisition of materials. The relation between government and university (not always cordial), the tradition of

according or not according prestige to the university and its libraries, the relative strength of different schools in a university at the time funds are distributed, and the relation of a particular school to its library all constitute factors that determine the wealth or poverty of a collection in a biomedical library.

Personnel

It is common to complain about the shortage of personnel in libraries of schools of medicine and about the need to improve the image of the profession in order to attract individuals of high caliber who can ensure a superior level of development. Without disregarding the importance of this latter concept, we would like to discuss the quantitative and qualitative aspects of the medical libraries' personnel problems.

The results of BIREME's questionnaire on manpower indicate such striking differences among the libraries canvassed that further study of the characteristics of each institution is needed to establish the connection between demand for service and staff size.

Excluding the extremes, it seems that the ratio of 3,000 to 4,000 requests per year per staff member reflects a fair approximation of reality. Assuming 250 working days per year, this comes to 12 to 16 daily requests. This does not appear particularly dramatic, even taking into account the often time-consuming aspect of processing the information.

Without entering into a discussion of whether or not staff shortages exist in medical school libraries, what should perhaps be mentioned is that such shortages are common to all levels of our universities. If a survey were made among professors and researchers in Latin American medical schools, with few exceptions the general complaint would be the shortage of personnel: professors, professionals, technicians, and assistants. The situation is aggravated by an increased demand from a university community growing much faster than the funding provided for it. Since all university departments are competing for this limited

financial support, alternative solutions must be explored. For instance, to help solve their professional manpower problems, medical school libraries might be well advised to follow the example of the health care sector, which trains nonprofessionals to take on more responsibility for the provision of health care, thus making possible an extension of coverage to the entire population at need.

In other words, we believe that medical school libraries must make similar qualitative changes in their training programs. These changes should have as a starting point the training of librarians who will be genuine managers of health information programs capable of using a library's resources to the maximum. In addition to their technical process knowledge (which they will need for training auxiliary personnel), such librarians will also be required to have an extensive knowledge of biomedical information, a close interrelation with the teaching staff and researchers in order to obtain their collaboration, and the leadership capability to form their working group. They would need, in addition, the skill to establish an equilibrium between creativity and the reality of practical library procedures.

Are librarians of this caliber now being graduated from Latin American library schools? We are not sure.

## Considerations for a Strategy

### Conceptual Approach

If we should indicate concepts that might be useful for future strategies in the medical school information field, two points must be kept in mind: biomedical information objectives and a country's ability to cope with this information in view of existing conditions.

With respect to the objectives of medical school information, one should first establish that the library is a supporting element for school activities, that is, teaching and research. As such it is strongly associated with the model of medical education prevalent in each school. The aspirations and active efforts of the schools, the medical education community, and the government to change the present

pattern of health personnel training must be taken into consideration. The traditional teaching, in which physicians acquire knowledge in pathology, with a narrow view of biology and a specialized concept that permits them to see each person only as a collection of healthy or unhealthy organs, should broaden to a type of teaching that will enable the M.D. to take care of the health problems of a human being with mind and emotions who belongs to a certain community, who lives in a determined socioeconomic environment, and who participates in a culture peculiar to his community.

Different factors may hasten or delay this effort to change--a process that has been going on for the past three decades--and information constitutes a powerful weapon capable of doing either.

We realize that the role played (or that can be played) by information within this process demands an analysis which exceeds the limits of this report. Nevertheless, it is impossible to establish the role of medical school libraries without a conceptual approach to the importance of bibliographic information in medical education. Thus some ideas should be proposed for consideration.

In spite of great efforts and some results achieved so far, it is undeniable that the education of health personnel is still based on traditional patterns. Pilot experiences in community medicine and in primary care and the introduction of subjects such as sociology or so-called preventive medicine have been put aside in favor of the prevailing patterns of a doctor's education.

At this point the need to interrelate medical education with health care stands out clearly, and the concept has been exhaustively analyzed during the past years in a widely known bibliography. The medical student, however, regardless of his basic education, when initiating his clinical training in teaching hospitals, absorbs the type of care that these hospitals offer as well as the professional pattern of the doctor who is his teacher. Consequently, he adopts the same pattern, favoring its continuation without considering the possibilities of change.

Biomedical information, owing to its orientation, characteristics, structure, and interests, becomes a powerful support for a medical orientation based on the laboratory hypertrophy rather than clinical practice, and on the magic of drugs and sophisticated technology. The combination of the medical school's strong academic structure with the teaching hospital's search for ultraspecialized pathologies and the philosophical conception of man as a mass of organs attached to bibliographic information that feeds and enlightens the system constitutes a strong alliance against the proposed changes in medical education. Probably the core of the resistance to change has resided in this coalition. If Max Planck is right that "new ideas are not imposed by themselves but only because those who oppose them end up by dying," then the future of our field does not seem favorable to change. Each new generation of doctors has successively reproduced the same patterns during the past decades in spite of theoretical models that inspire curriculum changes; chances are that the process will keep on repeating itself.

In his classic essay on medical taxonomy, Bloom[4] indicated three areas in which the student should accomplish his apprenticeship in order to improve professionally: knowledge,* skill, and attitude. Bibliographic information is a vital part of the first area, and the field is virtually an unlimited one that will expand as medical knowledge expands.

Consequently, the trend in medical schools today is not to insist on the transmission of great amounts of information to students, but to help them develop comprehension and the capacity for continuing education during their entire professional life. Insisting on the

*We used to call this first area "information," but prefer "knowledge" because of its wider meaning, according to current concepts: integration of conscious information with insight, which is not always conscious and which we consider to be a product of the interrelationship of teacher and student.

accumulation of information during the training years is an unpromising line of evolution for medical education. Only the indispensable information should be required; the future doctor should not be swamped with information that will absorb his time and energy and cause him to neglect the areas of skill and attitude. Skill and attitude are basic to medical practice and cannot be learned in books or medical journals. It is, of course, a problem of equilibrium among the areas that contribute to the training of an M.D. Success in medical education is widely attributed to this balanced approach.

Therefore, maintaining bibliographic information with its present characteristics and fulfillment of demand as a fundamental objective of medical libraries is not only to accept the present (traditional) status quo of medical education, but also to provide a powerful weapon for its strengthening, rather than transforming information into a tool for the change we look for.

This statement is, of course, valid mainly for clinical practice. Basic science will probably require a special analysis suited to its own peculiarities.

Operational Aspects

Keeping in mind this conceptual approach and the reality that exists within each country, it is possible to deduce the role of the medical school libraries and to establish strategies for the accomplishment of their objectives. Since Latin America is not a homogeneous unit, a single pattern cannot be used for all libraries. Moreover, these countries have different levels of technological develoment and resources, and each medical school has its own characteristics. But even with these differences, a general approach can be formulated.

The starting point for an operative strategy probably should be the deficiencies currently present in medical libraries, both those reported so many times by librarians and those of a more general nature such as obsolete buildings, poor collections, and insufficient personnel. If a survey on the main topics and problems we are considering here had been

made every 5 or 10 years since 1950, the results obtained would probably have been quite similar in each country, with some transitory variations. When work published by distinguished specialists from both Latin America and other areas is compared with the partial but essential information retrieved in the past months, it suggests that we are facing, at a different technological level, the same problems of 20 years ago.

It is not easy to quantify these problems globally; we have, therefore, used the journal subscription as a "tracer," or indicator. Three highly significant Latin American countries were chosen for this survey. Information from previous years was obtained for comparison with data furnished by librarians of the same countries in the questionnaire sent out in mid-1979.

Tables II and III show data for countries A and B of Table I, i.e., those countries with the highest GNP per capita.

Table II shows the situation of country A in 1970 and 1979. In spite of the increase in the purchase of journals, no library reached 25 percent of the Index Medicus journals in 1979. This is the result of several factors: for one, the increase in the number of journals indexed and, for another, the higher cost of subscriptions owing to the higher cost of paper and an increased number of pages in many journals.

Table III was taken from a report written at the beginning of 1971 by one of the most outstanding biomedical information specialists, using mid-1960 data. In that report, with respect to the number of publications, the author states: "In the enclosed Table [reproduced here as Table III] we observe that the titles received from different sources vary considerably, but individually no library overpasses half the publications indexed in the Index Medicus." At that time the Index Medicus contained between 2,200 and 2,300 publications, and, during most of the meetings then held, the aspiration of having in each country "all the publications indexed in Index Medicus or in other important indexes" was expressed.

More than 10 years later (1979) in country B, according to Table

TABLE II

PURCHASED SUBSCRIPTIONS IN MEDICAL SCHOOLS--COUNTRY A

| School | 1970 | 1979 |
|---|---|---|
| A | 345 | 601 |
| B | 171 | 450 |
| C | 394 | 400 |
| D | 228 | 309 |
| E | 171 | 450 |
| GNP per capita | 1,756 | 2,083 |

TABLE III

PURCHASED SUBSCRIPTIONS IN MEDICAL SCHOOLS--COUNTRY B

| School | 1965 | 1979 |
|---|---|---|
| A | 312 | 301 |
| B | 465 | 186 |
| C | 600 | 174 |
| D | 280 | 80 |
| E | 150 | 38 |
| GNP per capita | 1,380 | 1,720 |

TABLE IV

COUNTRY J--SCHOOL OF MEDICINE 1
ANNUAL VARIATION IN GROSS DOMESTIC PRODUCT (%) AND NO. OF PURCHASED JOURNALS (1976-78)

| Year | Annual Variation in Gross Domestic Product (Percentages)* | No. of Purchased Journals |
|---|---|---|
| 1976 | 3.4 | 216 |
| 1977 | 0.3 | 102 |
| 1978 | -1.8 | 68 |

* From IDB "Economic and Social Progress in Latin America," 1978.

III, the libraries of the most important medical schools had between 8 and 13 percent of the approximately 2,600 publications that appeared in the Index Medicus that year.

To enlarge the picture, we have taken country J, whose GNP per capita lies between the highest and the lowest of Latin American countries, and have analyzed its data. The medical school shown in this country has great prestige and a number of its researchers are of international repute. The country has a significant cultural and university tradition. Subscriptions for 1976-78 as well as the GNP variations during that period are listed in Table IV.

If we consider the conceptual approach presented above and the experience obtained from the analysis of such trends, an exclusively quantitative approach to the biomedical information problem (and we emphasize the words "exclusively quantitative") would not seem rational for Latin American medical libraries. There is no doubt that biomedical information is a relatively neglected sector compared with others such as health care, if we use as a basis for comparison the complex and costly medical equipment available for health care in most of the countries. To borrow from the economists' terminology, we would say that biomedical information constitutes a "pocket of underdevelopment" within developing countries. Thus we believe that those who request greater resources for their libraries in our countries should be encouraged; but we must point out the need to rationalize the allocation of these funds, no matter what the amount, in order to achieve the proposed objectives in the broadest terms possible.

What specific proposals could be made to bring about the desired results? What would be an adequate method of handling the deluge of publications that flood the biomedical field and are placed within the users' reach by technology?

We believe that the starting point is to establish demand limits according to the reality a library faces in its day-to-day work. It is important to remember that the demand is a by-product of the medical system. At this time we do not specify or qualify the demand but only

quantify it, and recognize this as a first step. In epidemiological terms and using medical care as a model, we will not try to point out real needs but only the demand as it appears. This demand produces the daily pressures and absorbs the entire energy of libraries and librarians, obstructing all other activities that would offer a deep view of the system, starting with the qualitative characteristics of the same demand. At best, our medical libraries are automatic answering machines working to satisfy an information demand whose real value in the health field, for teaching as well as for research and health care, is unknown either in general for the sector or the country or individually for each medical school.

We have begun by analyzing BIREME's journal demand during six months, considering BIREME as a medical school library and not as region coordinator of the biomedical information network.

BIREME is really the library of Escola Paulista de Medicina (one of the most prestigious medical schools of Brazil), and the demand data reflect local users exclusively. Only 50 percent of BIREME's local users belong to Escola Paulista de Medicina; the other 50 percent come from the medical community of São Paulo, which includes the school of medical sciences of the University of São Paulo (another first-rate Latin American school) and the health professionals working in institutions of the same city. Consequently, BIREME answers the demand of the entire São Paulo area, one of the highest-level scientific centers of Latin America in medical research (both basic and clinical) as well as in teaching and medical care.

Demand Study

This study represents an analysis of local users' requests to BIREME. Journals were classified according to the number of times they were requested. Table V shows the total demand and the percentage of answers, Table VI the cumulative frequency of the most requested and the percentages of cases in which the requests were filled.

The observation of the diminishing returns of journal investments

is, of course, not new; evidence of it may be found in the abrupt deceleration of the percental increment in demands filled from 500 subscriptions on, confirming what was observed by health economists as to the importance of the economy of scale in the health field. It also serves as one more example of the similarity between biomedical information demand and health care demand. One of the reasons for the title concentration might be the fact that it constitutes a specialized field, with emphasis on the clinical aspects of medicine.

To obtain further information, we extended our study to include titles not in BIREME's collection and to those requested less frequently. The results obtained are shown in Tables VII through X.

Table VII shows titles consulted fewer than five times, including 114 holdings that were not consulted at all during the six-month analysis. There were 354 titles requested 627 times, averaging 1.77 requests per title.

Table VIII shows titles not found in BIREME's collection that were requested fewer than five times for a total of 1,123 titles and 1,957 requests, an average of 1.74 requests per title.

Table IX shows titles requested fewer than five times whether or not they existed in BIREME's collection. They totaled 1,477 titles requested 2,582 times for an average of 1.75 requests per title.

Table X shows titles not found in BIREME's collection that were requested more than five times. They totaled 141 titles requested 1,463 times. Most of these titles have been subscribed to for 1980.

From these results, it would seem reasonable to assume that above a certain percentage of fulfillment of demand, the increase of this percentage is uneconomical or impractical for the average library. This is the result of the great dispersion produced by the demand at random of thousands of less frequently requested titles.

It would also appear that for each medical library there is a threshold, or a point above which an increase in purchased subscriptions is antieconomic in relation to the community it serves. The dilemma is serious; limited resources make it necessary to seek a balance between

TABLE V

REGIONAL LIBRARY OF MEDICINE--LOCAL USE (FEBRUARY-JULY 1979)
TITLES AND REQUESTS

| | Number | Percent |
|---|---|---|
| Requests filled | 31,237 | 90.1 |
| Requests not filled (titles not in collection) | 3,420 | 9.9 |

TABLE VI

REGIONAL LIBRARY OF MEDICINE--LOCAL USE (FEBRUARY-JULY 1979)
NUMBER OF PERIODICAL TITLES REQUESTED*

| The First ... Titles | This Represents ... Requests | Account for ... Percent of All Requests | Relative Percentage of Increase |
|---|---|---|---|
| 100 | 17,424 | 50.2 | |
| | | | 32.8 |
| 200 | 23,100 | 66.6 | |
| | | | 14.1 |
| 300 | 26,357 | 76.0 | |
| | | | 7.6 |
| 400 | 28,344 | 81.8 | |
| | | | 4.2 |
| 500 | 29,580 | 85.3 | |
| | | | 2.5 |
| 600 | 30,354 | 87.5 | |
| | | | 1.7 |
| 700 | 30,861 | 89.0 | |
| | | | 0.9 |
| 800 | 31,129 | 89.8 | |
| | | | 0.28 |
| 900 | 31,237 | 90.1 | |

*Titles listed by increased cumulative percentage of total filled requests.

TABLE VII

REGIONAL LIBRARY OF MEDICINE--LOCAL USE (FEBRUARY-JULY 1979)
TITLES IN THE COLLECTION AND REQUESTED FIVE TIMES OR LESS

| Number of Times Requested | Titles | Requests |
|---|---|---|
| 0 | 114 | 0 |
| 1 | 73 | 73 |
| 2 | 47 | 94 |
| 3 | 50 | 150 |
| 4 | 40 | 160 |
| 5 | 30 | 150 |
| Total | 354 | 627 |

TABLE VIII

REGIONAL LIBRARY OF MEDICINE--LOCAL USE (FEBRUARY-JULY 1979)
TITLES NOT IN THE COLLECTION AND REQUESTED FIVE TIMES OR LESS

| Number of Times Requested | Titles | Number of Requests |
|---|---|---|
| 1 | 663 | 663 |
| 2 | 233 | 466 |
| 3 | 116 | 348 |
| 4 | 75 | 300 |
| 5 | 36 | 180 |
| Total | 1,123 | 1,957 |

TABLE IX

REGIONAL LIBRARY OF MEDICINE--LOCAL USE (FEBRUARY-JULY 1979)
TITLES REQUESTED FIVE TIMES OR LESS

| Collection Status | Number of Titles | Number of Requests |
|---|---|---|
| Held | 354 | 627 |
| Not held | 1,123 | 1,955 |
| Total | 1,477 | 2,582 |

TABLE X

REGIONAL LIBRARY OF MEDICINE--LOCAL USE (FEBRUARY-JULY 1979)
TITLES NOT IN THE COLLECTION AND REQUESTED SIX TIMES OR MORE

| Number of Requests | Titles | Total Requests |
|---|---|---|
| Between 6 and 10 | 91 | 663 |
| Between 11 and 19 | 41 | 578 |
| Between 20 and 40 | 9 | 222 |
| Total | 141 | 1,463 |

information needs and the education and research levels toward which a medical school strives, keeping in mind the community it serves. This is true for both quantitative and qualitative information aspects.

Continuing our reasoning, it would perhaps be well to remember that BIREME is considered here exclusively as a library. Since it is the center of the health information network for Latin America, interlibrary loan studies are now under way. Results will be presented at meetings to be held in the near future, according to recommendations of BIREME's Scientific Advisory Committee and endorsed by PAHO's director. The purpose of these meetings will be to identify Latin American health information needs in the 1980's, as well as to delineate BIREME's role in coping with them.

To complement these studies, we have made a survey of faculty and researchers in the departments of the Escola Paulista de Medicina and in its teaching hospital, to identify the publications they consider basic for the development of their activities. These publications numbered approximately 300. Those surveyed were also questioned on the use of reference material and the different sources from which they receive information to keep themselves up to date in their respective areas.

## Discussion

We do not believe that our demand study has solved any of the problems in the medical information field, but we hope that it may be a step in the right direction. We do believe it is the kind of study that the libraries of Latin American medical schools should make in order to utilize fully the resources available to them to fulfill their objectives in the communities they serve.

Through this study we have begun to understand the mechanism that generates the demand and the procedures frequently used by professionals of different fields (teaching, laboratory and clinical research, and health care) in their search for information, as well as the formal and nonformal channels used.

Our studies are now being fully developed and have been extended

to the University of São Paulo medical school, which we believe to be an important source of information for the interaction of medical school and biomedical or health information centers. The feedback generated leads us to believe that this type of communication should be permanently maintained as a device for the quantitative and qualitative adjustment of library subscriptions to the faculty needs. It benefits the users' education as far as medical information problems are concerned and also keeps the librarian advised as to both the need for such information and its most significant use. We believe that this is one of the most efficient tools for turning our present medical librarians into the professionals we spoke about: information managers, leaders of their team, and active participants in the changes proposed by their schools.

There is no alternative other than this interaction of users and librarians to overcome their frequent lack of communication, which results in the neglect of our libraries and the faculty's feeling that the library does not fulfill its needs.

We must make an information "critical mass" for the needs of each school. For the developing countries at least, this cannot be done on an exclusively quantitative basis because of lack of funds; a qualitative approach must be used. Epidemiologically speaking, we could say that with the resources available one must obtain maximum effectiveness (maximum coverage of demand) with the greatest efficiency. In this effort the interface of librarians and users should prove invaluable. It is not an automatic process; rather, it calls for intelligent action on the part of the medical librarian, who must participate actively in the genesis of demand in the medical schools.

Demand cannot be restricted to students and professors. One must not forget that bibliographic information constitutes one of the most efficient tools in continuing education programs for graduate personnel and in extramural programs for professionals who, for geographic, professional, or economic reasons, cannot attend graduate or refresher and updating courses at medical schools.

At the beginning of this report, we mentioned that even if we had the necessary funds, we would not now perform a study on the biomedical libraries' status in the traditional way, which, at high cost, would lead us only to what we already know. Instead, we would spend our resources in the development of national information networks, coordinating the collections of existing libraries with that of the library with the largest holding, and promoting studies on the genesis of the demand in each school, in order to adapt it to the needs of the institution.

When speaking of developing countries, one must keep in mind how medical information, in each case, contributes to the health programs of the country with respect to research, teaching, and medical or health care. The prevailing factors for decision must be the needs of the countries, not the interests of the "book trade."

The process, even in developing countries, is not difficult or costly. Once the decision is made by medical school authorities and the strategy adequately elaborated, the librarians themselves can develop it by exchanging information and making use of the available and appropriate technology.

Sophisticated technological equipment is not indispensable. A managerial technology is necessary, and should be incorporated by each medical librarian as part of a change of approach in his role concept. We must not identify technological input with sophisticated equipment; for us, technological input is fundamentally know-how--the practical skill to study the needs, to get acquainted with the situation in each country, and to apply the appropriate technology. Imagination, creativity, managerial capacity, and knowledge of the social context are fundamental conditions that a librarian in our countries should put to use to solve the problems of adapting resources to information needs.

And here we find the real challenge.

NOTES

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# MEDICAL SCHOOL LIBRARIES IN SOUTHEAST ASIA

Uthai Dhutiyabhodhi

## Introduction

The twentieth century has been the time of the information revolution. The great demand for information from researchers, planners, policymakers, and the ordinary citizen has brought about an information explosion, which, in turn, has fueled the need for developing systems, services, means, and methods for coping with this deluge of information and putting it to effective use in the national development. It has also meant an expanding role for information technology, computers, telecommunication systems, and reproduction. If the total system is to function successfully, it must have good organization and the cooperation of all its component parts.

## Medical School Libraries

### Background

There are no real modern medical school library services in the developing countries of Southeast Asia. There are, however, a good number of medical schools in each country of the region. Some countries (for example, Indonesia and the Philippines) have both private and government medical schools, while Malaysia, Singapore, and Thailand have only government medical schools. In recent years, there has been a growing interest in libraries for these schools, with respect to both establishing new ones and upgrading existing ones. The fact that each country has its own historical and social background, and problems that may differ from those of other countries, makes it difficult to plan a coordinated system of medical school libraries for Southeast Asia. The problems encountered, however, could prove useful in formulating policies for future development.

## Role of Medical Libraries and Librarians

Medical libraries acquire essential information, then organize and store it in such a way that they will be able to retrieve and disseminate it to users. The importance of their role in teaching and training, in research, and in the practice of medicine has long been recognized. Medical librarians also have a vital role in the development and functioning of medical school libraries. They must know the needs of users and be trained to fill these needs. In addition, they must record, collect, preserve, and disseminate the original research done in their own countries. It can be said that both medical libraries and their librarians play a crucial role in the education and development of students and workers in the health and medical sciences.

## Organization of Libraries

Most medical school libraries in Southeast Asia are separate libraries under the dean of the medical school rather than a part of the whole university library system.

## Budget

The problem of finances is particularly acute in developing countries, which makes it difficult to raise their libraries to the level of the accepted standards in other countries. The medical library budget is of great significance because of the relatively high cost of books and journals, although salaries, binding, and some other expenses are likely to be lower than in other countries. Five to 10 percent of the total budget of an institution is considered an appropriate medical library budget. In the past, medical school libraries in Southeast Asia received support from U.S. foundations as well as from other foreign organizations, but at present nearly all have to depend on their own budgets.

## Staff and Their Continuing Education

The most important part of a medical library is its staff. A well-

trained and able staff is a must if the resources of the library are to be used to the best advantage of the library patron. There is a shortage of medical librarians in Southeast Asian countries, and there is no program in medical librarianship in the library schools on any level--junior college, undergraduate, or graduate. There has, however, been an increase in the number of libraries which have at least one librarian formally trained in library science. In some countries, there are also workshops and seminars to give continuing education to the staff. Fellowships from foreign organizations have been provided to librarians for continuing education abroad. Moreover, there is currently a move in some institutions toward the formation of a medical library association to serve as a vehicle for the promotion of librarians to better positions.

Resources

Materials available in medical libraries include periodicals, monographs, dissertations and theses, proceedings of conferences, seminars and workshops, research projects, and government publications in the field of clinical medicine and preclinical sciences. Literature available will be in English, most of it coming from Europe and the United States. Many of the periodicals are subscribed to through a foreign agency that will take care of new subscriptions, claims, and cancellations. Time delays in receiving publications range from 4 to 10 weeks. Delayed delivery of periodicals is a major problem for some institutions.

Domestic materials in each country may be obtained in several ways. Societies and organizations, for example, place the names of libraries on their mailing lists. As for current periodicals, many libraries receive sets as gifts from various institutions and individuals.

Monographs are acquired through recommendations from the teaching staff as well as from publishers' catalogues and accessions lists of other libraries. The medical libraries in Southeast Asia are faced with restricted budgets, so purchasing libraries rarely buy more than

five copies of the same text. Books ordered are channeled through local as well as overseas book agents. Nearly all institutions in this region try to acquire locally published materials in the field of health sciences. In Thailand, books have been published in the Thai language on various medical subjects. They give general basic knowledge about the relevant subjects, but teachers consider it essential that standard textbooks be provided. They feel that the books published in the local language do not cover the subjects adequately and that students must have the use of standard English-language textbooks.

## Technical Processing and Maintenance

In order for materials that have been acquired to be used effectively, they must be properly classified and catalogued and the library's clientele informed about them. Information and materials available in other libraries must also be made known to the library's users. The National Library of Medicine (NLM) classification and the Medical Subject Headings (MeSH) are used by many institutions in this region. The NLM classification, however, is sometimes not applicable to local collections and conditions.

## Indexing and Abstracting Journals

Many institutions can afford to purchase indexing or abstracting periodicals (e.g., Index Medicus, Science Citation Index, Biological Abstracts, Chemical Abstracts, "Tropical Diseases Bulletin") in order to let their clients know where the references in their fields of interest are published. But there are also many libraries that cannot afford to maintain indexing and abstracting publications. As for local periodicals in the health sciences field, in some institutions in the region (in Singapore and Thailand), they are indexed on cards. Indexes that are already published in volumes are the Philippine Index Medicus and Biblio Med-SM.

## Information Services

A good library is judged not only by the size of its collection,

but also by the quality of services offered to satisfy the needs of its readers. Services that are available in some institutions include current awareness, subject bibliographies, copy reproduction, interlibrary loans, and the exchange of materials. The MEDLARS/MEDLINE service provided by the National Library of Australia, WHO, and SEAMIC, which started to operate on a trial basis from August 1979 to March 1980, is being used by the countries in this region.

It is important also in the developing countries that priority fields for the information services be selected on the basis of national interests.

## Users' Needs

Users' real needs ought to be the major factor in devising an information center's policies and activities. Determining them, however, is a difficult task. With an increasing flood of information and insufficient means of coping with it (including manpower), the librarians or documentalists must spend all their strength in solving such problems and are unable to go to the users to find out what they need. There is also a gap between providers and users of information that results from the inefficiency of the information services and the users' lack of awareness of the help that they could receive from them. To fill in this gap, users must be motivated to make better use of such services. In October 1976, the UNISIST seminar held in Bangkok stressed the urgency of user training and strongly recommended that it be instituted in all medical libraries.

## Information Resources in Southeast Asia

Before anything can be done about information resources in Southeast Asia, it is necessary to know what resources, both primary and secondary, are currently available. To accomplish this, an inventory of what exists in each nation as well as in the region should be undertaken. Especially needed are a directory of health information centers in Southeast Asia, a union list of serials, a union list of theses and dissertations in Southeast Asia, and a union catalogue.

Another important aspect of information resources that should be emphasized is the control of local publications. The situation at present is far from satisfactory. Each nation should have a national center in charge of collecting the medical and health publications of its own country. These national centers would provide the basis for a network of centers in Southeast Asia which would consolidate this material at the regional level and publish it as an "Index to Medical and Health Literature in the Southeast Asian Countries." Such an index would not only benefit these countries, but would also be useful for worldwide data bases.

It is true that an inventory of collections is not an easy task. There are many problems to be faced, not the least of which is the method of updating to be used. It is a task, however, that must be done, and some means must be found to do it in the most useful and economical way possible. Action must also be taken to complete the missing holdings lists of libraries and information centers.

## Information Resources Outside Southeast Asia

It is essential also to consider information resources produced outside Southeast Asia that will be available from different channels, e.g., the United States, Australia, and Japan.

## Sharing Resources

The way to attain full use of the information resources available both inside and outside Southeast Asia must be on the basis of sharing resources. This can be done through interlending cooperative acquisitions, cooperative cataloguing, and computerized systems and networks, but, first, methods of linkage between Southeast Asian and non-Asian centers must be established. User demand must also be studied and found to be sufficiently large to justify establishment of the system.

The methods of linkage may vary. One could be on the basis of having a single information center in Southeast Asia that would have

computer facilities and would produce the computerized data bases for the benefit of the whole region. Another method might be by direct but off-line access from individual or national Southeast Asian centers to non-Asian centers using air mail or telex.

There are currently many uncoordinated efforts being made to promote sharing resources for specific subjects. In the field of medicine and health, SEAMIC is a case in point. The Southeast Asian Medical Information Center (SEAMIC) started operation in 1973 as a special project of SEAMHO, initially funded by the International Medical Foundation of Japan (IMFJ). Its purpose is to assist Southeast Asian countries in health planning, medical care, and the training of personnel through the exchange of medical and health information and materials. Its two major activities are: the organization of conferences, training seminars, and workshops, involving medical as well as library personnel, and the exchange and dissemination of information and library materials by photocopy service, information depots, and the SEAMIC library service. The dissemination of information programs of SEAMIC will serve as a vehicle for identifying documentation needs and problems of Southeast Asian countries for which common solutions can be reached.

## Problems Facing Medical and Health Libraries

Many governmental and nongovernmental institutions in the Southeast Asian countries are now confronted with a serious shortage of library resources that are of vital importance for their national development. Much knowledge, technical, practical, and theoretical, is required to synthesize systems and networks for information and communication. Information technology can solve many problems, but automation brings new ones. Particularly in developing countries, insufficient means and too many needs make it essential that the right priorities be selected for support. The best possible use of all available information should be the guide for setting up any system for dissemination of that information.

## Recommendations

It is recommended that action be taken:

1) To strengthen the organization of medical and health science libraries at a national level;

2) To set up a regional infrastructure to ensure effective regional cooperation;

3) To develop information centers corresponding to national interests within the framework of existing national information systems, such centers assuming full responsibility for the exchange of experience and information techniques;

4) To improve the coverage of local publications by assigning responsibility for collecting, processing, and disseminating such material to the national information center;

5) To provide training for medical librarians in Southeast Asia;

6) To continue to bring together medical librarians from Southest Asian member countries for discussions of new developments and problems;

7) To survey all projects, past, present, or envisaged, which deal with information on medical and health sciences and which involve regional information network activities in Asian countries.

## A Look at the Future

To establish an effective information flow, many important linkages must be made with other approaches and with policy information studies. These developments must be based on the work that has already been done. They should lead to a clearer understanding of the ways in which information for health sciences can be best organized in the sense of providing a foundation for the best deployment and use of professional talent. Through meetings such as this one, common problems can be identified and discussed and, above all, a sense of professionalism can be developed which will encourage the maintenance of high standards in the provision of information services for the users in the field of health sciences.

I wish to thank The Rockefeller Foundation for giving me the honor of attending this meeting and the financial support to make it possible.

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# GROWTH AND DEVELOPMENT OF MEDICAL SCHOOL LIBRARIES IN AFRICA

S. O. Oyesola

> "There is a formidable increase in the number of journals devoted to the arts and sciences of information, computing, and communicating; new ones seem to appear every day. Quality control is badly needed in our own field. Greater support is needed for good information analysis centres, for compilers of critical data, and for all those who can help us put the seal of quality on information and data."
>
> Andrew A. Aines[1]

## Introduction

Comparatively, African countries fall behind many other less-developed countries in the adoption of written literature as a means of communication. Because of widespread illiteracy, oral literature was for many years the usual mode of communication on the African continent, a fact which no doubt contributed to the slow and unimpressive rate of growth of its libraries and literature services. Even today, in some countries of Africa it is still difficult to obtain statutory support for the provision of a minimum public library service in a community.

In the United States in the mid-1960s, collection building for libraries was often done with little direction or purpose since ample money was available and there was no economic pressure for selectivity.[2] In Africa, increasing demands for the establishment of small medical or health science library collections, or for the updating of existing collections, have emphasized the need for selection tools to guide medical school libraries and libraries of hospitals, societies, clinics, or other educational institutions, in assembling useful collections of quality rather than quantity.

## Medical School Libraries

The primary role of medical schools is to produce physicians; in the African context, it is to produce practitioners in modern medicine and related sciences. In this process, much information must be transferred from books and nonbook materials to the memories of the students. To carry out their role in this transfer, medical school libraries must be organized functionally and must raise their collections to the level of important instructional and scientific tools. There are a number of ways in which relevant information can be stored and made accessible; there are also a number of ways in which the library can contribute to the education of future doctors by stimulating scholarly attitudes and intellectual activities.

Recently, the educational role of medical school libraries has been recognized, and more attention is being paid to it. Although overall development is slow in Africa, the status of some medical libraries within their respective university systems or parent organizations has been excellent. Some of these library systems know no departmental affiliation or prejudices, and are free from parochialism. All members of a medical institution are basically perpetual students, and the search for information puts students, faculty, and research workers on the same level. This phenomenon is symbolized in the medical library in Africa (as indeed elsewhere in the world) by a single set of library rules, applicable without exception to all users.[3]

From the data available, medical education in Africa as a whole has some soft spots. The uneven geographical distribution of the medical schools on the continent (Table I) is not unrelated to the different levels of economic, social, cultural, and political awareness among the people. The Association of Medical Schools in Africa (AMSA) has 46 schools on its list, and no fewer than 13, or 28% percent, are in Nigeria. The schools are also at different stages of development. The extent, or levels, of commitments to provide adequate library and information services varies from country to country and even among libraries within the same country or city.

TABLE I

GEOGRAPHIC DISTRIBUTION OF MEDICAL SCHOOLS IN AFRICA*

| Location in Africa | English-Oriented | Non-English Arabic or French | Total |
|---|---|---|---|
| East | 7 | - | 7 |
| West | 15 | 6 | 21 |
| North | 2 | 10 | 12 |
| Central | - | 4 | 4 |
| South | 1 | - | 1 |

*Medical schools in Zimbabwe (Southern Rhodesia) and South Africa, both English-oriented, are not included.

Collection building in general presents a competitive scenario. Even within the same city, coordination or cooperation in the acquisition of materials does not exist. Collections, moreover, by any standards, are inadequate to meet the growing user demand. But it is gratifying to note that the problems in collection building have not been aggravated by political factors. Embargoes are not placed on the diffusion or dissemination of knowledge. In the biomedical communication fields, deliberate attempts are made to upgrade and supplement existing collections within the limits of current enabling factors (such as adequate budget funds for the regular purchase of books, periodicals, and other items). Efforts are also put forth to make libraries fully aware of the possibilities for collection building through various exchange schemes--for example, the U.S. Exchange, the Medical Library International Book Exchange Program, the British Library Lending Division (BLLD), and the Library-to-Library Exchange Program.[4] These

are sources that are usually open to libraries in developing countries for utilization in collection building, particularly in filling gaps which inevitably occur through unfilled claims, theft, mutilation, and the hazards of flood and fire.

Growth of Libraries

The development of institutions of higher education is receiving more attention than other areas in many countries of Africa. Libraries are expected to be at the heart of learning, and some countries (Nigeria, for example) have recently given the universities definitive guides as to the percentage of the total institutional annual budget that should be set aside for libraries. Thus all 13 Nigerian universities now allocate 5 percent of their total budgets to their libraries, in contrast to the former practice of giving a library only what remained after all other budget requests (including such items as entertainment) had been filled.

Medical school libraries in Africa in general, however, have not been given the place they deserve in their institutions. For instance, the AMSA has not considered (or even listed in any of its proceedings) the problems of availability, accessibility, and utilization of library services and resources for medical schools on the continent. At the association's twelfth annual congress, held recently in Lagos, the participants grappled with the problem of determining the basic needs for making medical education relevant to the health conditions and environment of the African population. The theme for the professional session was the definition and evaluation of educational objectives in relation to public health in the African environment.

Mahler was articulating relevance when he wrote: "Education in medical schools, I suggest, has to become relevant [his emphasis] to present and foreseeable future community health needs rather than satisfying professional interests."[5] And again, "the activities of individual medical schools would be defined by the health manpower plans based on the overall national health policies and plans that each

society must set for itself in the light of its social, economic and political aspirations and its own needs and resources."

It is a matter of great significance to libraries and information services on the continent that the medical schools will, in due course, raise a new breed of medical practitioners more tuned to the health needs and demands of the African peoples. Since 1975, for example, Nigeria has established schools of basic health technology. These schools are now training the many different cadres of health professionals required for the primary health care services program, an important feature of the national basic health services scheme. They are established in all 19 states of the federation, and course duration varies from six months to four years. The courses offered include the training of public health assistants, community nurses, dispensers, nurses' aides, and others. This trend does not preclude the establishment of postgraduate courses, however.

A postgraduate medical program has been introduced through the Nigerian Medical Council's postgraduate fellowship program and has now been extended to other West African countries, where it is known as the West African Postgraduate Medical College. Its member states are Sierra Leone, Gambia, Monrovia, Ghana, and Nigeria. It is expected that this development will eventually lead to the availability of instructional and research programs more relevant to the needs of Africa. At the same time, the problems of "brain drain" from the less-developed countries and the social and educational implications of the Foreign Medical Graduates (FMG) in developed or advanced countries will, in due course, diminish appreciably. In biomedical communication, the situation will lead to increased demand for literature services that must aim at international standards. Hence, if their programs are to gain international recognition, the degree-awarding authorities in Africa should anticipate these needs and plan to meet them.

All these developments are of great significance to the medical school libraries in Africa, and should have a salutary effect on those in Nigeria within the foreseeable future. They also constitute a sign-

post for educators of professional librarians, alerting them to the need for designing curricula that are relevant and that will enable their graduates to offer effective and functional library services in such environments.

Available Documents

The problems involved in the procurement of print and nonprint materials for health science libraries in Africa have been fully documented in the literature, and the solutions suggested should be executed by relevant initiating organizations and/or institutions.

In this paper I wish to emphasize the importance of access to some materials which are basic to the information, educational, and research needs of health science professionals in Africa. Attempts will be made to discuss their availability in various formats and media, including the so-called oral literature of Africa which contains a vast amount of information concerning its traditional medicine and healing arts. With respect to the role of librarians in this process, Darch in 1975 wrote: "Unless librarians in Africa are accepted as equal partners in the vital process of preserving oral traditions and, in countries like Ethiopia, of discovering and recording perishable manuscript materials, a large pool of expensive talent will be underutilized and much time will be lost."[6] This is a call for the development of enduring relationships based on mutual respect and understanding between librarians in Africa and librarians in other countries of the world.

Document Delivery

Austere budgets and galloping inflation have hampered the availability of requested reading materials for library users in some of the medical schools in Africa. For example, since October 1, 1978, health science libraries in developing countries have been denied the NLM "free literature" provision, which in 1977-78 enabled the library of the College of Medicine of the University of Lagos (CMUL) to obtain without charge about 7,329 pages of photocopy of articles from 305 journal

titles. This is an average of 24 pages per title. Overlooking the copyright implications, the cost effectiveness of free literature for use in research, education, and patient care is invaluable to the recipient library. Under the current NLM policy of a fee of $2.00 for not more than 50 pages per unit of request, the College of Medicine would have paid about $1,220 for the material it received in 1977-78. Given the prevailing cost of living, the current rate is still a generous offer, but there are other statutory bottlenecks involving foreign exchange transactions. The situation is similar in other African countries as well.

Foreign Language Literature

This literature consists mainly of the primary journals, that is, those that are usually recognized as "gatekeepers" of the advances in knowledge by the international scientific community. Its growing importance, especially in Africa, can be attributed to many factors, a few of which are:

1) Contributors or authors of articles from less-developed countries prefer to send their manuscripts to developed countries to achieve promptness in publication;

2) The foreign journals are often well established and of high international repute;

3) Political expediency and/or institutional requirements are the relevant considerations in the author's choice of communication medium.

In the majority of medical school institutions in Africa, and in some advanced or developed countries, there are faculty tenure requirements of publication in reputable journals. As observed by Brandon and Hill, and as can be noted by examining titles in "Medicine in West Africa,"* the literature is scattered among several European languages and not confined to English alone.

*These are MEDLINE computer searches produced monthly by the World Health Organization from the National Library of Medicine data in Bethesda, Maryland. Copies of the printouts are made available to some

For example, an ongoing study of the current literature on Lassa fever confirms this trend. Out of the three monographs published on Lassa fever, two are in non-English-language publications. Among the articles on the disease a significant number appear in journals published in languages other than English.

In 1974 Taine identified the Anglophone, Francophone, and Hispanophone countries and alerted the health science library community in Africa to the importance of these language groupings in the provision of library services in the African region of the World Health Organization.[7] Obviously, they should not be ignored in the effort to obtain quality-based service in Africa.

## Oral Literature

The felt need and expressed desire for national identity--which must be harmoniously incorporated in the medical school library acquisition policy--can be recognized in the collection of oral literature. This is an area where library and information services in Africa must make breakthroughs. For example, through the efforts of international organizations such as WHO, notable traditional healers (native doctors) are being encouraged to collaborate with modern medical practitioners. In other areas, herbal medicines are being suggested as topics for pharmaceutical research, while seminars and workshops are being sponsored to document and make available what medical scientists have found essential to African acceptance of modern medicine. In Nigeria, the traditional healing methods are being integrated with modern medical practice. Hospitals have been attached to the University of Ibadan medical school, and quite recently the psychiatric hospital was designated as a WHO research and training center. Many instructional materials are being generated or produced.

medical libraries through the E. Latunde Odeku Medical Library, UCH, Ibadan, as computer-produced bibliographies to help medical researchers, practitioners, and educators in their efforts to keep up to date on what is being published relating to West Africa. "Medicine in West Africa" was first produced in 1975.

## Audiovisual and Instructional Materials

Medical school libraries in Africa must acquire from the growing market of audiovisual equipment simple and portable hardware and software. Dowling writes: "Trained members of staff and adequate funds must be made available to collect, record wherever available, classify and organise the materials for use."[8] The availability of such equipment in libraries will encourage the communicators of oral literature, who are in the main illiterate, and will assure them copyright protection. Then, if proper arrangements are made for adequate compensation wherever and whenever necessary, more experts will cooperate and will make available for posterity invaluable information and skills in the traditional healing arts, material which at present is unavoidably hoarded in individual memories. The potential benefits of such developments for both the African medical school libraries and biomedical communication are tremendous, and should be encouraged.

In addition to the traditional role of medical libraries in audiovisual acquisition and utilization, instructional programs such as those mentioned by Suess should be encouraged:

> A variety of new instructional media have come into vogue, including correlated clinical teaching, programmed instruction, and television. . . . when videotape libraries are organized in various teaching centres, tapes of teaching material or of visiting lectures can be exchanged. It is also possible to transfer videotaped material onto 16-mm sound film for dissemination to centres which do not have television recording equipment.[9]

## International Involvement

Health is a subject of international significance, and contemporary events in Africa indicate a welcome wind of change in this area. The medical school libraries' unique role includes the provision of access to reports on medical research being conducted on the African continent. This involves the acquisition and organization of these publications, including their abstracting and indexing. It is, moreover, the responsibility of the library staffs to give adequate publicity and marketing to such sources and to mount a promotive campaign for them. This is

necessary because of the demand for these services and the failure of established indexing and abstracting periodicals to provide them. For instance, the one most widely used, Index Medicus, published by the National Library of Medicine, indexes only a handful of the national health science journals being published in Africa. The same is true of other secondary publications, such as Excerpta Medica, Current Contents, and British Medicine. The importance of these indexes in retrieving medical literature for research, education, and patient care cannot be overemphasized. (I have personally experienced the inefficiency of reference services, which is a result of the lack of up-to-date indexing for locally produced journals.)

Problems of Staff

To establish such an indexing and abstracting service could be difficult if not impossible in Africa because of the scarcity of trained librarians--a scarcity that is in part the result of the absence of professional librarian associations in Africa. There has been little motivation for such associations among the health sciences library professionals, funds available for such groups have been inadequate, and even moral support has been lacking. Now, however, the possibility of some help is in sight. The Health Sciences Library and Information Services (HeSLIS) of the Nigerian Library Association, which was founded on August 26, 1977, could be a nucleus for a forum of professional librarians through which approaches to AMSA could be channeled. Support for a cooperative indexing and/or abstracting service could be sought, and guidelines provided for minimum standards for medical school libraries in Africa.

There is also the potential for establishing a continuing education program for librarians working in the health science libraries. Ideally, such a program should be based in the country and conducted mainly by African librarians. It should include workshops, seminars, symposia, and congresses designed to promote international participation at all levels. Due consideration should be given to the needs

of these practitioners as Africans in Africa. Less emphasis should be placed on the use of sophisticated equipment and more on improvisation.

Toward Quality Provision

Earlier, it was mentioned that in maintaining quality collections a collection analysis is desirable. Let me buttress this theory with some of the tools of citation analysis described by Brandon and Hill and by Brennen and Davey.[10] These lists are well-established tools for collection building and for the selection of both books and periodicals for medical libraries. Hence, their relevance and importance to medical libraries in Africa cannot be overemphasized.

A study of Brennen's guide to journals on tropical medicine indicates that:

1) Journals in English, French, and Spanish ranked higher (80.21 percent) than any other language journals in the analysis. This re-emphasizes the importance of language representation in building a collection on the subject;

2) The three African (local) national publications cited are the East African Medical Journal, the Central African Journal of Medicine, and the Journal of the Egyptian Medical Association. Even these are not fully represented in some of the medical school libraries in Nigeria;

3) Close study and analysis of the serials catalogues of the three well-established medical school libraries in Nigeria show that none subscribes to the Mosquito News, which ranked seventh among the 61 journal titles cited.

Since Africa is at present the largest and most noteworthy of all the areas where tropical diseases are endemic, it would appear that if the rank-order list of periodical titles prepared by Brennen for use as a guide in the purchase of journals is anything to go by, the library collections of some African medical schools are not only unbalanced but deficient as well.

The "core list" idea can be extended further toward the provision of quality journals in medical school libraries in West Africa, for

instance, if the writer's ongoing study of journal citations provided by "Medicine in West Africa" is given a chance to succeed. The study, which was started in 1976, is based on lists of titles from articles retrieved on MEDLINE for "Medicine in West Africa." Again the predominance of non-English-language journal titles has been evident. They are, quite frankly, formidable sources of material in quality collection building for journals in medical school libraries in Africa.

Unmet Needs

There will be a growing demand for literature that will address the needs of the new health professionals, whose skills and knowledge must be maintained. They will require in the libraries relevant literature resources to support their continuing education.

In addition, the libraries must make provision for the education of other users, e.g., patient education. Medical school libraries in Africa will be involved in the provision of literature that would be considered unnecessary under normal circumstances in developed countries. The task will call for selection tools designed to achieve this specific purpose. For example, King's list contains many introductory textbooks which, according to him, were found to be of value for the training of auxiliary staff.[11] They would be of particular value for the libraries of training schools in Africa. A study to determine whether or not librarians use such tools in the acquisition of books and journals would be useful.

Of more relevance to the theme of this conference is the problem posed by the growth of the national biomedical literature in the African continent. In their study, Dhir and Anand supported the inclusion of national biomedical serial titles in the medical school libraries.[12] A list of such titles for the African biomedical literature has been compiled by the author as reported in Nigerian Health Sciences Periodicals.[13] It is quite appropriate to emphasize the importance of the national journals in the health sciences literature programs. These journals often include case reports and other significant developments

in the biomedical sciences peculiar to the African continent, and so will enrich the knowledge of librarians both here and in other countries.

## Suggestions

Some areas of concern in medical school libraries in Africa merit further investigation. They include the following:

1) The lack of comprehensive and up-to-date directories of health science information sources in Africa;

2) The lack of detailed knowledge concerning the information-gathering habits and problems of health professionals in the areas of research and patient care;

3) The need for effective dissemination of information concerning medical and health-related scientific research;

4) The need for bibliographic control of an accessibility to African national biomedical publications which are excluded from major data bases (e.g., MEDLINE), especially publications of government and research reports, theses, conference proceedings, etc.;

5) The apparent lack of knowledge concerning important information tools, systems, and services on the part of many health professionals not directly involved with information work;

6) The shortage of professionally trained librarians and information scientists;

7) The absence of a professional forum for discussion of health sciences library information issues and development on the African continent;

8) The need and potential demand for low-cost textbooks in different languages;

9) The problem of foreign-language materials as sources of information in the health sciences;

10) The feasibility of establishing a model medical school library as a pilot project for the provision of quality library services.

The most urgent need is for guidelines for the provision of li-

braries for the African health services. This must be the major concern of the professional health science librarians in African medical schools. The purpose of such a group should be:

1) To form a forum for discussion and solution of problems encountered by librarians in the health sector of the African community;

2) To discuss ideas and problems, gather expertise, and keep up with new developments on biomedical information in general;

3) To provide a regular platform for the exchange of information;

4) To promote and facilitate local cooperative ventures;

5) To apply appropriate pressure in support of improved bibliographic standards in publications for the health professionals throughout the continent.

## Conclusion

The medical school libraries in Africa should provide library services to meet the information, educational, and research-related needs of the medical and hospital staffs. Emphasis under these broad principles has in the past been placed on the availability of relevant library resources in sufficient quantity to ensure maximum utilization. It should now be extended to require the provision of professional library services, guided by written policies and procedures, which were hitherto considered to be inadequately provided in medical school libraries in Africa.

Collection materials of current and authoritative print and nonprint media to support clinical, educational, and research activities are essential, and machinery should be set up to achieve this most desirable objective.

Written policies for acquisition and collection maintenance in accordance with AMSA guidelines or standards will ensure the quality and relevance of library resources. Similarly, written policies concerning levels of reference, bibliographic, and access services provided by the library will be of value to both the librarian and the clientele

in maintaining such services at the prescribed levels.

Collection development as an individual process should allow for individual differences in growth and development, since each library has its own unique clientele and peculiar demands to satisfy.

Selection tools should be supplemented by additional books and journals in subject areas of greatest interest to the library's clientele.

Publications of national professional associations are also essential. They are generally authoritative in scope, usually inexpensive, and tend to be heavily used, particularly by members of the respective associations.

Journal literature is becoming more important to institutional needs, as it is usually based on research and educational programs. But science journals are among the most expensive items for medical library acquisition. Access is essential, but individual acquisition is not always cost effective. Cooperative resource-sharing is, therefore, considered imperative, particularly in Africa, as noted by Akinyotu.

It is my belief that the apparent deficiencies in the collections of quality periodicals on tropical medicine in some of the identified medical school libraries in Africa, in both English and languages other than English, can be minimized through coordinated and/or cooperative schemes. They could be national in scope for a start, and later channeled into international programs such as the West African Health Secretariat and/or the Association of Medical Schools in Africa.

Finally, we should be aware of the causes of the information explosion, one of which is the rising educational level of people everywhere, thus multiplying the information-user population in the process. The African continent has not been excluded from this growth of "knowledge workers," particularly in medical- and health-related sciences, a growth that has been spectacular within the past 20 years in Africa and in Nigeria in particular. Aines discusses the inevitable "prolifer-

ation" and writes: "How do we measure proliferation? By collection of statistics showing the growth in the printed products, by examining the expansion of the machinery devoted to information storage and delivery."

These are the problems that preoccupy the medical school libraries in Africa.

In the foregoing, I have raised more questions than I have answered in an effort to outline some of the issues involved in developing library and information systems that will respond effectively to the different needs of all health care professionals in Africa. Perhaps I should end with a plea that less-developed countries be provided with libraries and information materials and resources of "quality in the right quantity"[14] for their medical schools and other health-related institutions.

NOTES


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# DEMAND FOR AND ACCESS TO PRIMARY BIOMEDICAL INFORMATION IN BRAZIL

Gilda Maria Braga

The continuous growth of developing countries is intrinsically related to the quality of information each country consumes and produces. The organization and dissemination of information, mainly in the so-called strategic areas of agriculture, energy, and health, are essential parts of the overall process of development. In Brazil, the biomedical sciences (including the health professions) have an important role, as shown by papers presented at meetings of the Brazilian Society for the Advancement of Science from 1956 to 1977. An analysis of these papers indicates that more than 40 percent of the total number of authors, papers, and grants have been in the area of the biomedical sciences.[1] The postgraduate courses offered in the country in 1978 show a similar trend (Table I). Biomedical areas comprise roughly one-third of the total number of courses, one-third of the total number of faculty members involved, and one-fifth of the student population.[2]

The demand for biomedical information is remarkably high, as can be seen from the report of Dr. Sonis (this Working Paper) on the work of the Regional Library of Medicine (BIREME), whose headquarters are in the state of São Paulo. Access to primary biomedical literature is also supplied by the National Union Catalogue of Periodicals (CCNP) with headquarters in the Brazilian Institute of Scientific and Technological Information (IBICT) in Rio de Janeiro. In the period 1977-78, the CCNP supplied approximately 1,900 copies of some 600 papers in various biomedical journals (Table II); almost half of the requests referred to the literature published in the period 1970-78 (Table III).

This heavy demand for biomedical information encounters one major problem: the incompleteness of journal collections in Brazilian libraries. A survey of the availability of the 16 major biomedical journals,

TABLE I

POSTGRADUATE EDUCATION IN BRAZIL (1978)

| Area and Total No. of Courses per Area | Ph.D. Courses | M.S. Courses | Area % |
|---|---|---|---|
| Health Professions (176) | 49 | 127 | 20.09 |
| Exact Sciences (143) | 47 | 96 | 16.32 |
| Technological Professions (109) | 30 | 79 | 12.44 |
| Biological Sciences (102) | 34 | 68 | 11.64 |
| Social Sciences (95) | 20 | 75 | 10.85 |
| Agro-Industrial Professions (93) | 11 | 82 | 10.62 |
| Social Professions (69) | 16 | 53 | 7.89 |
| Literature Linguistics (58) | 17 | 41 | 6.62 |
| Education (30) | 4 | 26 | 3.42 |
| Arts (1) | - | 1 | 0.11 |
| Total: All Areas (876) | 228 | 648 | |

TABLE II

JOURNALS REQUESTED 10 OR MORE TIMES IN TOTAL OF 1,897 REQUESTS: NATIONAL UNION CATALOGUE OF PERIODICALS, 1977-78

| Journals | Requests | |
|---|---|---|
| | No. | Percentage |
| American Review of Respiratory Disease | 54 | 2.84 |
| Revista Brasileira de Biologia | 36 | 1.90 |
| Journal of Bacteriology | 34 | 1.79 |
| Chest | 29 | 1.52 |
| Journal of the American Medical Association | 27 | 1.42 |
| Respiratory Care | 27 | 1.42 |
| New England Journal of Medicine | 25 | 1.31 |
| British Medical Journal | 19 | 1.00 |
| Applied Microbiology | 18 | 0.95 |
| Lancet | 18 | 0.95 |
| American Psychologist | 16 | 0.84 |
| Annals of Thoracic Surgery | 16 | 0.84 |
| Revista do Instituto de Medicina Tropical | 16 | 0.84 |
| Canadian Journal of Microbiology | 15 | 0.79 |
| Journal of Biological Chemistry | 15 | 0.79 |
| Journal of Creative Behavior | 15 | 0.79 |
| Journal of Thoracic and Cardiovascular Surgery | 15 | 0.79 |
| Memorias do Instituto Oswaldo Cruz | 15 | 0.79 |
| Perceptual and Motor Skills | 15 | 0.79 |
| Vox Sanguinis | 15 | 0.79 |

TABLE II (cont.)

| Journals | Requests | |
|---|---|---|
| | No. | Percentage |
| Cytogenetics | 13 | 0.68 |
| Psychological Reports | 13 | 0.68 |
| Biochimica et Biophysica Acta | 12 | 0.63 |
| Comptes Rendus des Séances Société de Biologie et ses Filiales | 12 | 0.63 |
| Journal of Bone and Joint Surgery | 12 | 0.63 |
| Journal of Pathology and Bacteriology | 12 | 0.63 |
| Virology | 12 | 0.63 |
| American Journal of Medicine | 11 | 0.57 |
| Concours Medical | 11 | 0.57 |
| Proceedings of the Society for Experimental Biology | 11 | 0.57 |
| Radiology | 11 | 0.57 |
| American Journal of Roentgenology | 10 | 0.52 |
| Analytical Biochemistry | 10 | 0.52 |
| Bulletin of the World Health Organization | 10 | 0.52 |
| Heredity | 10 | 0.52 |
| Journal of Clinical Investigation | 10 | 0.52 |
| Journal of Immunology | 10 | 0.52 |

TABLE III

REQUESTS FOR COPIES IN 1977-78 BY JOURNAL YEAR OF PUBLICATION: NATIONAL UNION CATALOGUE OF PERIODICALS

| Journal Year | No. of Requests | Percentage |
|---|---|---|
| 1975-1978 | 527 | 27.78 |
| 1970-1974 | 362 | 19.08 |
| 1965-1969 | 271 | 14.28 |
| 1960-1964 | 218 | 11.49 |
| 1950-1959 | 240 | 12.65 |
| 1940-1949 | 109 | 5.75 |
| 1930-1939 | 69 | 3.64 |
| 1920-1929 | 52 | 2.74 |
| 1910-1919 | 29 | 1.53 |
| 1900-1909 | 13 | 0.69 |
| Until 1899 | 7 | 0.37 |
| Total | 1,897 | 100 |

TABLE IV

BIOMEDICAL JOURNAL COLLECTIONS IN BRAZILIAN LIBRARIES

| Journals | Available in . . . Libraries | Complete Collections |
|---|---|---|
| American Journal of Pathology | 68 | 3 |
| American Journal of Tropical Medicine and Hygiene | 73 | 3 |
| Annals of Tropical Medicine & Parasitology | 52 | 3 |
| Bulletin of the World Health Organization | 83 | 1 |
| Experimental Parasitology | 56 | 2 |
| Journal of Infectious Diseases | 75 | 3 |
| Journal of Parasitology | 66 | 1 |
| Lancet | 96 | - |
| Nature | 146 | - |
| Transactions of the Royal Society for Tropical Medicine and Hygiene | 44 | 1 |
| *Gazeta Médica da Bahía | 87 | - |
| *Hospital | 118 | - |
| *Revista da Associação Médica Brasileira | 156 | 3 |
| *Revista Brasileira de Malariologia e Doenças Tropicais | 118 | 1 |
| *Revista do Instituto de Medicina Tropical de São Paulo | 122 | 7 |
| *Revista da Sociedade Brasileira de Medicina Tropical | 80 | - |

* Brazilian journals

known as the "top quality" literature of tropical medicine, has been made by the CCNP. Ten of these journals are in English and six Brazilian journals in Portuguese. The survey showed that for the period 1970-79 there were 1,440 collections of these 16 journals in the almost 1,000 Brazilian libraries, but only 28 were complete (Table IV). This means a degree of completeness of less than 2 percent and a duplication of collections by a factor of nine. This low degree of completeness is not confined to the biomedical area, however. Other studies in the series being conducted by the Division of Teaching and Research of the IBICT to determine the degree of completeness of journal collections in Brazilian academic libraries show that the situation in general is bad. Results in the areas of chemistry and engineering, for example, tend to confirm those found in the biomedical sciences.

This problem of incompleteness of collections is a very complex one involving variables such as acquisition policy, financial resources and administrative constraints. Access to primary information is clearly a vital point in the whole process of scientific and technological communication, however, and the Brazilian Institute for Information in Science and Technology has undertaken several studies in an effort to approach the problem in a rational and systematic way. Results obtained so far indicate that the best solution lies in development of a system of resource sharing. This can be implemented through careful planning at the governmental level, but its effectiveness will depend in large part on the capabilities of individual librarians. Thus the training of librarians must have an important place in any program planned to meet the problem of access to biomedical information.

## NOTES

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# III. METHODS AND TECHNOLOGY FOR SOLUTIONS

# METHODS FOR QUALITY SELECTION

William Goffman

The need for selective literature systems stems from the unabated growth of scientific and biomedical literature. For biomedical literature alone there were an estimated 20,000 journals in 1977.[1] MEDLARS, acting as a quality filtering mechanism, includes the citations from about 2,500 of these journals. Yet, for example, for the six tropical diseases designated by WHO as among the most important health problems facing mankind, namely, filariasis, leishmaniasis, leprosy, malaria, schistosomiasis, and trypanosomiasis, there were more than 13,000 citations listed in MEDLARS for the 10-year period 1966-75. So in spite of improved storage and retrieval capabilities, the information overload persists. Although large mechanized archival systems such as MEDLARS are essential, a major obstacle to the development of more effective information systems is the absence of a continuously current manageable body of selected information that is rapidly accessible.

The question is: How should the information selection be carried out? There can be little argument that the primary literature represents the only genuine record of scientific achievement. Hence, the first step in the selection process is to limit the information source to the primary literature. Selection is a phenomenon already built into the system of scientific publication. At the very beginning of the process is the production of manuscripts by scientific workers reporting the results of their work. These manuscripts are then submitted to journals for possible publication. At this stage, selection occurs by the mechanism of refereeing of the manuscript by a number of experts in the field with which the particular manuscript is concerned. This conventional reviewing system determines when and where an author may publish. Its effectiveness, however, is questionable. Arnold Relman, editor of the New England Journal of Medicine, reported that among a

random sample of papers rejected by that journal, 85 percent were published elsewhere, many in prestigious biomedical journals.[2] In a previous report, Franz Inglefinger, former editor of the NEJM, reported that concurrence between two reviewers of each of some 500 papers submitted to NEJM was only moderately better than chance.[3]

As a consequence, there is need for further selection of the primary literature. In the biomedical field, as already mentioned, such a selection process takes place in the MEDLARS system of the National Library of Medicine. In this case a panel of experts periodically meets to decide which journals should be included in the MEDLARS store. As a result, the total biomedical population of about 20,000 journals is filtered down to about 2,500. Nevertheless, the amount of information remaining is overwhelming: witness the 13,000-plus citations over a 10-year period of the aforementioned six tropical diseases, diseases, I might add, which have been relatively neglected. For those diseases which are in the forefront of biomedical research, the numbers are considerably more impressive. This situation would suggest, therefore, the need for further filtering.

The method of choice would seem to be to have panels of experts evaluate the MEDLARS files. Only a panel of this sort is qualified to make such judgments. That this process would yield a considerable reduction in the resulting selected literature is supported by two major studies in which this technique was employed.

K. S. Warren and V. A. Newill published a bibliography of the world's literature on schistosomiasis from 1852 to 1962 consisting of close to 10,000 journal articles.[4] This bibliography was evaluated for quality by a panel of 47 experts chosen by WHO.[5] The results showed that about 3,200 articles, or about one-third of the total number, were selected at least once and that half of these were selected at least twice. Thus only about 17 percent of the total literature was selected by at least two experts. Warren subsequently published an updated bibliography covering the period of 1963-74.[6] It consisted of about 4,000 citations and the selected literature for that period chosen by a panel

of 25 experts in 37 research areas.[7] The resulting collection comprised about 10 percent of the total literature.

Comroe and Dripps, in analyzing how and why lifesaving advances came about in cardiovascular and pulmonary diseases, filtered down an initial collection of 4,000 articles to 529 that they and a panel of 140 experts considered essential, or about 13 percent of the initial collection.[8]

The two obvious drawbacks to filtering the literature in this way are the great amount of time needed to carry out the procedure (e.g., the Comroe-Dripps study took almost 10 years to complete) and the difficulty of getting the experts to devote the time necessary to do the job. Hence, other methods are needed. Fortunately, the biomedical literature system has two characteristics in which peer assessments are implicit, but which do not directly involve peer participation in a review procedure. These are the listing of references at the end of every publication and state-of-the-art review articles.

As E. Garfield has stated:

> Authors refer to previous material to support, illustrate, or elaborate on a particular point, so that the act of citing is, in general, an expression of the "importance" of the material cited. It appears that the number of times a given journal has been cited is an objective indicator of the quality of the journal. Thus, a useful tool to aid in journal selection and evaluation is a statistical report on the frequency of citation.[9]

This argument might equally well apply to authors and papers. When you consider that 25 to 50 percent of scientific papers published are never cited even once, citation analysis can constitute a consequential filter of the scientific and biomedical literature.

However, a citation analysis of an entire field would require first the collection of the entire literature of that field; the citation frequencies would then have to be computed from that collection. In the case of the six tropical diseases referred to above, this means that over 13,000 articles would have to be analyzed for 1966-75 alone. Moreover, although citation analysis may imply peer review, it does not

imply expert assessment, since every citation is treated equally.

Use of the review articles of a given subject would seem to address the above issue. In the first place, computing the frequency of citation by reviews would require the analysis of many fewer articles than would be the case for computing the frequency of citation in the literature at large. For example, for the six tropical diseases there were only 134 review articles listed in the Bibliography of Reviews of the Index Medicus from 1970 through 1977. Consequently, only 134 articles would have to be analyzed instead of over 13,000. Second, since review articles are generally produced by experts in a given field, by analyzing them one can arrive at a quality assessment of a literature by consensus of experts without having to involve them personally in the selection process. For areas such as the biomedical sciences, where review articles are an integral component of the communication system, we have a relatively simple device for quickly identifying authors, papers, and journals of quality for any given field. Thus it should be possible to develop automated systems for rapid access to the quality literature of a given subject in three different ways: by author, by paper, and by journal. Such systems could easily be kept current, and would be based on the sound principles of identification of quality by consensus. These systems could be used for selective dissemination and retrieval of information (quality papers); establishment of small quality-based libraries (quality journals), and as an aid to funding policy (quality authors).

On the basis of the above discussion, the following procedure for rapid access to any selective literature of choice in the biomedical field was constructed.

Step 1: Identify a profile of subject headings covering the relevant subject areas. These would be the Medical Subject Headings (MeSH) of the Index Medicus and would be selected by a subject specialist. This profile can take the form of individual headings or combinations of headings defined as conjunctions, disjunctions, and negations of

individual headings. The totality of these subject headings would represent a covering of the entire field of interest.

Step 2: List from MEDLARS Bibliography of Reviews all review articles for each area covering the most recent five-year period. A five-year period was selected because this constitutes the average life span for citation of a scientific paper.

Step 3: Feed into a computing machine all references from all the reviews, identified in Step 2, denoting authors, journals, and subject category.

Step 4: Rank authors, journals, and papers according to the number of times cited by the reviews.

Step 5: Compute a selection number for each author, paper, and journal. For papers and journals, the selection number can be simply the frequency of citation, since no paper will appear in more than one journal and no review articles will cite a given paper more than once. For authors, however, this measure is clearly not adequate because of the phenomenon of co-authorship. That is, papers are often produced by teams of collaborators, and the relative importance of individual contributors cannot be assessed in terms of the frequency of citation alone. This can be done, however, by the following method. We construct co-author networks for the most highly cited authors. These networks have the property that every two authors in a given network is connected by a chain of co-authorships. We then compute a synthesis measure for each author in each network by computing the amount of decomposition occurring in the network when each author is removed. In other words, those authors who are the highest synthesizers, i.e., who are the most important for a particular network, will, when removed, lead to the greatest amount of disorder in the network. Such a measure has been defined as

$$S_j = -\sum_{i}^{n} (N_i/N-1)\log(N_i/N-1)$$

where N is the number of authors in the network; $N_i$ the number of authors in each of the n subnetworks of the resulting decomposition when author j has been removed.[10] Authors with the same synthesis number would be ranked according to the number of times cited.

Step 6: Rank authors, journals, and papers according to their selection numbers.

Step 7: There exists a time lag of two to three years built into the data base during which the actual state of the literature would not be reflected in the data. This time lag derives from three different sources, namely, the time lag in the publication of papers; the time lag in the publication of review articles; and the time lag in the listing of review articles in the Index Medicus Bibliography of Reviews. We can partially correct for this time lag by identifying the most recent published papers in the selected journals identified in Step 6. This can be easily obtained by a MEDLARS search.

Once the selected authors, journals, and papers have been identified, it is not too difficult to group them in a variety of different ways. For example, they could be classed in terms of basic or applied research, or they could be partitioned in terms of more refined subspecialties within the larger specialty. This could probably best be accomplished from the key words in the titles of the selected papers and the review articles which cite them or by the MeSH headings under which they appear in the MEDLARS system.

The entire procedure can be updated at monthly or yearly intervals by inputting the new review data as it becomes available in the Bibliography of Reviews.

The above procedure constitutes a method by which the user can have rapid access to a selected literature of any field. This system can easily be kept current, can be automated if desired, and is evolved from existing quantity-based systems. Thus the user is not denied access to the total literature if he so desires.

The procedure just described was applied to the literature of the six tropical diseases discussed above--filariasis, leishmaniasis,

leprosy, malaria, schistosomiasis, and trypanosomiasis. There were approximately 4,000 unique citations in the 134 relevant review articles for the period of 1966-77, or about 30 percent of the total number of papers listed in MEDLARS for the same period of time. Of these articles cited by at least one review, only about one-third of them, or 10 percent of the total, were cited by at least two review articles. Thus a considerable reduction of data was obtained.

## Discussion

The proposed system is clearly subject to a number of criticisms. First, one may argue with the contention that the scientific literature represents the only legitimate base of scientific knowledge. Further, one may dispute the effectiveness of the MEDLARS system and the effectiveness of citations from review articles as a quality filter. Finally, one may point to the time lag inherent in the use of review articles as a filter.

In answer to these criticisms, I would say first of all that one cannot seriously argue with the contention that legitimate scientific information can be found only in the published literature; the publish-or-perish syndrome sees to that. In fact, if a scientist does not publish, he should perish. However, it is because of the publish-or-perish syndrome that selection of the literature is essential.

Moreover, with all of its well-known laws, MEDLARS represents the most comprehensive and readily accessible body of biomedical information available. Similarly, in spite of certain flaws, citations represent the best consensus of peer review. To quote Professor John Ziman:

> Scientific papers are derivative, and very largely unoriginal, because they lean on previous research. The evidence for this is plain to see, in the long list of citations that must always be published with every new contribution. These citations not only vouch for the authority and relevance of the statements that they are called upon to support; they imbed the whole work in a context of previous achievements and current aspirations. It is rare to find a reputable paper that contains no references to previous research. Indeed, one relies on the citations to show its place

in the whole scientific structure, just as one relies on man's kinship affiliations to show his place in his tribe.[11]

Citation by state-of-the-art review articles represents an even finer peer review specifically related to the subject of interest. Again quoting Professor Ziman:

> In its narrow sense, a review article is little more than a classified bibliography--a catalogue raisonné of the primary literature, putting the results into order and commenting impartially on any obvious contradictions and controversies. But a good review article, besides performing this archival function, should go much further. As I have emphasized, the primary literature is fragmentary, and only intelligible within a context of action research. It is a ridiculous but commonly held belief that the publication of results of particular investigations is sufficient to create a body of knowledge. On the contrary, the information to be gleaned from a primary scientific paper is often about as meaningful as an entry in a telephone directory, or map reference in a military dispatch; it only acquires significance by use, or by its explicit place in a larger pattern, which at some stage must be made explicit. The job of the review writer is to sift and sort the primary observations and to delineate this larger pattern. It is only by such public re-appraisals that those who are already not expert in the subject can have any idea of the credibility of the innumerable results "reported in the literature."

As for the time lag, one may argue that the time lag is not a serious defect since quality is a function of time, hence the current literature is too new to be accurately assessed for quality. However, the time lag can be closed by introducing into the selected data base all recent publications by selected journals in the area of interest. These publications would then either remain in the data base or be automatically filtered out by the system.

In summary, the proposed system incorporates four major filters inherent in the traditional process of scientific communication. These are:

1) Publication, where filtering takes place by the peer-review system of refereeing;

2) Selection by a secondary source such as MEDLARS, where a panel of experts selects about 2,500 journals from among the 20,000 in the biomedical field for inclusion in the MEDLARS system;

3) Citation, where the individual author selects those papers which relate to the work that he is reporting;

4) Citation by review articles, where selection is made by an expert in a particular field as he surveys the state of that field at a particular point in time.

The proposed system would thus be built on existing conventional systems and processes.

Having reached this stage, we still only have an output of documents and not of information. The information output, however, can be accomplished by subjecting the filtered literature to the assessment of a panel of experts who would by consensus extract the relevant information. In other words, we would simply apply the method employed by NLM in its hepatitis project.[12] At this stage, the direct intervention of experts cannot be avoided. However, as a result of the filtering procedure, they must evaluate only about 1,500 documents instead of 13,000.

In conclusion, as a method for quality selection, a sequence of filtering procedures could be applied to the biomedical literature, each being an outcome of the previous filter. In all but one instance these procedures could be carried out automatically and would provide the user with rapid access to the quality literature of a given field at various levels of coverage. That is, the user could enter the system for a specific fact or piece of data at one extreme of the sequence, or enter for a comprehensive bibliography at the other.

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# CORE COLLECTIONS FOR MEDICAL SCHOOL LIBRARIES

Alfred N. Brandon

Although there is no stated and/or recommended core collection for a medical school library, there are several tools that may be useful in such a selection process; one is a core list.

There has been much debate concerning the need for and usefulness of core lists for medical libraries. However, demand for such information has continued to increase to such an extent that 30,000 reprints have been ordered of the latest edition of the Brandon List,[1] the most widely accepted selected list for small and medium sized medical libraries. Before it was first issued in 1965, the standard selection tool of this type was one distributed by the American Medical Association, the latest edition of which was published in 1959.[2]

For many years, the U.S. Veterans Administration issued a Basic List of Books and Journals for Veterans Administration Medical Libraries, as well as several Medical Specialty Checklists,[3] all of which were helpful in developing hospital library collections.

Sister Mary Concordia's Basic Book and Periodical List: Nursing School and Small Medical Library,[4] published in 1967, although Catholic-oriented, was useful in developing a combined medical-nursing collection.

For other older lists, I would refer you to the references cited in earlier editions of the Brandon List.

Today there are several good selected lists, all of which are helpful in determining what books and journals would best suit the needs of specific types of health science libraries:

For nursing collections there is the recently published "Selected List of Nursing Books and Journals";[5] for dentistry, Raskin and Hathorn's "Selected List of Books and Journals for a Small Dental Library";[6] for public health, La Rocco and Jones's "A Bookshelf in

Public Health, Medical Care, and Allied Fields";[7] and for clinical specialties, the lists published by Allyn[8] and West.[9]

The Library Association in London has recently issued a new edition of Books and Periodicals for Medical Libraries in Hospitals,[10] a subject listing of publications which a subcommittee of its Medical Section considers most likely to provide useful coverage in various basic and clinical fields.

For establishing a good working medical reference collection, there is Duncan's "Selected Reference Aids for Small Medical Libraries,"[11] and for larger reference collection needs Blake and Roos's Medical Reference Works, 1679-1966 and its supplements.[12]

A more comprehensive listing of standard books and journals in the basic and clinical sciences can be found in Myrl Ebert's 1970 Introduction to the Literature of the Medical Sciences.[13] Although the listing is outdated, it can still be used as a guide to the classic texts and key journals in the different fields.

About 10 years ago, Stearns and Ratcliff presented the "core library" concept.[14] Their list was purported to be the absolute minimal collection necessary for the hospital library. Even in the early 1970's, this list proved to be too minimal and restrictive in scope for anything except the smallest hospital libraries. Yet it was a beginning goal for the traditionally underdeveloped hospital library in the U.S.

Subsequently, other core lists for hospital libraries have been compiled by some of the regional medical libraries. However, because of the importance given the hospital (or basic unit) library in NLM's Regional Medical Library Programs, these core lists hardly meet the needs of the upgraded hospital library and must be supplemented.

Book and journal lists compiled primarily for practicing physicians are apt to be overloaded in the clinical sciences and too meager in the basic sciences and nursing for the hospital library, but they can be instructive in building a core collection of clinical volumes. Using these varied and generally well-accepted selection tools, one might be

able to compile a model working collection for the larger medical library, but in applying this method to the medical school library in less-developed countries, general and local conditions must be considered. Availability of translated editions should be noted in any such listing of books.

The philosophy behind the core collection concept is that such a model should provide the minimal number of quality books and journals that will be apt to satisfy the average institution's primary clientele. The Stearns-Ratcliff core list is useful for the average small U.S. hospital; a medical school core collection should be designed and compiled for the average medical school. "Average" would probably differ greatly from country to country in less-developed areas of the world, and it would be prudent to compile a smaller list of core materials than one would for a medical school in the U.S. or Britain. The limitations for funds in less-developed countries would also dictate a limited collection. Factors to take into consideration in adopting a core list for medical schools in less-developed countries include: (1) the geographical location of the school; (2) the availability of nearby collections; and (3) the status of regional medical library development and cooperation.

In a city or country that has more than one medical school or medical research library, cooperation in developing subject collections must be encouraged. Sharing resources is essential if wider coverage of the medical literature is to be achieved. However, availability of one institution's collection to another has not always been, and is still not today, a fait accompli. Whenever possible, a regional medical library network must be implemented, financed, and sustained.

Let us turn our attention to some of the unique problems of building a medical school collection in less-developed countries. Today many of these so-called libraries have small outdated collections that we might compare with the hospital library in the U.S. a decade or more ago. In order to achieve a quantitative supply of books and journals, pleas were made for medical libraries in the U.S., Great Britain, etc.

to send old medical textbooks and journals. This kind of exchange program was often an expensive and inept way of procuring materials and resulted in the sending of duplicates and unneeded old monographs. To avoid these problems, a "buddy" system was adopted by some of the larger U.S. medical libraries under which they would send specific needed items to a designated medical library abroad. The World Health Organization and the U.S. Book Exchange have collaborated with developing medical libraries and have achieved some success in making useful and needed materials available to them.

Lack of funds to purchase current medical books and to pay for current subscriptions to journals is common. Yet even if such funds were available, the time lag in receiving materials, especially current journal issues, would be a major problem.

The lack of interlibrary cooperation policies and of government support of such plans greatly hampers the exchange of information between libraries in many developing countries. Absence of union catalogues and of lists of holdings of major libraries further restricts the availability of medical information, as does the dearth of photocopy and microfiche reading equipment.

Although English is fast becoming the universal language of medicine, language barriers exist which may take decades to break down. Any core list must of necessity be based on English-language materials, but those texts and monographs that have one or more translated editions would be preferable in many countries. Availability of local literature would need to be considered. This material would not usually be included in a general core list, but provision must be made for it.

Based on the knowledge I have gained in producing selected lists, I would suggest that a good core list for medical schools in less-developed countries should probably contain about 1,000 titles of current books and 400 journal subscriptions, not including local literature. General recommendations would have to be made concerning retrospective literature. Using existing lists and bibliographies, consulting authorities in various disciplines, and considering the usage

of materials in medical libraries would all facilitate the production of such a core list. For journal selection, the titles included in periodical indexes generally available in these countries must be considered.

If a smaller collection is desired for monetary or other reasons, the existing Brandon List could be adapted with modifications suggested by subject specialists and medical librarians for some of the developing countries as well as from WHO personnel.

Some possible solutions to the problems of establishing viable medical school libraries in developing countries include:

1) The creation of a proposed core list with data on translated versions available. No listing of books and journals will satisfy everyone. Each teacher, student, and practitioner has his own preferred texts and journals. However, a consensus can indicate whether or not a specified group of materials will meet the general needs of the majority of potential users. With the approval of a recognized body or organization, a standard core collection can be a successful means of achieving a good working library for present underdeveloped medical school libraries.

2) The funding of a few model basic collections, which could serve as initial experiments. The institutions chosen should be carefully selected and some guarantee should be forthcoming that would ensure the maintenance of data for guidance in the further development and possible expansion of the project. A commitment might be obtained to continue journal subscriptions and update the book collection as new editions become available.

3) The finding of a book jobber who would cooperate in assembling, packaging, and transporting the books in the collection. This agent should be requested to outline a procedure that would ensure quick delivery of books at reasonable prices, including handling and transportation costs. Negotiations of terms should be under the direction of personnel familiar with the particular problems in the countries involved.

4) The locating of a periodical agent who would be willing and able to enter journal subscriptions, check in all issues, forward them to the library, and automatically claim all missing numbers. If possible, an agent who can show proven success in this type of service should be selected.

In conclusion, I would like to state that I believe it is possible and feasible to develop a core list for medical school libraries in less-developed countries. This cannot be accomplished quickly unless one of the existing lists is used as a base. Moreover, I believe such a project should be independently financed and commissioned. It deserves study and input by subject specialists and medical librarians from various parts of the world. Guidance must be given concerning the scope of the project, and any financial restraints should be specified.

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# DELIVERY OF LITERATURE TO AND MAINTENANCE OF COLLECTIONS IN MEDICAL SCHOOL LIBRARIES IN LESS-DEVELOPED COUNTRIES

George Ember

Since my paper follows in the program the status reports of medical school libraries in Latin America, Southeast Asia, and Africa--an almost global panorama of the developing world--some of my remarks will necessarily deal with issues which have already been introduced or discussed. This is only natural, since my topic--document delivery and collection maintenance--cannot be bypassed by any inquiry into the main theme of the conference. No matter from which direction you approach the problem of medical school libraries, there is somewhere, often at the center, the question of document delivery: the movement of the literature into, within, and among developing countries. Inseparable from this question is collection maintenance: what happens to the acquired books and journals, and how they are made accessible to the reader. I know, therefore, that I am only further exploring an area which has already been mapped out and inspected by others who spoke before me.

Document delivery supplies the information in its published literary form. It is the last stage of the information-gathering process, when the reader gets into his hand the text he wants to read. This can be a book, a journal issue, a selected article, or a technical report printed, photocopied, or reduced to some microform. The conditions of document delivery are threefold: the text must first be acquired, then stored in an identifiable form, and finally forwarded to the requester by some mode of transport.

The reader's interest in a document can be raised in many ways--for example, by browsing in the stacks of a library or by spotting the reference in some index, abstract journal, or the bibliographic appendix of a published article or monograph. In the developed world,

and in a few developing countries, the reference is most often presented to the user from electronically manipulated data banks. Our highly evolved computer-based bibliographic services are, in effect, "literature-offering mechanisms," electronic aids for browsing in the scholarly records of science and technology. They present the literature reduced to the bare essentials: a citation identifying the author, title, and publication source; perhaps a brief abstract indicating the topic of the paper, and a set of subject descriptors or key words. This miniaturized record reaches the user either through the screen of an on-line terminal or in some printed form selectively created in response to his query. In whatever shape or form this "menu" of the literature is placed before the customer, it will necessarily whet his intellectual appetite and prompt him to get what he chooses. A large sector of the information industry is engaged exclusively in creating epicurean menus as end products. It is then the customer's business to find an establishment which will take his order.

Even in developed countries, document delivery can be a problem. Often it is slow and costly; there is a large area of fugitive or "shadow" literature--technical reports, conference presentations, translations, and like--which is difficult to locate. Prepayment of photocopies whose length is unknown to the requester, compliance with copyright laws of the supplier country, and other factors contribute to the problem.

There is a growing confidence that in the developed world the efficiency of electronic bibliographic services will be matched in the not too distant future by an equally efficient technology for document delivery. We are already familiar with some technical innovations which in one way or another have affected document delivery in the past few years. Automatic ordering, for example, which electronically carries back to the on-line service the request for the full text of the cited material, has become a reality in the United States, Canada, and Britain; it is employed in Italy by the ESRIN system serving the member states of the European Space Agency from Frascati, near Rome. Although

easy to use, reliable, and increasingly popular, automatic ordering offers only a partial solution. It speeds up and transmits the request error-free, but transportation of the desired material is left to the conventional mail service, which can cancel out the time saved by the electronically sent order.

Thus, while improving continuously and aided by technological advances, document delivery in the West is not free from difficulties, frustrations, or, because of the often considerable cost involved, economic constraints. Still, the availablity of reliable information on national and international holdings and good tools for locating it, the strength of cooperation through generally accepted interlending practices, and the support of copying equipment and communication facilities, all afford the Western medical professional enormous advantages over his colleague in a less-developed country.

Any comparison is difficult in this area. Less-developed countries differ from each other more than developed countries do. Some of them have functional national infrastructures and have achieved a high level of bibliographic control, interlending, and library education; Nigeria is a good example. Others have developed hierarchical biomedical information networks with local, regional, national, and international levels, such as BIREME in Brazil. In contrast, we find developing countries which have no document delivery at all and the accumulated medical literature of a whole nation is locked into a noncirculating library of a single medical school; the Sudan is an example. Some, like Korea, have developed interactive networks linking and channeling the libraries of all medical schools into a centrally reinforced literature. Others, for example India, have created a national medical collection with only very weak interfaces with medical school libraries. The varieties are many, and any attempt to characterize medical school libraries in less-developed countries by a single model can only lead to misconception.

To evaluate the degree of success of document delivery in developed countries, three parameters are usually used: (1) satisfaction

rate, which is the percentage of the requests that can be filled from the library's own collection; (2) the internal turn-around time, that is, the number of working days needed to fill or reject a request; and (3) the unit cost of the transaction. The British Library's Lending Division reported in 1976 a 73 percent satisfaction rate;[1] this indicates a high degree of success for a collection of such great international importance. Any library with a satisfaction rate above 70 percent deserves the mark of excellence in document delivery. For internal turn-around time, in general, a three-day average can be considered extremely good. The unit cost covers labor, processing, and mailing; for Canadian document suppliers, a range of $6.00-$9.00 has been calculated; as I understand it, this is below the Western average.

Unfortunately, these parameters cannot be applied without some modification in the less-developed countries. In fact, the criterion that the request must be filled from the library's own collection to calculate the satisfaction rate might not be applicable even in developed countries on a large scale. To go above 70 percent on this basis presupposes a comprehensive collection on the order of the National Library of Medicine, the British Library, the WHO Library, the strongest university libraries, or national collections such as that of my own institute in Canada, which, incidentally, has a 72 percent satisfaction rate. Therefore, selectively in Western countries and generally in developing countries, the satisfaction rate becomes the percentage of all requests filled whether the item is held in the library that receives the request or is obtained from another collection. Of course, if the book is borrowed from somewhere else, or if a photocopy is ordered from another library, the turn-around time will be much longer. It is my understanding that the few libraries in less-developed countries which measure the success of their document delivery employ the modified formula. In 1976, when the British Library reported a 73 percent satisfaction rate, BIREME in São Paulo achieved 75 percent.[2]

In 1975-76, a WHO survey[3] of health science libraries in Southeast Asia investigated 185 libraries in this region of six countries.

Only 14, or 7.5 percent of these 185 libraries, supplied photocopies for external requesters. The most generous library system in this respect was Thailand's, with 27 percent of its libraries having a geographically nonrestrictive service policy.

The main reason for the poor photocopying service was obviously the lack of equipment. India, which has 108 medical colleges of which 70 are granting M.D. and Ph.D. diplomas in medicine, has only a very few copying machines in Delhi and in some territorial capitals.[4] The country has no national interlibrary lending system of any sort;[5] therefore, no national union list or union catalogue exists for assisting libraries and readers in locating the literature. With some notable exceptions, the situation is virtually the same in Africa and in the Middle East.

The borrowing of material from medical school libraries shows the same type of mosaic. A large majority of medical school libraries provide reading-room facilities only for qualified patrons, and where an open-stack policy has been adopted (in roughly half of them), the use of the collection is strictly supervised. This measure is understandable when you consider that in many of the university libraries the staff has to pay for the loss of books and journals. According to the Dhir-Anand survey of Southeast Asia, in 66 out of the 185 libraries, or 35 percent, losses are recovered from staff members by salary deductions. In the Eastern Mediterranean region, out of 83 libraries, in 48, or 58 percent, the staff is held financially responsible for book losses and in some cases, for heavily damaged books as well.[6]

In eight countries of Southeast Asia, "student loan libraries" have been established with WHO support. This program has been in effect since 1974, and is to be evaluated later this year. From these centers books can usually be borrowed for a semester or for a whole academic year by students who pay a rental fee for them. In Indonesia, the loan period is only three months, but borrowing is free. Even if the collections of the student loan libraries (which usually contain 50 to 100 basic English textbooks) are incorporated in the main collection of a

noncirculating library, the stock is treated differently and is made available to enrolled students of medical schools.

The literature that reaches the end user, the reader, through the delivery mechanism of the medical school library must be acquired either by purchase or some other means, or be obtained as a loan or a retainable photocopy from an external supplier. Though progress is slow, some improvement in document delivery is apparent in several of the underserviced regions. Without attempting any broad assessment or overview, let me just mention a few promising signs of progress. The cooperative network structure in Nigeria will have an increasing Pan-African significance in the English-speaking countries of the continent. BIREME in Latin America has the potential to become the continental reinforcing element in document delivery, and its effect is already strongly felt outside Brazil. In Southeast Asia and in the Mediterranean region, Korea, Malaysia, Thailand, Singapore, Iran, and Turkey have plans or programs through which they intend to develop their public services in general. In the West Indies, Jamaica has embarked on an ambitious program of bibliographic control and the creation of a national union catalogue.

Scientific book and serial publishing in the developing world shows a growing trend. In the year 1977, India produced close to 12,000 books in all the pure and applied sciences; Korea, 11,000.[7] It is important to note that in that year, according to the UNESCO Statistical Yearbook, only 13 countries in the whole world published more than 10,000 book titles. The share of the less-developed countries in scientific journal publishing is also significant and is growing continuously. Quoting the figures from the survey of Christopher Wooton of the British Library,[8] African countries in 1977 published 2.1 percent of all scientific serials, a total of 1,070 titles; Latin American countries produced 1,550 titles, 3.1 percent of the world's output; Asia, excluding China, Japan, India, and the Asian part of the Soviet Union, 1,310 titles, or 2.6 percent. In addition, India alone published 1,190 journals, or 2.3 percent of all scientific serials recorded in UNESCO. Thus the

developing Asian countries, including India, published a total of 2,500 serials, or 4.9 percent of the global total. According to this rough calculation, about 10.1 percent of all scientific periodicals are published in the developing world.

John Parkkari, who is in charge of acquisitions at the Canada Institute for Scientific and Technical Information, recently made an interesting study of the number of primary medical journals published in the three economic groups of the developing world.[9] The Organization for Economic Cooperation and Development (OECD) defines a developing country as one whose per capita GNP is below $2,500. Excluding Warsaw Pact countries and the People's Republic of China, this amounts to 88 countries. OECD divides these 88 countries into three groups: 37 countries with a per capita GNP below $400 are classified as belonging to the "low income" group; 33 countries with a per capita GNP between $400 and $1,000 comprise the "lower middle income" group; and in the "upper middle income" class there are 18 countries with a per capita GNP between $1,000 and $2,000.

Parkkari made the assumption that the 2,562 journals indexed in January 1979 in Index Medicus are the primary medical journals of the world; or, if not, that their distribution by country of origin represents the comparative degree, the rank order, of primary journal publishing in the universe of the 88 countries. On this basis, he looked at the publishing activities in each of the economic groups and found the following:

1) The country with the largest number of primary journals in the developing world is India, which belongs to the low income group; it publishes 65.8 percent of the journals in its group; Egypt is the second largest publisher in the low income class. Peru and Nigeria are at the top of the lower middle income countries, but the differences in numbers of journals published by the group are minimal. In the upper middle income group, Brazil, Mexico, and Yugoslavia stand out significantly over all the others. Calculating the total of all journals published in the 88 countries, Parkkari found that more than half (52.7 percent) are

published in four countries--India, Brazil, Mexico, and Yugoslavia, in that order.

2) In the low income group, including India, one journal is published per country; excluding India, this rate is reduced to 0.36 primary journal per country. In the lower middle income group, the average for each country is 0.57 journal; and in the upper middle income group, the average is five per country.

3) On the basis of population size and the number of journals published in each economic group, one journal is published for each 32 million people on the lowest level; one for each 19 million on the middle level; and on the upper level one for each 4.1 million people. For the sake of comparison, in the high income countries of the developed world, there is approximately one primary journal published for each 350,000 people.

I would stress that this calculation could be distorted by a statistical bias; the data are, therefore, only suggestive and approximate. The National Library of Medicine's selection criteria were not analyzed, and we cannot exclude the fact that certain topical interests and language preferences played an important role in choosing the serials. Besides, the size of publishing activity cannot be based on primary journals alone. Secondary journals, serials in local languages, those produced for the associated health professions or for a paramedical readership, are very important publishing activities which should not be overlooked.

The size and growth trends of book and journal publishing in developing countries have already somewhat eased the pressure of budget constraints in acquiring materials in Western currencies. Exchange agreements between national collections have been in effect for many decades, but in recent years several exchange links have been established between medical school libraries in the West and those in developing countries. The increase in publishing activities in developing countries will, of course, produce longer want-lists in the West, which, in turn, will bring a more significant hard-currency inflow as Western buyers pay for these publications.

Purchasing the literature from abroad is generally curtailed in developing countries by their small acquisition budgets, by restrictions on the availability of Western currency, and by bureaucratic red tape. In several of these countries, foreign exchange and import permits are needed for each book ordered from Western publishers. While the ordering and the whole acquisition process in developed countries is mediated by jobbers and distributors who sell books and journal subscriptions in the local currencies, no such jobbers exist in the developing world.

From his acquisition budget, the librarian of a medical school first buys the indexes and abstract journals. Index Medicus, Excerpta Medica, Biological Abstracts, Tropical Diseases Bulletin, and, in French-speaking Africa, Bulletin Signalétique are the most popular and best-known indexing-abstracting tools. Among them, Biological Abstracts has the best coverage of health-related periodicals in the less-developed countries. A 1976 study on the representation of Southeast Asian medical literature in Western indexing-abstracting tools found that Index Medicus covered 11 percent, the Tropical Diseases Bulletin 12 percent, and Biological Abstracts 29 percent of journals published in that region.[10]

Following the indexes and abstract journals, books are the second priority. There are a good number of medical school libraries where journal acquisition is almost negligible. Budgets are usually approved for one year only, and in the majority of universities, the medical library is advised of the amount allocated to it for aquisitions or for the library as a whole just a few months before the academic year begins. This prevents the librarian from subscribing to a full annual run of a serial unless he waits until the next January to place the order. But the real problem is the fluctuation of the budget and the inability of the librarian to commit funds for future years when subscribing to a serial; no library wants to hold only a year's portion of a journal. The bad timing of his budget allocation, the ignorance of the fiscal situation in following years, the rising cost of journal subscriptions, amplified by inflation, all these factors discourage the librarian from placing journal subscriptions.

Journals usually arrive after long postal delays, not infrequently five to six months after the publishing date, when the currency of the content is almost lost. Air-mail or air-freight transport is fast and reliable, but often prohibitively expensive. It is less costly, faster, and safer to borrow or order photocopies of requested articles from the British Library Lending Division, the National Library of Medicine, the WHO Library in Geneva, or the Centre Nationale de Recherche Scientifique in Paris. Their services are excellent and highly praised throughout the developing world.

This brings me to the final part of my talk and to a few comments and suggestions. The rather sketchy outline which I have presented on the problems of literature supply and document delivery should be considered as background to the points I shall raise.

First, since the scarcity of serial resources appears to be the most acutely felt deficiency in the medical schools of less-developed countries, any new program of assistance or cooperation should focus on the journal literature. Supplying the content of periodicals in copy (photoduplicate or microform) should have priority over any other medium such as monographs, audiovisual materials, etc. In the short run, it is expected that well-stocked international and accessible national sources will continue to provide photocopies to developing countries. In some cases, photocopies can be obtained free of charge, and in others the cost is covered and shared (within certain limits) by subsidies from international organizations. To my knowledge, UNESCO provides free coupons of the British Library Lending Division to developing countries that participate in some special programs and request this assistance. Recently, the global Aquatic Sciences and Fisheries Information System (ASFIS) of FAO recommended that 70 such coupons per month be given free to member institutions in developing countries for backing up their monthly abstract bulletin with full-text document delivery.

I suggest an approach which is not project- or membership-oriented, but which would permit a medical school to obtain photocopies of its own choice up to a predetermined annual cost ceiling. The size of the faculty could be a measure when setting the limit, but the extent of

ongoing research should not be considered a factor, since the literature itself could create the intellectual fertilizing effect and stimulus for research activities.

This brings us to the next requirement, that of professional staff support. Manipulating the limited remote supply and assuring that only the truly necessary material is ordered requires a resourceful and properly trained person, preferably a librarian familiar with the subject matter and the methods of transaction. This individual must have good judgment and a strong sense of responsibility to act as an intermediary between his medical school and the world. I suggest a special education program of perhaps short courses or workshops and carefully composed manuals with practical guidance for all phases of the necessary procedures.

What I have suggested in the preceding paragraphs could be first accomplished in a selected small number of medical schools. This would also create conditions to test the effect of an information-rich environment on the educational program, on the preparedness of faculty members, and on the emergence of research ideas and new projects in a developing-country setting. It would be revealing and of enormous instructional value to see what an unobstructed flow of information could do to an instituion which previously was shut off from the literature. We have never seen a medical school in an economically deprived country which had open access to new knowledge and a rich supply of journals. Giving this opportunity to one, two, or a dozen schools could well produce benefits that would be felt in the health care, the educational system, and research activities of a whole region.

Assistance to promote local journal publishing could also lead to lasting results. The exchange potential of serial publications would be very significant, as would the psychological, communicational, and professional orchestrating, associative effects of locally produced journals. Perhaps preference should be given to specialty organs on regionally important disciplinary topics such as tropical medicine, hygiene, pediatrics, nutrition, and the like.

I would also like to mention the interuniversity sponsorship or assistance programs in which three Canadian medical schools are currently taking an active part. I am told that a number of medical schools in the United States have adopted medical schools in less-developed countries. Such programs typically involve faculty visits, information on curricular programs, and a limited level of document delivery. At least one Canadian medical school plans to put literature supply at the core of the partnership arrangement. This could become an example worth following by others. I suggest that wider publicity be given to these initiatives so that, from the present few examples, a visible trend might develop.

If we try to look beyond these and other short-range possibilities, all requiring some form of assistance and commitments for continuing support, the chances in the long range seem to be more promising for truly fundamental improvements. We have reason to expect that the problem of document delivery will be eased or perhaps solved in global dimensions by a powerful new technology that has already arrived. The Prestal service in Britain, Antioppe in France, Teledon in Canada, and similar efforts in Germany, Denmark, Norway, and lately in the United States have introduced the still infant Teletext technology, which electronically transmits text or graphics via a television into the homes of subscribers. Predictions on Teletext applications are optimistic, often comparing the anticipated effect to the impact of computers in the 1960's.

Paralleling Teletext developments, fiber optics technology will make line communication cheap and of a much higher quality than at present. Thus further improvements in Teletext technology and the transmission of textual images through dedicated glass-fiber connections could be the birth of the electronic journal that delivers itself to the most remote parts of the world.

Another new field is video-disk technology. Optical disk systems are capable of storing enormous amounts of images and printed pages, making them portable and searchable in a random access mode with

relatively inexpensive projectors. A 30-centimeter disk with a long-life tellurium film coat has 40,000 tracks on each side, with every track containing 32 sectors of 15,200 bits of data impressed with laser beams. This means that a single disk can store the full content of 25 magnetic tapes. Such a tellurium disk, developed experimentally by Philips, costs roughly $10.00. A storage and replay system--the so-called "video juke box"--could accommodate 1,000 disks and occupy only six square meters of floor space.[11]

An article recently published in Special Libraries informs us of American developments in storing full-text articles on optical disks. According to that paper, "the National Library of Medicine is developing video disks capable of storing one billion bits of information and another disk that can store ten billion bits--the equivalent of an entire data base."[12] With the highly compressed textual content and the easy transport of these disks, document delivery could become a much simpler, faster, and less costly line of operation.

Perhaps even more spectacular changes can be expected from text transmission technology via satellites to remote earth stations, using microwave signals. Three stationary communication satellites 22,000 miles above the equator can cover the principal inhabited regions of the earth. Such a satellite generates the electricity required for its operation from sunlight that it collects by its own solar batteries, which cover the outer surface. Fifteen-foot rooftop antennas can pick up the high resolution image for viewing or printing in some storage medium. It is important to note that transmission cost is independent of the distance; it costs the same to transmit from New York to Washington as from New York to Paris. Dedicated circuits on satellites also show dramatically decreasing cost figures: in 1965, the cost of such a circuit was $30,000 per year; it has been reduced to roughly $700 in 1979.[13]

It seems obvious that these technological advances will create new conditions for conventional activities, perhaps a new era for global communication and for document delivery. Once the developed countries

employ these technologies and establish the electronic international pathways for text transmission, global applications will not be far behind.

A good number of nontechnical problems will, of course, accompany these developments. Publishers' financial interests, copyrights, and a host of other issues will emerge, but optimists predict that the technologies I mention will be much further developed and fully implemented in the late 1980's.

Until then, we should do what can be done with our present means. The literature of today is for now, for today's educator, researcher, and practitioner, whose achievements depend on the availability of the knowledge created today. There is a classic Canadian example of what a piece of information can do if it is available to the right person at the right moment. In his Nobel lecture in Stockholm, the distinguished Canadian physician Frederick Banting traced back his discovery of insulin to a moment of reading. He said, "On October 30, 1920, I was attracted by an article by Moses Baron from Minneapolis. Having read the article, the idea [of insulin] presented itself."[14] This anti-diabetic hormone has since saved many millions of human lives all over the world. But the intriguing question in Banting's retrospective account is: What would have happened if he, the general practitioner in the small town of London in the province of Ontario, had not seen the article which presented the idea?

Without attempting to find an answer, let me conclude my talk with that enigmatic question.

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# APPROPRIATE TECHNOLOGY FOR MEDICAL SCHOOL LIBRARIES IN LESS-DEVELOPED NATIONS

Davis B. McCarn

> "We should note the force, effect, and consequences of inventions which are nowhere more conspicuous than in those three which were unknown to the ancients, namely, printing, gunpowder, and the compass. For these three have changed the appearance and state of the whole world."
>
> Francis Bacon
> Novum Organum, Aphorism 129

Slightly over half a millennium ago, four skeins of technology were united in the small German city of Mainz by a man whose patronymic was Gooseflesh but who is now better known by his mother's family name, Gutenberg. The four fundamental skeins were the printing press, printers' ink, paper, and movable type. Without any one of these there could have been no printing. While our textbooks emphasize the last of these processes--that is, the use of movable, reusable type--the use of paper was at least as significant; the five sheepskins required to produce a single parchment book cost much more than the labor of the scribe. Gutenberg did not invent any of these technologies, but he did what we would now call the systems development work of weaving the four together into a new technology.

> It does not at all minimize the importance of the invention of printing or the genius of the inventor to point out that the invention was the result of a process of synthesis or combination of known elements. For that power of the human mind which can visualize known and familiar facts in new relations, and their application to new uses--the creative power of synthesis--is one of the highest and most exceptional of mental faculties. Others had seen the need which Gutenberg saw, and others had experimented with printing and had at their disposal all the elements essential to success. But with every condition favorable towards the middle

of the fifteenth century, the invention of printing still awaited the patient labor of a man with a truly creative mind. (McMurtrie, 1943.)

As Bacon pointed out, the invention of printing changed the world. It changed the world in ways that were completely unforeseen at the time of its invention. First, it created the information explosion: there were more books produced between 1450 and 1500 than had been produced since the birth of Christ. Second, it created the concept of and demand for literacy. Before the invention of printing, there was little value in learning to read because there were so few books, and those few were so expensive to produce that they constituted part of the treasures of the Church. With the invention of printing, learning to read became worthwhile for a much larger segment of the population. Finally, printing triggered the processes that were to result in the modern world: it freed the human intellect on a scale several orders of magnitude greater than ever before and made possible the growth of modern science and technology. Printing fostered new freedoms--and new repressions, as seen in the rise of censors and of the Index Librorum Prohibitorum. The printing press allowed the mass production of indulgences, and what had been only a nuisance became a scandal, leading to Luther's posting his 95 theses on the church door and thence to the Reformation. One wonders what a Vatican Office of Technology Assessment might have said of this apparently innocuous invention.

Libraries, the treasure houses of the pre-Gutenberg era, have become vital necessities in the accumulation of knowledge. Without denigrating the role of libraries as archives for the memorabilia of civilization, it is still important to recognize that without libraries the present growth of science and technology in general, and medical science in particular, would have been impossible. It has become fashionable to analyze the "invisible college" and to minimize the importance of the organized processes which articulate the totality of science and medicine. But without such organization, the fabric of science would be only separate swatches. The results of the research of each investigatory group would be known only to itself, the creation of

new paradigms would be retarded, and the cumulative nature of science and technology would be seriously disrupted. Without libraries, the invisible college would become solipsistic. While an investigator can reasonably follow the output of 5 to 10 journals--and this may keep him current with his research area--the moment he wants complete information or research results outside his normal narrow specialty, he must have a library and an index. The National Library of Medicine now receives more than 22,000 serials. (A serial is anything printed regularly, and the term covers journals, annual reviews, yearbooks, regularly updated handbooks, recurring proceedings, etc.) How could any research investigator or laboratory afford to acquire this mass of information? The library system is required, therefore, to permit the cumulative advance of science; and accumulation must be assembled somewhere, and the cost has gone beyond what any small organization can afford.

Libraries permit the advance of science. But their role has been based on the characteristics of print technology, on the cost of acquiring the scientific record, on the space required to store it, and on the effort required to catalogue and index it. It now seems probable that the world has reached another crossroads, and that new technologies may already have begun to supersede the print technology of the past 500 years.

Shortly after the end of World War II, the electronic computer was born. Since the first monstrous machines--machines of such incredible cost and size that they were installed in semi-temples and evaluated in terms of the equivalent calculation-years of all the mathematicians on earth--we have seen astounding progress in the reduction in both size and cost of these general-purpose machines. A recent advertisement states the progress graphically: "If the auto industry had done what the computer industry has done in the last 30 years, a Rolls-Royce would cost $2.50 and get 2,000,000 miles per gallon." Americans purchased 200,000 microcomputer systems in 1978; the most ubiquitous system, the TRS-80 from Radio Shack, sells for under $500. A variety of other

technologies, such as microforms, data communications, satellite communications, and video disks, offer alternatives for the future of science information exchange. But what is appropriate technology for medical libraries in developing countries?

Before addressing that problem, we must first ask about the contents of the model medical library for a developing nation. How much of the vast outpouring of modern medical research is it important to have in a local library for access by local physicians and researchers? The answer is (probably not unexpectedly) very little. There is clearly a general body of information, now largely in textbooks, about the fundamentals of medicine, sanitary engineering, and public health, but it is also clear that the interests of medical research are not focused on the major sources of suffering in the world. I realized this with surprise when, in the fall of 1978, I ran some test searches against the MEDLINE files of the National Library of Medicine to investigate the viability of a special bibliography on the major tropical diseases targeted for emphasis by the World Health Organization. These diseases affect the majority of mankind in the developing countries; they affect very few people in the developed countries. The following were the specific diseases: filariasis, leishmaniasis, leprosy, malaria, schistosomiasis, and trypanosomiasis. A month's search of the medical literature index covering 3,000 journals and a total of over 22,000 articles found about 100 articles on these diseases. Converting this to a percentage, we find that one-half of 1 percent of the research product as expressed in the journals of Western medicine dealt with these major diseases.

During the preparation of this paper, I wondered whether the picture was much different now than it had been two years ago. Out of 20,000 articles indexed for the August 1979 issue of Index Medicus, only 244 were on some form of parasitic disease. This would seem to be graphic evidence of Mansour's assertion:

> Parasitic helminth infections are widespread throughout the world. . . . At a time when there has been considerable progress in

> combating major diseases in the developed world, parasitic infections stand as a major obstacle to economic progress and a better life in developing countries. There has been a lack of interest in this problem among scientists in the West and, as a result, the field has not benefited from many of the advances in biology and medicine (Mansour, 1979).

This paucity of applicable research results has significant consequences for the development of medical school libraries and other health science libraries in the less-developed countries. First, it appears that most of the research has yet to be done. Probably the less-developed countries should not expect that the developed nations will actually do the necessary research for them; while there is increasing interest in helping the Third World, the charity of the rich nations is a poor basis for hope in the less-developed nations. It seems likely that it would be better to heed the advice repeatedly given by T. S. Eliot: "Work out your salvation with diligence." An approach to the solution of the problems of the less-developed countries that relies on the self-interest of these nations and on efforts resulting from this self-interest is much more likely to bear fruit than is a reliance on outside interest. The Puritan-ethic view that God helps those who help themselves is good advice in most situations.

The conclusion I would also draw is that the less-developed countries should actively design the information system for the research that they will largely have to do themselves in order to solve their health problems. Since very little has been done and much needs to be done, the method of documenting the progress of this vital research need not be restricted to the communication media of "big science" in the developed nations. The proliferation of journals and books may not be the appropriate technology for the research that needs to be done. Appropriate technology in some minds seems to be closely related to "ontogeny recapitulates phylogeny." The most common advice seems to be to use the old way because the less-developed nations are not up to the complexities of the newer technologies of the developed world.

What then would be the appropriate technologies for medical school libraries in less-developed nations? In one sense this question must

be frivolous. Who would ask what are the appropriate technologies for use in the operating room or what is the treatment of choice for tuberculosis in a less-developed nation? In another sense it reflects very real problems. The printed-paper media is expensive and not very suitable for use in tropical climates. A library in such a climate requires expensive air conditioning and special climate controls in order for the paper to survive. Inevitably, the library cannot afford to acquire all the materials that may be desired. The journals it does subscribe to are likely to arrive late or not at all. Those materials it tries to obtain from other libraries (the WHO Library or some others) will be slow in coming because the post is slow in both directions. It is ironic that such slow communications may not be crucial to research activities but are unacceptable for health care. These are simply a few illustrations to suggest that print on paper may be both a poor recording media and an inadequate communications media for less-developed countries.

What are the alternatives? From the examples, it seems clear that the first problem is not the recording of knowledge; it is its communication. I cannot claim to be expert at what might work in the less-developed countries, but I have been involved in installing satellite communication terminals in the Indian villages of Alaska. Improbable as it may sound, satellite communication worked and was an appropriate technology for health care delivery in the isolated wilds of that vast state. I think it only fair to add that the frequencies used for this service are now largely the property of the military and the air traffic controllers of the developed nations. Satellite communications are only easy and cheap if the right frequencies are available. Lower frequencies allow the use of small inexpensive antennas and taxicab radios; the presently allocated very high frequencies for satellite communications require very large antennas and expensive ground stations. If the less-developed countries wanted to have inexpensive satellite systems, they would be insisting on the reallocation of part of the radio spectrum to them for this purpose.

Another alternative may be the use of radio, either AM or FM. In the U.S., FM broadcasting stations are being used to transmit messages. Little receivers in a city decode messages broadcast by the FM station and print out only those addressed to them. These are simply illustrations; the problem is real, but these may not be solutions. A group of experts could probably identify several realistic ways to provide low-cost, reliable, low-energy communications. The appropriate technology is surely not poles and wires. It is probably not a microwave system. Whatever the communications system selected, the library media must be related to the system. The book and journal system of recording and communicating knowledge depends on the postal service for transmission. In both developed and developing nations, the postal services are slow and difficult; science will almost certainly rely on some other communications system soon. When such a new communications system is selected, it should provide for the needs of both developed and developing regions, and libraries must plan to store and communicate knowledge in the media appropriate to the medium. If it were possible to store and communicate pictures easily, then medical information should be stored in graphic form. On the other hand, if electronic digital information were the easiest form of information to transmit over the communications system, then medical information should be stored in digital form.

Should the less-developed countries invest in computers and computer terminals? I believe this question is now almost irresponsible; whatever else they may invest in, the less-developed nations must invest in computer access and computer communications. At the moment, the worldwide communications required for the wired world are lacking, but such a worldwide digital communications system will exist soon. The digital communications networks of the U.S. now extend to Hong Kong, Manila, Mexico City, and Riyadh. Terminals in these cities can use all the computer resources of the U.S. Vladimir Slamecka and I produced an inventory of the information resources available via such networks for the United Nations Conference on Science and Technology for Development

(Slamecka and McCarn, 1979). The scientific and technical communities of the less-developed countries need access to the information resources of the United States and to those in Europe on EURONET not merely to obtain answers to specific developmental problems, not merely to distill appropriate technology from the world's developments, not merely to conduct research in areas most relevant to their own national problems, but, as is most important, to provide the information lifeblood without which a community of scientists and engineers cannot be maintained. In this age of international science and technology, a viable program cannot be developed or maintained in isolation. Without adequate access to the world community, scientists and engineers either wither or become part of the "brain drain" from the less-developed countries. Thus the provision of appropriate and adequate information access may be a sine qua non for successful development programs. The difficulties in developing sufficiently reliable terminals and communications are formidable; but as the developed world moves toward the paperless society, ways must be found to move the less-developed world along the same path. Less-developed countries do not need library collections of what the rest of the world used to know years ago.

It may be that microforms will also have a part to play in the libraries of the less-developed countries for some time to come. Much of the world's medical literature is now or could be available on microfiche or microfilm. The catalogue of University Microfilms International lists as available over 1,000 journals in the medical sciences (University Microfilms International, 1979). There are available hand-held inexpensive microfiche viewers for use by telephone linesmen atop telephone poles. It would also seem simple to design and develop a larger viewer using a light-collecting mirror instead of an electric light. I am not a fervent fan of microforms, but I believe they may offer a viable option to print on paper. Perhaps in this case small is beautiful again.

These paragraphs have described several alternatives for the recording and communication of medical information for the less-developed

countries. Alternatives, however, are often confusing. What is needed is some kind of coordinated program. The communications experts, the computer communications technologists, the biomedical researchers in the subject areas vital to the less-developed nations, and the medical librarians of those nations should confer and agree on the primary communications channels, the recording medium, and the local storage and retrieval requirements for a worldwide system for medical information development and dissemination and for storage and retrieval. Such agreement could lead to new methods or rely on old ones, but whatever the methods, all those involved--the generators of knowledge, the communicators, and the libraries--should be working in the same vineyard. The researchers shouldn't be raising raspberries while the shippers are expecting oranges for their crates and the warehouse has set up facilities for dried apples. The appropriate technology for the medical libraries of the less-developed countries is the technology that works to support the communications channels used by the producers of the relevant research, but the channels used should be appropriate to the rapid and reliable communication and storage of information in the libraries of those countries. Producers and librarians must together decide what that technology is.

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# IV. GLOBAL NETWORKS AND PROGRAMS

# THE U.S. NATIONAL LIBRARY OF MEDICINE: A NATIONAL RESOURCE SERVING INTERNATIONAL NEEDS

Martin M. Cummings

It is a privilege for me to be here today and to have this opportunity to share some thoughts with you. Although I had prepared a paper for the 1978 Rockefeller Foundation conference at Pocantico Hills, it was necessary at the last minute to have it presented by a proxy, Davis McCarn, who kindly agreed to do so. I subsequently read with great care the published papers from the conference, and, if we are to consider those papers as our "quality base," we have set for ourselves a high standard indeed.

My first paper concentrated exclusively on the mechanisms used by the U.S. National Library of Medicine to ensure quality in collection building, indexing of the literature, bibliographic publications, selection of audiovisuals, and computerized retrieval services. Today I would like to broaden the view and discuss the development of the NLM as a national and international resource, and the services it has instituted for the international health community.

## NLM as a National and International Resource

The library traces its roots back to 1836, when it was a small collection of books and journals in the office of the U.S. Army Surgeon General. In 1865 the library was assigned to the care of a brilliant army surgeon, John Shaw Billings, and it was he more than any other person who was responsible for its development as a resource of international significance.

Dr. Billings' tireless efforts to collect and index the world's growing body of medical literature can be traced to his experience as a medical student. In attempting to write a dissertation, he had discovered that there was no library in the United States, public or

private, where a medical practitioner or researcher might find a large body of the published literature relating to any medical subject. Under his direction, the library's collection grew from 1,800 volumes to 117,000 books and 192,000 pamphlets at the time of his retirement in 1895.

To ensure that the collection was truly international in character, Dr. Billings began a vigorous effort to acquire material from overseas. He kept his clerks busy writing innumerable letters to foreign publishers, scientists, and physicians in an attempt to locate important foreign literature. Because his agents could not obtain reasonably priced journals from some countries, Billings asked U.S. consuls to aid him. Through the State Department, he sent imploring letters to U.S. consuls in every part of the globe--Brazil, Jamaica, Cuba, Mexico, Spain, Portugal, India, Australia, Japan, and Russia, to name a few countries. Billings also sought help from travelers, emigrant physicians, anyone who could serve his purpose.

Since the library's budget for acquiring materials was quite limited (even by prevailing standards), Billings also instituted a vigorous program of worldwide exchange. Through correspondence and visits, Billings arranged exchange agreements to develop every area of the library's holdings: transactions, proceedings, journals, dissertations, books, and many of the rare seventeenth century and early eighteenth century medical pamphlets and theses now in the library. In 1881 Surgeon General Barnes commissioned Billings to visit a number of European libraries, medical schools, and societies to secure exchanges. Unfortunately, the comptroller disallowed the $2,185.92 in expenses that Billings had incurred in the 10,000-mile trip, and Billings had to petition in the Court of Claims for reimbursement. In this connection, I trust that history will not repeat itself.

The same ingenuity that produced a stream of literature flowing into the library was then employed in devising ways to bring it under bibliographic control. To meet this challenge, Billings began the Index Medicus in 1879, and one year later the Index Catalogue. The

Index Medicus, as you know, is still a thriving publication, subscribed to by some 6,000 libraries around the world.

After the death of Dr. Billings in 1913, William H. Welch spoke at two memorial meetings. At one he described the development of the Surgeon General's library as "probably the most original and distinctive contribution of America to the world,"[1] and at the other he said:

> I question whether America has made any larger contribution to medicine than that made by Billings in building up and developing the Surgeon General's library and in the publication of the Index Catalogue and the Index Medicus. That, in my judgment, is America's greatest contribution to medicine and we owe it to this extraordinary man.[2]

The library remained as part of the U.S. military establishment in the decades following Billings' retirement. In 1922 it was renamed the Army Medical Library; in 1952 the name was changed to the Armed Forces Medical Library. Finally, in 1956, recognizing that the collection was a de facto national medical library, the Congress passed legislation transferring the collection to the Department of Health, Education and Welfare, and created the National Library of Medicine.

Since that 1956 legislation, the library has expanded considerably the scope of its operations and responsibilities. Planning for automation was done in the late 1950's, and the result of that planning, MEDLARS, became operational in 1964. MEDLARS eased considerably the problem of collating indexed citations and preparing them for printing in Index Medicus. In recent years the system has been refined to allow on-line searching of the stored references. I will discuss MEDLINE, as this capability is called, and its international usage a little later.

In 1965 the Congress passed the Medical Library Assistance Act, which allows the NLM to make grants to the U.S. health science library community for resource building, research, training, and publications support.

In 1967 a Toxicology Information Program was established at the library to provide a national focal point of access to information on toxicology. Under this program, the library has set up a center to

provide various reference functions and has also created a number of on-line bibliographic and data retrieval services in the field of toxicology.

Also in 1967 the National Medical Audiovisual Center in Atlanta, Georgia, became a part of the NLM. This center has as its principal goal the improvement of the quality and use of biomedical audiovisuals in schools of health professions and throughout the biomedical community. The National Medical Audiovisual Center has also developed an on-line data base of audiovisual materials used in health science education.

The last of the major new programs to be added to the library was the Lister Hill National Center for Biomedical Communications, in 1968. The Lister Hill Center is the research and development component of the library, and its mission is to explore the uses of advanced computer and communications technology to improve health education, biomedical research, and health care delivery. The center was instrumental in developing the library's on-line retrieval services in the late 1960's. Since that time it has conducted a number of valuable communications experiments using satellites, microwave and cable television, computer-assisted instruction, video disks, and other new technologies.

Despite all these new responsibilities that have been taken on by the library, I can assure you that we are not neglecting our basic mission of collecting, organizing, indexing, and making available the scientific and scholarly literature of medicine. Under our present collection policy, we acquire and catalogue some 15,000 monographs each year, and the library regularly receives about 20,000 periodical publications, of which 2,500 are indexed for Index Medicus. The collection now comprises approximately 2.5 million items.

The next historic step in the library's development is the imminent completion of a new building adjacent to the present NLM building, to be known as the Lister Hill National Center for Biomedical Communication. The 10-story structure will house the research and development programs of the Lister Hill Center, the National Medical Audiovisual Center

(which will be moved from Atlanta), the Toxicology Information Program, the grants program, and the MEDLARS computers. The new center will greatly alleviate the present crowding of books, computers, and people, and it will allow us to return the present library building to its original use.

## NLM International Services

Probably the oldest of the library's international programs is that under which NLM exchanges literature with institutions in other countries. I have already briefly described Dr. Billings' efforts in this area. Today the library has formal exchange agreements with 382 partners in 72 countries. In return for such publications as Index Medicus, Abridged Index Medicus, and various other NLM recurring bibliographies, we receive periodicals and monographs issued by foreign medical institutions that could not easily be obtained otherwise. We try to maintain a rough equivalency in value between what we send out and what we receive.

Another important library activity, with international impact, is the provision of photocopied material on interlibrary loan. In fiscal year 1978, almost 15 percent (38,000 of 262,000) of the requests the library received for interlibrary loans came from institutions outside the United States. A modest fee of $2.00 was levied for each request filled. Beginning this October (1979), the charge for interlibrary loan photocopy was raised from $2.00 to $4.00 to cover costs of handling and air-mail postage. It is too early to tell what the effects of this change will be.

Prior to 1979 an exception to the charge for interlibrary loan was made for countries in which the U.S. Agency for International Development had a health program. Under an agreement between AID and NLM, the library provided approximately 22,000 free interlibrary loans in fiscal year 1978 to institutions in these developing countries.

In addition to photocopy for interlibrary loans, the AID agreement reimbursed NLM for 5,000 MEDLINE searches, 52 subscriptions to

Index Medicus, and 48 subscriptions to Abridged Index Medicus provided to these countries. Approximately 25 percent of these services were for technical support for the Pan American Health Organization's Regional Library of Medicine in Sao Paulo, Brazil; 36 percent went to Turkey; 10 percent to India; 9 percent to Indonesia; and 7 percent to Korea. The agreement under which these services were provided terminated at the end of September 1978. As a result, the fall-off in requests from AID-supported countries was dramatic--approximately 50 percent in the months following the termination of the agreement. Later, I will describe briefly a new arrangement that we hope will assist the developing countries in meeting their need for computerized reference retrieval and document delivery services.

A third NLM activity in the international sphere is the Special Foreign Currency Program (P.L. 480). This program is carried on under the Agricultural and Trade Assistance Act of 1954, which requires that proceeds from the sale of U.S. agricultural commodities should be spent in the countries where such credits to the U.S. government are accrued. It was used in the 1950's to translate special biomedical literature from Russian, Polish, and Serbo-Croatian languages into English. In 1964 the emphasis turned from translation to bibliographic development which would assist physicians in research, education, and medical practice. Two years later we began to support the preparation of critical reviews by outstanding scientists in a particular field.

In fiscal year 1978, the library made 20 new awards under the Special Foreign Currency Program. There are now 88 current projects totaling $1.7 million (equilavent). These projects are located in Poland, Tunisia, India, Pakistan, Egypt, and Yugoslavia. The collaborative NLM program is also continued in Israel through a bloc award from the U.S-Israel Binational Science Foundation.

Included among the projects in the seven cooperating countries are the preparation of critical reviews and monographs analyzing biomedical research and practice; translation of foreign monographs in the health sciences; studies in the history of medicine; the publication of major

international symposia and conference proceedings; and the preparation and publicaton of authoritative bibliographies, guides, and other literature tools in the biomedical sciences. The program makes it possible for the library to procure and disseminate published information which is important to the progress of the biomedical sciences and the public health, using foreign scientific personnel and resources.

A new publication project, unrelated to the P.L. 480 program is the Quarterly Bibliography of Major Tropical Diseases. This is a joint undertaking of NLM and the World Health Organization and is designed to help fill the gap in the transfer of scientific information to the developing countries of the tropics. The Bibliography lists citations from MEDLARS on research and treatment relating to filariasis, leishmaniasis, leprosy, malaria, schistosomiasis, and trypanosomiasis. Three experimental issues have been printed and distributed to institutions and scientists in tropical countries.

Other recent developments in the library's international relations involve the establishment of ties with the People's Republic of China and further cooperation with the Soviet Union.

Last year, as part of a delegation from the American Association for the Advancement of Science, I visited China and had the opportunity to meet with officials of the Chinese Academy of Medical Sciences. As part of a quid pro quo arrangement, we agreed that the Chinese will provide professional staff to come to NLM to catalogue the library's collection of Chinese medical literature. NLM, in turn, will provide training for the visiting Chinese and will send sets of Cumulated Index Medicus and other important bibliographies to the library of the Chinese Academy of Medical Sciences to fill the 10-year gap in their collection resulting from the cultural revolution. NLM has also been asked by the World Health Organization to receive graduate students for training in modern library and information techniques.

Cooperative arrangements with the Soviet Union received a boost earlier this year when a U.S.S.R. delegation on biomedical information paid a 10-day visit to the NLM. The two sides agreed to cooperate in a

number of areas. We will exchange biomedical literature of equivalent value; transmit, by telex and air mail, requests for photocopies of journal articles; and exchange experts in a work-study training program. Both sides agreed that cooperative vocabulary development and the exchange of information on toxicology and pharmacology were desirable projects but needed further study.

Perhaps the best known of the library's international arrangements is that under which the MEDLARS data bases are made available in other countries. Eleven countries are now affiliated with NLM in providing computer searches for health professionals around the world. These countries are Australia, Canada, France, Italy, Japan, Mexico, South Africa, Sweden, West Germany, the United Kingdom, and the Pan American Health Organization.

Over the years, a highly successful quid pro quo mechanism has evolved for the provision of these services. NLM either provides direct access to its computers or, alternatively, sends computer tapes and programs to the cooperating foreign institutions for use on their own computers. Five of the countries find it desirable to be on line to the NLM computers, despite the communications cost involved. These are Canada, France, Italy, Mexico, and South Africa. The remaining six countries provide MEDLARS services on their own computers, using either software developed by themselves or NLM's own ELHILL programs.

In return for access to MEDLARS, the participating countries provide indexing input to the system. We estimate that this amounts to about 25 percent of all journal-article indexing done for MEDLARS. The foreign institutions must also meet certain technical criteria involving personnel, facilities, and financial resources, and must possess a user community large enough to justify an extensive computerized biomedical activity.

It is interesting to note how the different countries have developed different patterns of services:

1) The Australians have a network of 17 centers on line to their central computer. These centers do about 12,000 searches per year

against the MEDLINE, SDILINE, CATLINE, and back files. Access to other NLM data bases is by international communications links to the NLM computer.

2) BIREME--the PAHO Regional Library of Medicine in Brazil--coordinates a network of four on-line centers that conduct over 2,000 searches a year on a special MEDLARS-based file of references to English, Spanish, and Portuguese journal articles.

3) Canada has 67 on-line centers that conduct some 50,000 searches annually against the MEDLINE, TOXLINE, CANCERLIT, CATLINE, and back files. The Canadian MEDLARS Center also accepts requests from non-MEDLARS countries, and requests from developing countries are serviced without charge by the Canadian International Development Research Center.

4) France has 46 on-line centers that regularly search the MEDLINE, CATLINE, TOXLINE, CHEMLINE, AND CANCERLIT files on NLM's computers. In addition to the centers in France, there are associated centers in Switzerland and Spain. Some 16,000 searches were conducted on the French network last year.

5) Germany has a network of 52 on-line centers with access to MEDLINE, CANCERLIT, CANCERPROJ, MeSH, and the back files. There are also associated centers in the Netherlands, Belgium, and Austria. About 32,000 on-line searches were done by members of the German network in 1978.

6) Italy is the newest of the non-U.S. MEDLARS centers, becoming operational in 1979. The Italian center is on-line to the NLM computers and has access to most of the data bases, but it is still too early to assemble usage statistics.

7) The Japan Information Center of Science and Technology provides on-line service to its computer for the MEDLINE and TOXLINE files. There are 76 biomedical institutions in Japan with on-line access, conducting some 12,000 searches per year.

8) A terminal in the Mexican Ministry of Health and Welfare provides on-line access to NLM's computers for MEDLINE, SDILINE,

CANCERLIT, and the back files. Some 2,400 searches were done in Mexico in 1978.

9) Three centers in South Africa provide on-line access to NLM's computers, searching the MEDLINE, SDILINE, TOXLINE, and CANCERLIT data bases. The high communications costs limit the number of searches to about 500 per year. A small number of searches have also been conducted in South Africa for users in neighboring African countries and in India.

10) Sweden coordinates an extensive MEDLARS network that includes 39 terminals in that country, 17 in other Nordic countries, and 8 in other European countries--Austria, Belgium, the Netherlands, and Poland. Over 12,000 searches per year are done on the MEDLINE, SDILINE, TOXLINE, CHEMLINE, CANCERLIT, and back files.

11) In the United Kingdom, most of the MEDLARS files are made available to subscribers of BLAISE (British Library Automated Information Service). There are 331 subscribers to BLAISE, not all biomedical, however. Approximately 21,000 searches were conducted on the NLM data bases in 1978 by the U.K. network users.

I have described in some detail the international aspects of MEDLARS to give you an idea of its geographic coverage, the variety of bibliographic information available, and the acceptance it has met with as measured by usage statistics. In summary: there are at least 350 non-U.S. institutions regularly searching a variety of files about 160,000 times each year.

Although several of the non-U.S. MEDLARS centers provide services to users in other countries, only one of them was established with that specific purpose in mind. That center, of course, is the PAHO Regional Library of Medicine in São Paulo, Brazil, known as BIREME. Because it has been in many ways a model activity, I would like now to spend a few minutes describing the development of BIREME.

In 1963 the Pan American Health Organization (PAHO) began examining biomedical communications in Latin America, with NLM acting in a technical and advisory capacity. There were meetings of experts concerned

with the problems of Latin American medical education, biomedical research, international health, and delivery of health care. A study team examined the status of South American medical libraries. The conclusion reached by these groups was that Latin American medical libraries had not kept pace with the needs of biomedical researchers, educators, students, and practitioners, and that the problem should receive immediate attention, not on an institutional or national basis but on a regional basis.

The PAHO Advisory Committee on Medical Research in 1965 recommended the establishment of a regional library of medicine (BIREME) in South America under the joint sponsorship of PAHO and the Pan American Federation of Associations of Medical Schools, with technical backstopping by the NLM. The site selected for the library was the Escola Paulista de Medicina, São Paulo, Brazil. PAHO has organizational and administrative responsibility for BIREME, which provides the latter with international status. A very interesting aspect of this library is the multiple cooperation which established and supported BIREME--PAHO, the Ministries of Education and Health in Brazil, the Escola Paulista de Medicina in São Paulo, the U.S. Commonwealth Fund, the U.S. Kellogg Foundation, and NLM. Funds have been provided by the Ministries of Health and Education in Brazil, PAHO, the Commonwealth Fund, and the Kellogg Foundation. Staff and buildings have been made available by the Escola Paulista. NLM's excess credit rights at the Universal Serials and Book Exchange were used by BIREME to build a core collection. The NLM continues to provide technical consultation and expertise to PAHO and BIREME.

A Scientific Advisory Committee for BIREME which is responsible to the director of PAHO was established. The first full-time director, Dr. Amador Neghme, former dean of the Faculty of Medicine at the University of Santiago in Chile, was appointed in 1969. Dr. Neghme's successor, Dr. Abraam Sonis, former director of the PAHO Latin American Center of Medical Administration in Argentina, was appointed in 1976. Funding for BIREME has increased from $150,000 in 1969 to $650,000 in 1974 and $1.25

million in 1978. About 16 percent of BIREME's annual budget is provided by PAHO's regular budget, 7 percent by WHO, and 77 percent by external sources, including federal, state, and local governments of Brazil and philanthropic agencies.

The staff of the Regional Library has increased from 23 in 1969 to 71 in 1978. The most significant aspect of this increase is not quantitative but qualitative. Physicians and trained library professionals have become staff members. BIREME provides reference services, specialized bibliographies, and interlibrary loans of literature not only within Brazil but to other South American countries. Since 1969 BIREME has provided 288,000 loans, prepared 8,255 special bibliographies, obtained and donated 309,000 journal issues to other Latin American libraries, and furnished specialized training to 324 Latin libraries. A Brazilian library network of eight subcenters has been initiated, but all need increased resources to perform their role more effectively. BIREME has recently undertaken to develop specialized audiovisual and computer-based reference services using a subset of the NLM MEDLARS data base.

The Latin American Ministers of Health meeting in 1972 recommended for the decade 1971-80 the establishment of national documentation systems with a linkage to BIREME: an inter-American biomedical communications network. The vastness of this task is illustrated by a 1971 BIREME survey of 231 biomedical libraries in 15 Latin countries. An average of 137 current journal titles and four reference books was owned by each library. This survey emphasized not only the dire needs, but also the extensive resources that would be required to remedy the present deficiencies. The situation in other areas of the developing world may be worse.

I believe BIREME's experience demonstrates that the regional approach to providing biomedical information services is sound. We have also found this to be true in the United States, where regionalization has led to improved cooperation among local institutions and to a rational and efficient system for training, for coordinating on-line search services, and for document delivery.

Regional approaches cannot succeed, however, unless there exists a substructure of vigorous libraries and information centers within the countries of the region. Professor Saracevic has described the "camels and Concordes"[3] phenomenon in developing countries, where health workers may be highly satisfied with the results of a MEDLINE search only to be frustrated in their attempts to acquire the documents for which the citations were retrieved. I certainly agree with him when he says that "part of the answer for developing countries lies in small, qualitative collections."

A new program undertaken jointly by the World Health Organization, the Pan American Health organization, and the National Library of Medicine may also help in this regard. Under a memorandum of understanding signed by the three organizations earlier this year, NLM will provide MELDARS computer searches and photocopies of journal articles to the developing countries of the WHO regions of Africa, Southeast Asia, Eastern Mediterranean, and Western Pacific.

The World Health Organization's role is to provide funds to PAHO which that organization will use to contract with one full-time and one part-time individual to be located at NLM. Part of the funds will be used to reimburse NLM for air-mail costs of posting the MEDLARS searches. The agreement provides that NLM will accept requests for MEDLARS searches either directly from individuals in the WHO regions or through the WHO regional offices. Requests for photocopied articles must be transmitted from a medical library, either directly to NLM or through a regional office. Completed searches and photocopied articles will be sent from NLM to the requester. The volume of services to be performed under the agreement is 1,400 MEDLARS searches and 2,500 interlibrary loans, to be divided evenly among the four WHO regions mentioned earlier.

Such an arrangement is not in any sense a solution to the biomedical information problems of developing countries. It is a stopgap measure that will help fill the void that was created when an earlier MEDLARS arrangement with the World Health Organization was terminated in December 1977. The new agreement, however, has the virtue of involving

the WHO regional offices that deal with most of the developing countries in the world not presently served by a regional library of medicine.

This, I believe, is a crucial involvement. The development of regional resources like BIREME, coupled with the strengthening of local and national resources, will be a long stride toward ensuring that the world's health professionals will have rapid and efficient access to the world's biomedical literature. I can assure you that the U.S. National Library of Medicine stands ready to assist in this important effort.

NOTES

1. Welch, W. H., 1920, Collected Papers. Baltimore: Johns Hopkins Press, III, 397.

2. Ibid., p. 400.

3. Saracevic, T., 1978. "Health Sciences Libraries and Information Services for Developing Countries: Problems of Quality." In: Coping with the Biomedical Literature Explosion: A Qualitative Approach. Working Paper. New York: The Rockefeller Foundation, p. 85.

# THE WORLD HEALTH ORGANIZATION'S ROLE IN STRENGTHENING HEALTH LITERATURE SERVICES IN DEVELOPING COUNTRIES

Beryl Ruff

The World Health Organization's major goal, "Health for All by the Year 2000," is closely linked to the concept of primary health care--that is, essential health care made accessible to everyone by a variety of trained manpower ranging from physicians to auxiliaries.

There is much in clinical medicine and medical research that is equally applicable to all countries; this is less true in the public health field because living conditions vary considerably from one country to another. Nevertheless, we now realize that it is as important for public health planners and practitioners as it is for clinicians and researchers to know about the experience (successes and failures) of their colleagues in other countries with similar resources, problems, and constraints. The world's biomedical and health literature must, therefore, be equally accessible to all health personnel. Because of the exponential growth in the volume of the literature, it is increasingly important to be selective so as to make it possible for each person to receive only the part of the literature that is relevant to his needs. If we translate these attitudes to our present discussions on "quality-based or selective libraries for health science schools in less-developed countries," we should consider that this conference is concerned with "libraries comprising materials selected for their high relevance to the development of manpower for health care in less-developed countries."

During the past six years, WHO has developed a health literature program that has four major roles:

1) To promote cooperative activities and the development and utilization of national and regional health literature resources and services;

2) To organize regional networks, backup services, and training opportunities;

3) To coordinate activities at the national, regional, and global levels;

4) To cooperate directly with individual member states when so requested.

As George Ember said this morning, developing countries differ more one from the other than do developed countries. We should not, therefore, talk about developing countries as if they were a homogenous group. Because of their varying national and regional situations and priority needs, WHO's health literature program must perforce be flexible, with each WHO regional office taking a different approach.

The overall framework of the WHO program covers the following six components:

1) Surveying the existing situation to determine needs and promote an awareness of the vital support role of libraries in all health development programs.

2) Training health librarians and other manpower, including decision makers, library tutors, library technicians, and existing and potential library users.

3) Increasing and sharing resources by upgrading the quality, quantity, and timeliness of material resources, encouraging resource sharing, and developing regional health literature centers and networks to provide backup services and central points for training and shared activities.

4) Improving health library services and fostering new bibliographic systems for developing countries through stimulating dynamic attitudes as well as promoting the active dissemination and exchange of information, providing easy and rapid access to international bibliographic systems and document delivery services, and encouraging the creation of bibliographic systems to cover the literature issued in developing countries to complement existing global systems.

5) Developing communication channels to provide opportunities for an increased dialogue between health librarians, to improve referral services, and to foster cooperation and coordination.

6) Tackling special problems such as those of vernacular languages, textbooks, currency restrictions, and postal communications.

Surveying the Existing Situation

WHO is in a good position to obtain information on the situation in developing countries, since to sponsor activities relevant to their needs and to assist national personnel in recognizing and clarifying them, a review of existing conditions is an ongoing activity involving staff at global, regional, and country levels.

As early as 1960, exploratory visits were made by WHO staff to a number of medical libraries in the Middle East. In 1970, at the request of the Twenty-third World Health Assembly, a questionnaire was sent to member states and a global study, "Medical Literature Services," was made. The regional office for Southeast Asia has performed and documented two surveys of the health library situation in the countries of their region: the first one, carried cut in 1969-70, covered the medical school libraries; the second, in 1975-76, included other health libraries. In 1975 the regional office for the Eastern Mediterranean sent out a questionnaire and made an extensive survey of medical libraries throughout that area. During 1976-77 the WHO headquarters chief librarian studied the health library situation and needs in 26 countries of the Middle East, Africa, and Asia; he visited some 90 libraries and made recommendations on actions that could be taken to effect improvement. Recently, the WHO regional office for Africa announced plans to compile an inventory of existing teaching and research libraries. This will lead to the identification of the institutions that will eventually form the African regional network of health science libraries. A consultative group will meet in Africa to discuss and formulate norms and procedures for the operation of the network.

Training

One of the principal problems highlighted by all inquiries made in developing countries was the dearth of medical librarians and an almost total lack of formal medical librarianship training facilities. Immediately after the 1960-61 series of visits to medical libraries, the regional office for the Eastern Mediterranean organized a number of regional short summer courses on medical librarianship. In May 1977, in furtherance of the 1975 survey, that same office held a workshop in Teheran to train future teachers of librarians; 15 senior medical librarians and one library tutor were first exposed to a teaching/learning experience in modern educational technology and then required to discuss and refine a teaching manual on medical librarianship for second-level librarians. This workshop on new educational technology for training librarians was an adaptation of workshops designed for professors of medicine, pharmacy, and other health sciences.

Within the framework of three WHO programs (Health Manpower Development, Research Promotion and Development, and the Special Program for Research and Training in Tropical Diseases), there exist fellowship components which include a small number of fellowships for librarians.

Also, the WHO office of Library and Health Literature Services in Geneva, together with the regional offices, is assisting in a project to find donors of travel funds to make it possible for worthy health librarians from developing countries to attend the Fourth International Congress on Medical Librarianship, to be held in Belgrade in September 1980. The congress will have as its main theme "Health Information in a Developing World." In addition to the principal sessions, there will be a number of small action-oriented sessions designed to bring forth suggestions for cooperative activities for the future and to enhance the educational nature of the congress. WHO is also organizing two short programs for special groups, one for the Middle East health librarians and the other for the librarians of institutions collaborating with WHO on research and training in tropical diseases. These special sessions will be held in Belgrade immediately before the congress. WHO is making

every effort to ensure that the congress is primarily educational for health librarians in developing countries.

Sharing Resources and Developing Networks

In 1968 the Pan American Health Organization, which is the WHO Regional Office for the Americas, together with the Brazilian government, established the Biblioteca Regional de Medicina (BIREME) in São Paulo as the first WHO regional medical library. It serves Latin America and has already accomplished much--notably, the production of Index Medicus Latino Americano, beginning in 1979. In 1977 the Pahlavi Library of Medicine in Teheran was designated the WHO Regional Medical Library for the Eastern Mediterranean. This regional medical library concept, however, seemed to many people to overemphasize the large and static centralized repository of books rather than concentrating on the host of outreach services needed to bring the relevant literature to the users. Accordingly, the original concept of one health literature center per region has recently been expanded into plans for either regional networks or two or three focal points in each region at which cooperative activities will be organized. The large libraries within the future regional networks could economically provide such advanced services as computerized bibliographic information retrieval and access to expensive indexes and abstracting journals. But libraries and information centers alike will provide coordinated benefits to the entire network through such services as interlibrary loans and the provision of photocopies, the training of personnel, and the collection, indexing, and dissemination of literature produced within the region. A network is capable of providing a wider range of service to larger groups of clientele than could any component of the network acting individually.

The ultimate goal is to strengthen national resources and services. Given the number of countries involved and the formidable size of this task, it is felt advisable to tackle the problem at two levels: (a) the promotion of regional medical library networks to supplement the

resources and services of libraries at national levels; and (b) the active development of health libraries within each country. This will provide the most effective mechanisms for coordinating and stimulating technical cooperation among developing countries in the area of health literature. It does not preclude WHO, if so requested, from cooperating with any individual member state in developing its national health literature services.

Library networks can be constituted in varying patterns, and this is being borne in mind in the planning for different regions and for different purposes. User needs, existing patterns of cooperation, communications, language, and available resources will all be factors in determining network structure.

In discussions before the Thirty-first Session of the Regional Committee for Southeast Asia in 1978, it was decided that the approach to be taken in strengthening health literature services in that region should concentrate first on building up national resources that at present are seriously deficient in many respects rather than on establishing a regional library that might syphon off a disproportionate share of available funds. Among the deficiencies noted were: a shortage of books, journals, and textbooks; duplication of journals in neighboring libraries; shortages of funds and foreign exchange; a lack of services such as photocopying; and a lack of trained personnel. Accordingly, emphasis will be placed on the creation of resource-sharing networks within and between countries that will promote better use of existing facilities and minimize duplication. Among the activities envisaged are a current awareness service, dissemination of information, indexing and abstracting, information searching and retrieval, photocopying, training and continuing education, translation, and interlibrary loans. As a first step, the regional office organized a consultative meeting in New Delhi, August 27 to 31, 1979, for the establishment of a regional network of health literature, library, and information services. The participants were policymakers, librarians, and information users. A list of priority national activities was

composed. The next step will be similar meetings at the national level to strengthen or create national health library networks.

The situation in the Western Pacific region is characterized by the fact that it includes both developed and developing countries. Thus the medical libraries and information centers in Australia, New Zealand, and Japan represent resources on which to base a health literature network. The Western Pacific Regional Advisory Committee on Medical Research (WPR/ACMR) has an understandable interest in the exchange of health and biomedical research information and has recommended that practical steps be taken for giving research workers in the region better access to the scientific literature through health library services. In response to the recommendations of an outside consultant appointed by the WPR/ACMR, a Working Group of Librarians from seven countries of the region met in Manila in November 1978. The group recommended the following:

1) The creation of a regional network of health libraries;

2) The provision of MEDLINE searches and photocopies of articles to developing countries;

3) The stimulation of current awareness services in the fields of tropical diseases, health services research, and nutrition in children;

4) The establishment of a regional biomedical information center;

5) The development of a system for the collection, analysis, storing, and dissemination of bibliographic information on serial and nonconventional literature produced in the region, to be compatible with the global HERIS (Health-Related Information System) concept;

6) That WHO encourage the active support of these programs by its member states in the Western Pacific region.

This meeting was an important first step toward a comprehensive regional health literature program. The Working Group's recommendations were considered by the Regional Advisory Committee on Medical Research at its fourth session in April 1979, and are awaiting review by the new regional director.

The plan of the regional office for Africa does not envisage the creation of a single regional medical library as in Latin America, or a

single regional network based on national networks as in Southeast Asia. Rather, the intention is to set up networks of national focal points clustered around three regional health literature service centers, one each for the English-, French-, and Portuguese-speaking countries.

## Improving Health Literature Services and Fostering New Bibliographic Systems for Developing Countries

To improve the health literature services within developing countries, WHO is encouraging the development of library manpower training programs, promotion of an awareness of the value of information transfer and library services on the part of senior administrators, and the growth of national and regional cooperative ventures. WHO is also taking a leadership role in the provision of backup services to supplement national and regional activities.

Since the WHO Regional Medical Library for the Eastern Mediterranean in Teheran suspended its activities, the paucity of efficient and effective health literature services in the countries of that area has become even more apparent, as has the urgent need to share the existing resources and to increase the developing countries' access to international bibliographic systems. Health personnel in the Middle East had begun to rely on the MEDLINE and photocopy services operated from Teheran; hence, their abrupt cessation has resulted in many requests for the supply of MEDLINE searches and photocopies through other channels.

Although the international bibliographic systems such as MEDLINE and FILE HEALTH (Health Planning and Administration Data Base) of the U.S. National Library of Medicine are oriented toward research and clinical practice, and cover particularly the health and biomedical journals published in industrialized countries, there is a great demand for easier access to these systems from the health professionals in the Third World. Recognizing the need, a WHO MEDLINE center to serve developing countries was set up in Geneva in 1975. The plan was to decentralize this activity to the regions as soon as it became techni-

cally feasible. From 1975 to 1978, the WHO MEDLINE center in Geneva was active in making available both bibliographic citations from MEDLARS and copies of the articles when the original journals were not available locally. During the peak 12 months of this service (in 1976), about 5,000 MEDLINE searches were sent to developing countries. The turn-around time between request and receipt was a maximum of three weeks.

From 1979 on, because of the cost of operating a MEDLINE activity out of Geneva, requests were met by purchasing searches from other MEDLINE centers in either Switzerland or the United Kingdom, and more recently, directly from the NLM. For one experimental year, beginning October 1, 1979, under a new WHO-NLM agreement, the National Library of Medicine will supply MEDLINE searches and photocopies free of charge to developing countries. The service, at a special low cost, will be paid for by WHO.

As stated earlier, the NLM's network of bibliographic information systems covers mainly the literature issued in developed countries. Until recently, very little of what is published in developing countries has been collected, indexed, and made available to a large audience in a systematic way. Although health literature published in the African or Asian regions, for instance, is especially important for countries in those regions, it is also often highly relevant to the information needs of the people in developing countries of other regions.

A major step forward in the direction of complete bibliographic control of health literature produced in the Third World was the publication in 1979 of the first issue of Index Medicus Latino Americano. This index, published by the Biblioteca Regional de Medicina (BIREME) in São Paulo, covers 250 journals out of the approximately 800 published in Latin America. Only 44 Latin American journals are indexed in the NLM's Index Medicus.

With assistance from The Rockefeller Foundation, WHO has also started studying the possibilities of promoting the publication of three regional Index Medicus editions for Africa, the Eastern Mediterranean, and Southeast Asia. The aim is to ensure worldwide bibliographic

coverage of health and biomedical journals at the earliest date.

As a complement to MEDLINE and the regional Index Medicus, WHO also plans to sponsor a Health-Related Information System (HERIS) for developing countries. This is envisaged as a mission-oriented system for the provision of essential information to the health planners and health care administrators who are involved in the development of national programs and services to achieve "Health for All by the Year 2000". HERIS is to cover health literature which is generated by or specifically related to the developing countries. Criteria for guidance in the selection of documents--which may be books, serials, or noncopyrighted materials--will be developed in close collaboration with potential users of the system. HERIS is to be a cooperative activity, with national, regional, and global focal points. Duplication with existing international bibliographic systems will be avoided, and backup document delivery services will be planned.

Developing Communication Channels

Since health librarians in developing countries frequently work in quite isolated conditions, they have no ready forum for discussions of mutual problems and developments; nor do they receive the moral support that comes from concerted effort. Librarianship is frequently misunderstood by senior administrators and readers, so that the librarians, who are regarded as mere custodians, often suffer from poor support and low status. While working to strengthen health literature services in developing countries, WHO is constantly trying to create new communication channels among librarians through meetings, networks, visits, and correspondence.

Apart from its role in professional growth, resource sharing, and the improvement of local services, good communication is essential to the improvement of backup and referral services. Compiling union lists of serial holdings, establishing core lists of serials, and providing information on international backup services and sources of specialized information are all ways of increasing communication and are some of the special concerns of WHO's regional activities.

## Tackling Special Problems

WHO feels that it has an international function in identifying, studying, and alleviating special problems. For example, because such a high proportion of the world's medical books and serials are published in industrialized countries, the developing countries have problems both in paying for them and in receiving them. A modest way of helping to combat the lack of hard currencies is WHO's Revolving Fund for Teaching and Laboratory Equipment for Medical Education and Training. Under this scheme, WHO acts as a purchasing agent for medical literature to be supplied to libraries in developing countries and paid for in hard currencies, provided WHO can use the local currencies in which the purchases are reimbursed.

Other special problems under study are the lack of textbooks, the supply of nonbook teaching and learning materials, and poor postal communications. In connection with postal problems, for instance, the WHO Library in Geneva is exploring the cost/benefits of supplying periodicals in bulk by air freight from the U.S. to Egypt, since the libraries there experience tremendous difficulties in obtaining periodical issues and the librarians are held personally responsible for the loss of library materials.

## Summary

The above gives a brief overview of WHO's health literature program and of its leadership and promotion role. There is much to do, and so far we have touched only the tip of the iceberg. But slowly and surely there is an increasing awareness of the importance of health literature services in information transfer and, in turn, of the vital role of information transfer in health and social development. WHO would like to assure you, the esteemed members of the conference organized by The Rockefeller Foundation, of its commitment to encouraging in all possible ways the improvement of health science libraries in developing countries.

# V. EDUCATION

# EDUCATION AND TRAINING FOR MEDICAL LIBRARIANS IN DEVELOPING COUNTRIES

Tefko Saracevic

## Introduction

A medical library, as any other system, can be only as good as the people running it. Even though the quality, effectiveness, and efficiency of a library and its services depend on many factors, the quality of librarians--their professional knowledge and skills--is the most predominant one. Obviously, economic, technical, and information (collection) resources are important, for without them even the professional can do nothing. The best library resources can be squandered, however, by inept librarians and bad library management; and, conversely, marginal resources can be used to provide good services by skillful librarians and good library management. A collection, no matter how good, does not make a good library or, even less, good library services.

The aim of this paper is to discuss the problems and constraints in the education and training of health sciences librarians in developing countries, particularly those librarians destined for medical schools, and to explore some possible paths for increasing their professional knowledge and skills. The central premises are these:

1) The surest path to improving the quality of medical libraries in developing countries is through an increase in the professional knowledge and skills of librarians and library managers.

2) Any plans and efforts made to improve the quality of medical libraries must include the education and training of librarians as a pivotal point; otherwise, such efforts are doomed to eventual failure.

## Paths to Becoming a Medical Librarian

Although the educational paths that lead to a student's becoming a medical doctor differ in detail and practice, there is considerable standardization of general educational requirements on the global scale. No such standardization exists for medical librarians anywhere in the world. Even within the United States, which has the largest number of medical librarians and the strongest professional association (the Medical Library Association) with an elaborate certification program, a variety of options is available for a person who wishes to become a medical librarian. The observed practices around the world include:

1) A course in medical bibliography in a library school at either the bachelor's or master's degree level;

2) A master of library science degree program with major concentration in medical (or health sciences) librarianship;

3) A bachelor or master of library science degree program without any medical courses or specialization, but with on-the-job training in a medical library;

4) Experience on the job (with or without provisions for training, but without any specific prior educational background or degree);

5) Short courses and seminars on aspects of medical librarianship for persons in any of the above categories.

In the United States today, the most prevalent way of becoming a medical librarian is by obtaining a master of library science degree with a major specialization in medical (or health sciences) librarianship. But the breadth and depth of educational offerings in medical librarianship are very uneven; in some library schools, medical library specialization involved as many as 9 or 10 semester courses on the subject, while in others only 2 or 3 courses are required. Medical bibliography or medical library courses have been around for some 50 years, but full-fledged medical library programs date only from the late 1960's and early 1970's. The main reason for the emergence of these programs was that learning medical library principles and practices on the job proved to be a somewhat haphazard and random process. The main

strength of the present U.S. model for medical library education is its being a graduate degree program, with the undergraduate education of students presumably and preferably coming from a health science area, so that future medical librarians will have at least some familiarity with health sciences as a subject and with medical terminology. The weakness is in the lack of any provision for the education of library support personnel, such as library technicians or library managers in the broader sense of information managers.

Although other developed countries such as Great Britain, France, and Germany have medical library courses and short-term institutes in library schools or training programs in medical or hospital libraries, none have medical library programs similar to those in the U.S. There is considerable movement in these countries to follow the U.S. model, however, just as it is being followed more or less in methods for science library and information education in general.

In developing countries the situation is quite different. Many library schools do exist (e.g., 68 in South America), and some are excellent. Most such library schools are on the undergraduate level, and none have medical library courses or programs. There are no opportunities whatsoever for the education of medical librarians in the library schools of developing countries. The reasons for this include a lack of qualified faculty to teach medical library courses and a relatively small demand for medical librarians; thus it does not pay for the schools to offer courses in the subject.[1]

In many cases, medical librarians in developing countries are simply persons who have a bachelor's degree in library science and by chance happen to work in a medical library. Their biggest problem is a lack of background in health sciences and medical terminology, since all their previous schooling was in librarianship and nonhealth-related subjects such as education and humanities. While in the U.S. and other developed countries certain gaps exist in the education and training of medical librarians, in the developing countries there are few internal opportunities for professional education. This is clearly an area in

great need of action, providing the opportunity for a number of innovative educational approaches in trying to improve the situation.

## The Status of Medical Librarians in Developing Countries

As mentioned at the outset, the performance of a system will depend, to a great extent, on the professional knowledge and skill of the people running it. But it will also depend on the opportunity, status, authority, and responsibility given to such professionals. No matter how good they are, they need a chance to perform. Unfortunately, in many developing countries, the low status accorded to medical librarians robs even the best of them of the opportunity to perform on a level with their abilities. More specifically, medical librarians often face some or all of the following:

1) Their pay scale is at the lowest end of the university or civil service pay scale, a situation that often forces them to do more moonlighting than library work;

2) Their university or civil service schedules are such that promotion potential is nil;

3) Their involvement in the policy- and decision-making processes is minimal;

4) Their involvement in educational deliberations is nonexistent;

5) Communication between educators and librarians is lacking or, even worse, patronizing;

6) The next higher administrative authority is the type of office that deals with supplies and/or janitorial and maintenance services;

7) The administrative regulations of the institution require them to spend so much time on bureaucratic chores that their ability to provide useful library services is diminished;

8) Their overall professional status within the university and society is low, often below the level of any other professional group;

9) Their status and reward are in sharp contrast to the status and rewards of the medical doctors and professors with whom they work.

The reasons for the low status of medical librarians are complex.

In some cases, it is a direct result of the inferior status of the literature, and thus of libraries, in the educational process and in health activities in general. In other cases, it is a result of the incompetence of the librarians themselves, who have never been given the education and training that would enable them to perform in a competent manner. But this low status sets up a vicious circle in another sense: the brightest young people tend not to choose a professional career in which they are given so little chance to excel and be recognized. The status of medical librarians is accordingly one of the most burning issues in discussions of medical librarianship in developing countries.[2]

Thus, in a most dramatic way, the status, performance, and education of medical librarians and the quality of a medical library are linked together. All these aspects need action, but the most important factor in raising the status of medical librarians is to raise the level of their education.

## Relation of Literature and Libraries to Medical Education

The complex issue of the status and role of medical librarians involves in a major way the role of literature, and thus of libraries, in medical education programs. Literature as a record of public knowledge serves roughly two functions:[3]

1) To synthesize and integrate the existing fabric of public knowledge and experience, and to provide an archival and even a popularization function;

2) To record the ongoing changes in public knowledge--new findings, challenges, similarities and differences in experiences, new ideas, etc.

The first function is represented by textbooks and lecture notes, medical books and pamphlets in general, review articles and the like; the second by journal articles, technical reports and monographs, conference papers and the like.

Medical literature is used in medical education in recognized universities throughout the world. But the type of literature and the

extent to which it is used in the curricula, in teaching and in learning, vary greatly. At one end of the spectrum are curricula and teaching/learning methods that extensively involve the types of literature which serve both functions mentioned above (synthesis and the reporting of new knowledge), and at the other end of the spectrum are curricula and methods that limit the use of literature to textbooks or even to mimeographed notes of classroom lectures. Obviously, the extent to which libraries are supported and used in a given medical school depends on which end of the spectrum literature is assigned to. The schools that limit the use of literature to textbooks and notes have hardly any use for a library--a bookstore might suffice. The more curricula and educational methods tend toward the other end of the spectrum, the more need there is for well-appointed libraries and for high-level library services. It has been demonstrated many times that the quality of medical education is closely related to the use of literature. The teachers and students of better medical schools everywhere in the world use current literature extensively in the curriculum and have well-appointed libraries headed by librarians with high levels of professional knowledge and skills, while the medical schools that are judged to be of lower quality inevitably do not follow this practice.

Unfortunately, in many developing countries medical school libraries are inadequate. To a great extent this has to do with a lack of physical, technical, human, and informational resources. But to some degree it also has to do with the schools' curricula and educational methods--which tend to be at the low end of the spectrum, involving little use of literature. These schools employ educational methods that do not support information-seeking and information-using behavior--and thus the use of literature; instead they practice a philosophy of a scholastic type, which supports rote memorization and regurgitation of selected facts or textbook passages. Developing quality libraries is, therefore, closely related not only to developing quality librarians, but also to develop quality curricula and educational methods.

## Level and Subjects of Study for Medical Librarians

As the authors of the well-known Carnegie studies on professional education in the 1910's and 1920's noted, the quality of a field's professional services depends upon the quality of its formal academic programs. Thus, on the basis of long experience with professional education in general, it should be axiomatic that professional education of medical librarians in all countries, regardless of their level of development, must be academically based. Job training, possession of other professional degrees, work experiences, short courses, affinity for literature, and the like should not be accepted as substitutes for the professional education of medical librarians. Although there are a number of examples of excellent medical librarians without formal medical library education, these are exceptions. As a rule, lack of formal medical library education results in inadequate performance on the part of the overwhelming majority of people. Barefoot librarians have a place in health information activities, as do barefoot doctors in health care, but barefoot librarians have no more place in medical school libraries than barefoot doctors have as professors in medical schools.

Given the necessity of academic education for medical librarianship, what should be the main topic of study? One can suggest the following four areas:

1) Communication in medicine and in even broader areas of health sciences and public health. This should incorporate the basics of the structure, functioning, and language (terminology) of these fields, and the use of information in them.

2) Literature (records of public knowledge) in health science and public health fields; the generation, structure, behavior, uses, dynamics, and availability of literature and other information materials oriented toward the effective use of literature and information in general.

3) Libraries and information systems and their functions, stan-

dards of operation, procedures, processes, and management. Such courses should be oriented toward the effective and efficient operation of medical libraries in relation to users, and toward the ability of librarians to study needs and accomodate changes.

4) Information resources outside one's own library and their access and exploitation. This should be oriented toward an increase in resource sharing and utilization of the growing number of networks.

In other words, specification of the contents of education of medical librarians in developing countries should take into account both the concepts involved in the formulation of medicine and health care systems and the modern scope of medical librarianship, which is discussed below.

## The Scope of Medical Education in Developing Countries

Clearly, medical librarians should respond to and satisfy the information needs of both the subjects of study and the population of users in a given medical school. The education of medical librarians must, therefore, be in accordance with the subjects involved in medical education proper, the patterns of communication and literature in teaching these subjects, and so forth. But the concept of what should comprise the subjects of study in medical schools of developing countries is changing.

The reason for this is that the very concept (or model) of health in relation to development is changing. It is being broadened from the classical consideration of morbidity and related causative agent(s) to include consideration of environmental, cultural, social, psychological, and even political factors (e.g., housing, nutrition, sanitation, attitudes toward habits affecting health, and many others).[4] Since it has been repeatedly found that the level of health of the overwhelming majority of people in developing countries can be much more readily improved with public health measures in addition to clinical practice than with clinical practice alone, it is being argued that medical education should be sharply oriented toward public health

rather than toward morbidity. Similar battles were fought in the United States in the early part of this century--the result being a clear separation of public health from medical education;[5] today in the United States there is similar pressure for inclusion of community medicine in medical education. Thus, even in the United States, there are moves to broaden or reorient medical education.[6] In view of the reorientation or even rejection of the Western model of medical education in many developing countries, it becomes important to orient the education of medical librarians to include public health information. This, by the way, is not the case at present in the education of medical librarians in the United States, where public health literature and information are covered only indirectly. The broadening of medical library education in the U.S. that occurred in the past decade was toward health sciences and not toward public health. Public health is, by and large, left to public librarians or even ignored. But, in order to be relevant to developing countries, the education of medical librarians in the U.S. (and in other developed countries) needs to be broadened and strongly oriented toward the inclusion of public health subjects.

## Modern Scope of Medical Librarianship

During the past few decades, there has been a considerable increase in concern with problems related to the generation, processing, and use of information in all subjects and in a great many human endeavors, including heal . sc ences and health activities. This occurred first in developed c. ' s and now is found also in developing countries. As a result, new fields such as information science have emerged; new techniques have been developed for processing information (particularly in representation and dissemination); modern information technologies have been applied to information processing (particularly computers and telecommunications); and new information systems and national and international networks have sprung up (particularly in relation to secondary sources such as indexes). All these advances involve an array of

practices (theoretical, experimental, and applied) that often have little to do with librarianship and librarians as traditionally understood.

However, in the broadest sense, these new studies, applications, systems, and networks are still addressing the basic library problem of the effective and efficient communication of and access to public knowledge by users. But librarianship is now an expanding subject. Modern libraries have much wider turf and many services other than circulation. The education and training of librarians thus requires more extensive coverage than the traditional library techniques, schemes, and standards. Today, everywhere in the world, efforts dealing with the education and training of medical librarians have to involve these broader aspects of modern information processing and studies of information problems. The global trends are in this direction.

The introduction of these new information developments has created additional problems, which are particularly acute in developing countries and involve the appropriateness and usefulness of international information resources, networks, technologies, and practices in specific situations in developing countries. While it is easy to dismiss these high-powered information developments as irrelevant to the real needs of most developing countries, it is wrong not to educate medical librarians concerning them. Dismissal is not a proper answer; the intelligent adaptation, translation, and utilization of any information resources and practices whenever and wherever they are needed is. The education of medical librarians in developing countries should include knowledge of these modern developments coupled with the ability to adapt and use them when appropriate to local needs. The librarians in developing countries should be able to examine these new information tools and procedures critically and to judge for themselves whether or not they can and should be used. The librarians should be capable of making choices, dismissals, and adaptations on the strength of their own knowledge. And they cannot make these choices if they are not educated in the modern scope of librarianship, including information

science. Simplistic educational solutions that do not include this modern scope will only prolong dependence and thus will be counter-productive to development.

## Educational Alternatives

There seem to be four alternatives for the academic education of medical librarians in developing countries in the near future:

1) Attending established medical library programs in developed countries (predominantly in the U.S. and Great Britain);

2) Establishing medical library programs at existing library schools in developing countries;

3) Establishing academic programs on a regional level (e.g., West Africa, Southeast Asia, South America) at a regional medical library or at the region's most prominent medical school, in conjunction with a library school;

4) Creation and conduct of "portable" educational programs to be given on a rotational basis at specified library schools and/or regional libraries in developing countries. This could perhaps be done in relation to 2) or 3) above; an international body could be created to form a sort of international university, with a faculty, curriculum, program of study, etc., that would rotate to different places.

### Education Abroad

The strength and pitfalls of sending students abroad are well known. The least attractive aspects are prolonging dependency, difficulties in linguistic and cultural adjustment, an increase in the possibilities of brain drain, and remoteness from the local situation and its problems. But at the moment the deficiencies are outweighed by the mere immediate availability of proven programs of good quality. A badly needed cadre of medical librarians in developing countries could be educated abroad in the least amount of time. Developed countries could be persuaded to adjust their curricula to reflect more closely the needs of developing countries. Furthermore, graduates

of these programs could be enccuraged to become future teachers of medical librarianship at their local universities. A number of medical librarians in developing countries have already graduated from such programs; they function well in their home environment; thus this alternative has already proven its feasibility.

Establishing Medical Library Programs at National Library Schools

Eventually, this alternative is the most desirous one. The economics, self-sufficiency, closeness to local situation, elimination of language and cultural difficulties, all speak mightily for support of this alternative. There are too many problems at the moment, however, to consider this as a realistic immediate solution. Lack of faculty, the relatively small demand for medical librarians, and the diffusion of library schools across many countries are some of these problems. Furthermore, as presently set up, most library schools in developing countries are not suited or geared to a specialized program such as medical librarianship which involves the teaching of aspects of biomedicine and public health. They offer only bachelor's degree programs, most often in education or social sciences. In the long run, however, it is this alternative that will provide the most lasting solution. Thus it should be pushed forward, but only in conjunction with the first alternative (sending students abroad to be trained both as medical librarians and as future medical library teachers) and the other two alternatives, which are geared to provide a biomedical context and a program of teaching.

Establishing Medical Library Programs on a Regional Level

This alternative should involve not only a national library school, but also a prominent medical library (if possible, the largest and best run). The program should be based academically in a library school and practically in a chosen medical library. The library school faculty would teach basic (general) topics in librarianship; the medical librarians would provide teaching on topics related to medical libraries,

and the doctors and other library users teaching on topics related to biomedicine. For instance, in South America, such programs could be established in conjuction with the the Regional Library of Medicine (BIREME) and the library school at São Paulo University or the master's program at the Brazilian Institute of Scientific and Technological Information (IBICT) in Rio de Janeiro. Such programs could be established faster than the second alternative. The strengths are obvious, but there are problems and pitfalls that must be taken into account: for example, the restricted time of practicing librarians for teaching and dealing with students; pressures to teach only immediate and local methods; uneven treatment of the curriculum from one period to another; lack of centralized control, commitment, and concerns. Even this is a viable and feasible alternative. It could be pursued by educating abroad future librarians/teachers (first alternative) and at the same time establishing "portable" educational packages (fourth alternative) that would provide necessary curricular materials and that could be used at the outset as the base for program establishment and development.

Creation and Conduct of "Portable" Educational Programs and Packages

This alternative involves setting up a mechanism through which a set of courses would be developed and delivered. The "portable" courses could be given on a rotational basis at different locations, such as large or regional medical libraries and/or library schools which have taken steps to establish medical library programs. "Development of courses" here means the development of a whole set of educational materials needed to conduct the courses, such as syllabuses, texts, reading materials, demonstration examples, exams, video-taped lectures and/or demonstrations, and similar audiovisual materials. For instance, modern audiovisual techniques allow video taping with two audio channels, one in the language of the original and the other available for translation into any language. The weakness of such "portable" courses lies in their relative remoteness; nothing can replace face-to-face teaching. But the strengths are considerable: they could be immediately

developed and deployed; even more important, they could be used for the continuing education and upgrading of practicing medical librarians.

## Conclusions

Every survey ever done on the medical libraries in developing countries has stressed the lack of competent librarians as one of the major problems. Not the only problem to be sure, but certainly a major one. Competent medical librarians are crucial to the quality of libraries and library services in medical schools (and other health sciences schools) all over the world. Attempts to raise the level of medical libraries cannot succeed without efforts to improve the education of medical librarians. Two aspects are involved: providing for academic education of those newly entering the profession in a way that will produce competent medical librarians, and extending the skills and professional competencies of already practicing medical librarians.

The educational job can be accomplished in a number of ways. In the long run, the solution with the greatest potential for success is to create medical library programs at national library schools in conjunction with well-run medical libraries. Implementing such a plan would require creation of faculty, curricula, and programs which are for the most part nonexistent at present. At the moment "packaged" courses and even programs could be created to be given on a rotational basis in different regions of the world. In addition, programs for the education of future medical library faculty could be established. Together, the "packaged" courses and education of faculty would make possible the education of medical librarians at local levels. Such "packaged" and rotational programs have been proposed and warmly endorsed a great number of times, but have not yet been put into effect because of the lack, on the one hand, of financial resources and, on the other, of an appropriate mechanism and authoritative sponsorship under which they could be carried out. A high-level international organizational body is needed in addition to the means to effect such educational efforts.

What is the magnitude of the need for the education of medical librarians in developing countries? Realizing that manpower projections are difficult, and that as a rule they are based on questionable assumptions, I nonetheless venture here to offer some speculative assessments.

Considering that about 80 developing countries have close to 600 medical schools,[7] and that most of these schools need a minimum of two to three medical librarians in addition to the personnel that they may now have, we estimate that at the present time developing countries are in need of a minimum of some 1,200 to 1,800 new medical librarians. In addition, probably a similar number of already working medical librarians need to have their knowledge and skills upgraded.

The educational efforts required are great, but do not prohibit direct and immediate action with the possibility of a global impact. This impact should also be considered in the light of the considerable influence and leadership that these librarians in medical schools will exert on all health information activities in their respective countries. Thus the investment required for implementing such educational programs will have a much wider effect than on medical school libraries alone.

NOTES

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5. Williams, G. 1978. "The Doing and Undoing of Schools of Public

Health." In: Cheshier, R. G. (ed.), The Environment Affecting Health Services Libraries. Cleveland, Ohio: Cleveland Health Science Library, pp. 140-51.

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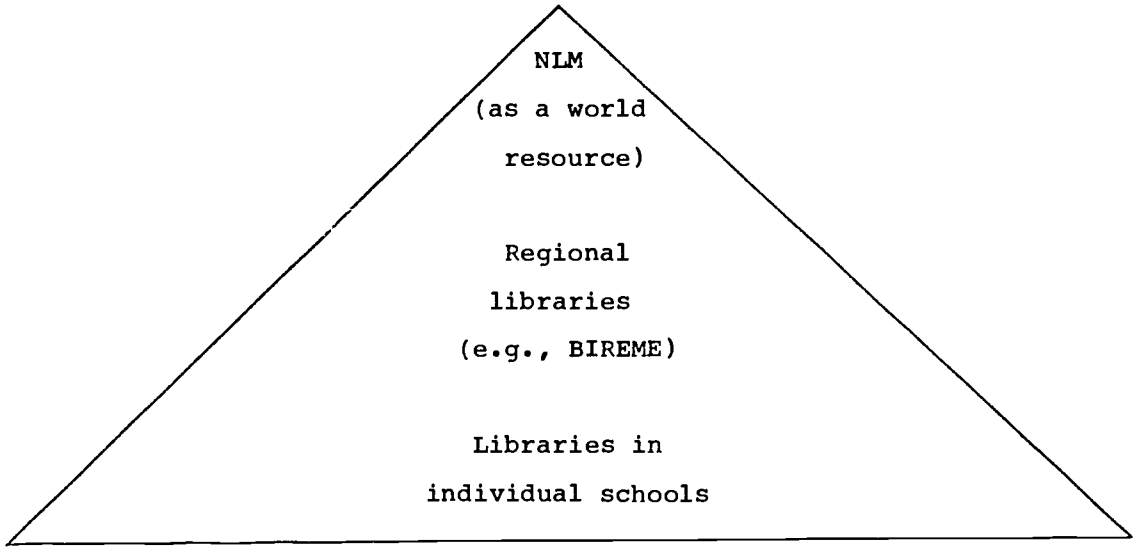
# VI. RECOMMENDATIONS AND JUSTIFICATION

# A COOPERATIVE PROJECT FOR ESTABLISHING SELECTIVE LIBRARIES IN HEALTH SCIENCE SCHOOLS IN DEVELOPING COUNTRIES

Tefko Saracevic and Alfred N. Brandon

The participants in this conference, "Selective Libraries for Medical Schools in Less-Developed Countries," conducted extensive discussions on possible practical approaches to solving the acute problems of libraries in medical and other health science schools in developing countries. Instead of presenting these discussions in the form of minutes, or the ensuing recommendations as a resolution, we are summarizing them here as a suggested approach and a project which is fairly comprehensive. All of the conference participants provided ideas, and are, in essence, co-authors of this paper.

There are roughly three levels of medical libraries as they relate to health science schools in developing countries:




In given countries or regions the actual structure may be more complex. For example, the middle and the lower level may be further subdivided to include national libraries or to accommodate the fact that

a large library in one school serves in effect as a regional or national library for other schools and health institutions. But the pyramidal structure remains.

The health science schools in developing countries can be divided into three groups on the basis of their libraries:

1) Those that have very good libraries (also considered major health science libraries in their respective countries);

2) Those that have libraries with incomplete, spotty, or broken collections (so-called Swiss-cheese collections);

3) Those that have no library at all (or no functioning library services and/or collections).

The question is: At what level should actions and interactions be promoted? Up to now, international policy for the most part has been to concentrate on the middle and upper levels of the pyramid. Considering the explosion of medical and other health science schools in the last decade, the time is overripe to direct action toward the bottom of the pyramid, particularly in relation to schools that have either spotty collections or no functioning library services or collections at all. The project presented in this paper is oriented toward such libraries.

## Overall Approach

To have a library means to have access to library services from an adequate collection, not just to have a library building. It is not enough to crate a collection and ship it to a school in a less-developed country, or to erect a building. Experience has shown that this may even be counterproductive, lulling a school into inaction with the idea that a library building or a collection will of itself result in library services and utilization. The simplistic approach of furnishing technical or economic assistance has been proven inadequate. The situation is much more complex, requiring an approach based on the principles of cooperation and self-sustenance.

The project suggested here is a massive one for medical and other health science schools in developing countries. It has as its goal the

establishment of new selective libraries and the upgrading of the quality of existing libraries in a way that will ensure their continuity and their further evolution as required by changes in their environment and by subject advances.

The proposed approach is based on the belief that bigger libraries are not necessarily better libraries. Judicious and systematic selectivity is needed to cope with the literature explosion on the one hand and, on the other, to provide as many potential users as possible with literature in their areas of interest on a reasonable economic scale.

Six interacting elements are involved:

1) Active participation of health science schools and other health authorities in resolution of the library problems of their country and region;

2) Defining and selecting a core collection of journals and books in health sciences consisting of a global core (applicable worldwide) and a regional or national core (specific to the region or country);

3) Using appropriate technology for delivery and use of the core collections; microfiche is suggested for journals;

4) Education and training of professional library personnel not only to manage the collections and provide quality library services, but also to train additional professionals and to be involved in the next element;

5) Education of user population in the ways of exploiting the core collection to its fullest; also to sensitize the potential users (faculty and students) to the value and utilization of literature;

6) Establishing connections with national and international networks to provide for requests which core collections are unable to fill.

Specifically, it was suggested that the project should be carried out over a period of five years and involve the following:

1) Establishment of core collection libraries in 200 medical or health science schools in developing countries;

2) Education of 400 graduate professional librarians (two for

each library) to ensure library services and continuation of collections at a high professional level, as well as the acceptance of librarians as professionals;

3) Development of 10-course packages in health science librarianship and their transfer to 30 library schools in developing countries to ensure the education of more librarians;

4) Development of five short courses for users, with appropriate promotional materials, and presentation of these courses at 200 participating medical schools to ensure maximum utilization of libraries in general and of core collections in particular;

5) Establishment of network connections between each of the 200 libraries and the nearest regional library to ensure backup services; six such regional libraries around the world are envisioned as being involved as backup centers.

Estimates of costs have been made, and the steps needed to implement the project have been discussed as described below.

Cooperative Involvement

The project should be governed and/or advised by a body of internationally recognized individuals and organizations. It should be carried out by an organization (or a consortium of organizations) specifically established for this purpose. It will be essential to secure cooperation between the project and the authorities in target countries, for example, ministries of health, university administrations, and health science schools' faculty and librarians. Cooperation here means more than lip service; it means the deep involvement of all participants in all phases of the project. It will be crucial in the first phase of the project, in particular, when an analysis of given situations must be made and the schools must be willing to commit themselves to participation in the project determined.

Cooperation of participating medical or other health science schools will involve specific responsibilities and commitments on their

part. These will include funding for certain aspects of the project, the provision of facilities and personnel, and, particularly, a commitment for continuing financial and other support of the library upon completion of the project. In other words, the project is not envisioned as a giveaway technical assistance plan, but as a cooperative agreement with mutual responsibilities.

Core Collections

The project will define, select, and furnish core collections of books and journals to participating schools. They will be supplied to schools without libraries (as the beginning of their libraries) and to schools with spotty collections (where they will strengthen such collections), provided that a whole core would be more economical than filling in individual gaps.

The definition and selection of core collections of books and journals for given subjects is a complex proposition. Subjects must be specified, associated literature canvassed, and methods for selection established. Feasibility studies must therefore be carried out and the participating schools involved. Two core collections are considered necessary: the global core, representing the recorded knowledge in given health subjects applicable to all humans and environments, and a national/regional core, representing recorded knowledge specific to local conditions and applications.

One way to select a global core of journals in medicine would be to adopt an existing list such as those journals indexed in the Abridged Index Medicus (AIM), which covers 100 journals considered to be of the highest world quality. This would be the easiest and most convenient way to select a core collection, because the journals are already indexed and the index to go with such a core is readily available. The question is: Would such a core be applicable in the first place? The complexity of the various situations involved will require careful study of selection methods and of selection itself. If it is shown that an existing list such as AIM is applicable, it will be adopted.

Once a core collection of journals (particularly the global core) is determined, the participating libraries will be supplied with at least the past five years of journals and assured of the next five years of subscription to ensure continuity and lay the ground for self-sustenance. With a continuous supply of journals at hand, the users should become accustomed to it and provide effective pressure for continuation.

A core collection of journals (be it global or national/regional) will require an index and a core collection of books a catalogue. The U.S. National Library of Medicine and the regional libraries such as BIREME will be approached with respect to the feasibility of creating an appropriate index and catalogue.

Appropriate Technology

Delivery of books in the paper format (as published or reprinted) seems to be the most effective and efficient method of distribution. Delivery of journals in the paper format, however, presents many problems: mailing costs, slow surface mail, binding, loss of individual issues, etc. Thus technologies for journal delivery should be explored. A feasible and appropriate technology seems to be microfiche or similar microreprography. The production of microfiche and other microreprographic products, particularly on a large scale, is cost effective. Microfiche and microfilm readers are a simple technology not subject to breakdown and requiring a minimum of very simple maintenance. Feasibility studies will have to be conducted within the project to determine the most desirable characteristics and standards on the one hand and the most appropriate equipment (readers, reader-printers, etc.) on the other.

Education of Librarians

The goal of "Health for All by the Year 2000," adopted by members of the World Health Organization, requires large numbers of competent health professionals whose education, both professional and continuing,

depends in large part on the availability of adequate library services and collections. In turn, the services, continuity, and self-sustenance of libraries will depend heavily on the librarians running them. Particular attention must therefore be paid to their professional education. The building of library collections and the education of librarians should proceed simultaneously. Persons selected for professional library education should have an undergraduate background in health sciences or life sciences. The library education should then proceed on the graduate level. Since most developing countries do not have such opportunities for health science librarianship, the education of the first generation of professionals would be carried out in developed countries and should be directed toward self-reproduction. That is, the first generation of librarians would act as educators for future generations of health science librarians in their own countries or regions.

Selected library schools in developing countries should be encouraged to embark on the development of relevant health science programs. For that reason, they should be involved in this project from the outset. Educational packages for courses in health science librarianship consisting of syllabuses, bibliographies, lectures, exams, videotapes, demonstration materials, readings, etc. should be prepared for these schools and for the first generation of librarians as teachers to enable them to develop and provide relatively fast qualitative education for health science librarians in their country or region.

Education of Users

In many schools where core libraries will be established, users may not be familiar with the literature and its potential or with the methods for the effective use of literature. Installment of a core collection in a school will in no way guarantee its use by faculty and students. User education should therefore be an integral part of the delivery and maintenance of core collections, including short courses, demonstrations, promotion and marketing, all of which require judicious

preparation and continuous deployment. Appropriate educational and marketing materials will have to be developed, including the preparation of packages and the elaboration of methods.

The cooperation of faculty in participating schools will be essential, not only for the selection of core collections but also for user education. A bond between librarians and users (be they faculty or students) should be fostered through user education and marketing efforts.

Network Connections

Core collections will be able to supply most but not all information needs of the users. Indeed, no library in the world can be entirely self-sufficient. Thus backup services and access to larger collections must be provided for selective libraries. A network connection to a larger library (national or regional) should be established, or the existing network structure strengthened. The help of regional libraries should be sought in defining appropriate subject areas and the contents of the local (national/regional) core collection, as well as in indexing the collection for local use. In many cases translations should be considered and a network connection set up for such efforts.

National bodies such as national libraries of medicine and regional and international bodies (the World Health Organization and its regional organizations) should be involved in all stages of this project, particularly in the establishment of networks.

Implementation

Participants have considered how such a project could be implemented. The following steps have been suggested:

1) Conduct feasibility studies, particularly on the selection of core collections and appropriate equipment, and collect data (such as presented in papers by Sonis and Braga) which will substantiate specific needs.

2) Involve various organizations (universities, foundations, national, regional, and international agencies) in discussions of the proposed project in an effort to find those that may be interested in participating in the project. The Pan American Health Organization and the World Health Organization expressed interest in it. Hold meetings and present papers on the ideas it contains.

3) Define an operational base for the project (within a university or some other organization, for example), and nominate a coordinator.

4) Prepare a detailed proposal and submit it to an organization such as the World Bank, or to a group of organizations that might provide composite funding.

The project has a central idea, that of selectivity and core collections; it is comprehensive, involving all the elements required by the complexity of the situation. But its success will depend on the full cooperation of all involved, and therein lies the major problem.

# SELECTIVE HEALTH SCIENCE LIBRARIES

## 1. THE DEVELOPING WORLD

John T. Bruer

The 1979 Bellagio conference, "Selective Libraries for Medical Schools in Less-Developed Countries," resulted in a proposal for the provision of quality-based core collections to health science schools. The quality-based library would consist of a core collection of journals and books in the health science area, which would form the materials portion of a package consisting of three components: library materials, personnel training, and technology. A core collection would consist of 100 to 150 journal titles, these titles being provided on microfiche for five years retrospectively and prospectively. The titles would be selected from existing core lists supplemented by local and regional literature. An index to the core collection could be prepared by combining indexes for the local and regional literature with the Abridged Index Medicus. A core collection of books in hard copy would be provided where necessary. Librarians and library personnel would be trained, both in the United States and locally. These key personnel would, in turn, not only manage the collections, but would also assume responsibility for the education of additional local personnel. Another, most important function of such personnel would be to educate the user population in how to exploit the core collection to its fullest. Microfiche technology is relatively simple and reasonably reliable. Miniaturized journal collections with readers and reader-printers have the advantage of not requiring a great deal of space for housing and would allow the collections to be kept current at minimal expense by sending volumes of the journals on microfiche via air mail. This is preferable to sending out hard copy at relatively high cost by surface mail.

Why should international aid agencies and ministries of health

and education be interested in such a project? How high a priority should it be given? All participants at the conference agreed that every health science school must have either its own library or access to a library. A library as a repository of information provides the raw material for an educational program. It is hard to believe that schools exist with no library facilities. Yet this is the case, and it must be remedied. The needs are obvious for both students and instructors. Instructors must keep abreast of current developments and their courses should utilize high-quality current information. Such course material must also be available for student use. Furthermore, students must be taught to think and read critically. This can best be achieved if relevant and high-quality material is readily accessible. One can envision a well-constructed, indexed core collection as an exemplar of critical literacy and informed selectivity, fostering sound reading and research habits. The presence of knowledgeable librarians and library staff would further contribute to the optimal utilization of library facilities. If information is the raw material of education, then educators, ministers, and aid agencies have an obligation to make it accessible to as many students as possible.

If the provision of libraries should be given high priority, what can be said in favor of this particular proposal to provide such libraries? First of all, it employs a selective strategy which guarantees both a high-quality and cost-effective collection. Secondly, it is an extremely flexible program which relies heavily on local participation and responsibility, guaranteeing a relevant and appropriate information service for the local population.

The selective approach to the scientific literature has recently gained popularity in the developed world, where it has been motivated by the scientists' need to deal with the proliferation of the biomedical literature. Selectivity based on bibliometric methods is intended to amplify the availability and impact of relevant, high-quality information.

How appropriate can such a strategy be to the information problems

of developing nations? The problem in the developing world is a dearth rather than a surfeit of information. Under such circumstances, a selective information system would seem to be the paradigm of inappropriate technology. But on the contrary, selective information systems in the form of core libraries are highly appropriate under conditions of scarcity. Patterns of information and library use reveal that a small number of journals in a collection can fulfill a majority of the requests. Furthermore, the few journals satisfying the majority of the requests are typically high-quality journals. It is this correlation between utility and quality that makes a selective strategy useful even under conditions of scarcity, as bigger is not necessarily better, and demonstrably so, with regard to library collections. One can use selective strategies to build cost-effective, high-quality library collections which will maximize the number of requests that a collection of a given size can satisfy. If there is a correlation between utility and quality, then a properly constructed collection would also represent the optimal quality collection of that given size.

Any library that can fill 70 percent of requests received in house is doing extremely well. What would one expect from a core collection of 100 journal titles? On the basis of statistics provided by Dr. Abraam Sonis, the first 100 titles of the BIREME collection fulfilled 50 percent of the local requests. Hence, for any core collection, if the 100 titles are chosen by local authorities with great care and a perfect match effected between the 100 titles chosen and 100 most requested, the core collection should be able to satisfy 50 percent of all requests it receives. If core libraries are installed where there are neither collections nor usable collections, this 50 percent success rate is a marked improvement. Core collections should provide maximal impact at minimal cost. Their popularity and success in small U.S. hospitals offers some support for this general approach to collection building.

The second advantage of this approach is its extreme flexibility in satisfying local needs. Local experts and authorities must assume

responsibility for choosing the 100 titles in the core collection. Material must not only be of high-quality, but it must also be relevant. It has been suggested that quality is a necessary condition for relevance. One must always ask, "Relevant for whom?" As audiences, situations, and conditions vary, so will the portion of the quality literature that is relevant. It is inconsistent with the selective strategy to draw up one core collection for deployment throughout the world. The selection of titles from local and regional literature for inclusion in the core collection must be left to local authorities. Standard core lists for hospitals in the U.S. can serve as guidelines, but not as the ultimate solution. Core collections are not prefabricated, packaged libraries. They must be tempered and adapted to local needs. Educators and librarians must investigate the needs of their user population and select accordingly if the core collection is to be both cost effective and of high quality.

Choosing sites for core collections is also the responsibility of local experts and authorities. One can envisage the information system of a country forming a pyramid, with the local libraries on the bottom and the national libraries, with linkages to regional and international collections, at the top. One should not assume that the core collections must necessarily be placed at the base of this pyramid. Complete usable collections may be unavailable higher up the pyramid, and, if so, core collections should be placed there. Where on the pyramid the core collections are placed depends on the state of the local information system. The issue can best be assessed by local authorities. This is not a trivial consideration. There is concern in some segments of the developing world that educational institutions of inferior quality are proliferating, and the fear that providing such institutions with core libraries will ensure or prolong their survival when funds might be better spent elsewhere. This decision is appropriately one for local authorities.

Finally, another sort of flexibility should be recognized. The proposed package is an initial attempt to provide quality-based health

science libraries. As an initial attempt, it must be viewed as experimental, and one must expect modifications. The phased introduction of libraries based on this approach and the study of their utilization will permit modification and improvement of the selective library package.

It is not suggested here that a cost-effective core collection able to satisfy 50 percent of local requests is the ultimate in information services. The core collections must be integrated into the information pyramid of the nation and region. Each level of this pyramid represents a more complete, comprehensive, and sophisticated service capability. Hence, as one is building core libraries, one must also look to the linkages between the core collections and the more comprehensive collections. Just as no one could justifiably argue that the ultimate health delivery system would be one that delivers primary health care only, the ultimate information system is not one that provides core collections only. Primary health care must be supported and supplemented by secondary and tertiary facilities. Similarly, core libraries, as primary information centers, must be supported by secondary and tertiary information centers. All three are necessary for an adequate and rational information system.

Quality-based health science libraries represent an efficient inexpensive means to provide high-quality collections to a great number of people. The proposal is extremely flexible, emphasizing local responsibility, with international agencies providing funds and consultation. It is intrinsic to the selective approach that collections be relevant to the needs of the client population. Determining the needs of that population is the role of administrators and educators from the developing world. The key to the success of the core library program is enthusiastic local participation. Educators from the developing world must decide what materials would suit their population best, where these materials should be located, and how personnel should be deployed. Development of qualified library personnel locally is a crucial factor for the maintenance and utilization of the collections as well as for comprehensive follow up.

Core collections are not underdeveloped libraries for underdeveloped countries; rather, they constitute a first step toward the development or improvement of information systems. They provide access to high-quality information at the local level, both via the core collection itself and via the integration of such collections into national and international information systems. Quality-based libraries are examples of appropriate technology and technological cooperation. Basic information needs of health science students and educators can be identified. Quality-based libraries satisfy those needs, and satisfy them in such a way that the users can be integrated into the larger, international information system.