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THE ASSISTANT MEDICAL OFFICER

The Training of the Medical Auxiliary in Developing Countries

Edwin F. Rosinski · Frederick J. Spencer

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THE ASSISTANT MEDICAL OFFICER

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The problem of medical manpower, particularly in the developing countries, is an especially acute one and one that will become greatly accentuated in the near future. The search for solutions to the problem occupies a position of high priority with the American Public Health Association, American Medical Association, American Nursing Association, and other professional organizations. While this controversial subject has been debated from emotional and philosophical points of view, this valuable report is a unique attempt to provide firm data on which further studies and programs may be based.

This study, based on visits to five medical schools, twenty-three health centers, and eighteen hospitals in five developing countries in Africa and the South Pacific, examines the function of the assistant medical officer, whose training falls somewhere between that of the doctor of medicine and the registered nurse. This examination of the procedures employed in selecting candidates for training as assistant medical officers describes the educational program—premedical, preclinical, and clinical courses—and explores teaching methods, classroom facilities, and testing techniques. The analysis of the educational program is based on direct observation of the classroom and the clinic; on textbooks, syllabi, and examinations; and on various student and

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faculty regulations. Extensive consideration is given to the type of student entering the assistant medical officer training, with particular attention to the cultural differences affecting student performance and to the type of faculty provided for this program. These factors are then interrelated and a general description of the graduate assistant medical officer emerges.

The duties of the officer are discussed in the light of his legal position as a qualified practitioner of medicine, and the limitations that may be imposed on his methods of clinical practice are presented. His conditions of employment, responsibilities, response to supervision, and the available equipment are noted, as is his role in public health and preventive medicine. The relationships of these officers to other medical personnel, particularly those auxiliaries with whom they work in practice, are also examined. In addition, consideration is given to the changing status of the assistant medical officer in the developing countries, especially as it pertains to his acquiring a degree in medicine at some later date.

Edwin F. Rosinski is professor of medical education and director of the Office of Research in Medical Education and Frederick J. Spencer is professor and chairman of the Department of Preventive Medicine, both at the Medical College of Virginia.

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THE TRAINING OF THE MEDICAL AUXILIARY IN DEVELOPING COUNTRIES

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INTRODUCTION

The material in this study has been gathered through the descriptive-survey method of research.

In even the most elaborately designed studies unforeseen problems arise and this study was no exception. After visiting the schools and commencing the writing of the report, it was apparent that more data had been collected than even the most liberal expectations had predicted. This turned out to be our chief problem. The generosity of almost all the school officials and faculty exceeded our hopes. The mailing bills incurred in posting much of the material to the Medical College of Virginia is objective evidence of the volume of material collected.

Because of the wealth of data collected we included in this report what we considered most pertinent. In culling and synthesizing, analyzing and summarizing, undoubtedly data were omitted that some might consider important. For any such omissions we offer our apologies. We attempted to present a well-integrated, objective, narrative report with exhibits, tables, and assorted material in the Appendices to illustrate and corroborate the narrative. Editorial judgement, perhaps not the soundest, was made by us alone.

The recommendations in the last chapter again are ours solely. These are based on our findings, a review of the literature on the subject, and personal, although professional, opinion. The reader is welcomed to differ.

The focus of this study is on how the assistant medical officer (A.M.O.) is selected for training and how he is trained. (The reason for the choice of the term "assistant medical officer" is presented later.) This was the original charge of this study and we have attempted to keep within these bounds.

The data comprising the bulk of the study were collected from various sources: extended interviews guided by an interview schedule with the principals of the schools; where possible, detailed interviews with the faculty; interviews with the students; gathering all the syllabi, examinations, and class schedules avail-

able; sitting in on classroom sessions, making ward rounds, and observing clinic sessions. Approximately forty different teaching situations were observed. Our own extracurricular activities in informal settings provided a wealth of information that could not have been gathered under more formal circumstances.

That part of the report (Chapter 7) dealing with the work of the A.M.O. must be regarded as complimentary to the main objective of the study, that is, the training of the A.M.O. The review of the A.M.O.'s role cannot be looked upon as a comprehensive evaluation of his competency but rather as a presentation of some facts of his daily work which must be considered in planning a training program. The facts presented are the results of interviews with A.M.O.'s, their supervisors, and some of the many persons with whom they work in their medical services. Within the limitations of time and travel the A.M.O.'s were interviewed at their places of work, and every use was made of opportunities to see them in practice.

A total of twenty-three health centers and eighteen hospitals were seen in the five countries visited. In addition, visits were made to rural villages where A.M.O.'s were located. A preliminary discussion with the program director in each country was useful in furnishing details of the development and present status of the health services. It must be pointed out that no attempt was made to obtain more than a very superficial idea of the structure and policies of the total medical services.

The purpose of that part of the report is to present some facts disclosed by practicing members of the health professions with a broad interpretation of these facts where indicated. Examples of practice were used wherever possible to illustrate general principle. Because of the development of the medical school in Suva the program in Fiji is used extensively, but not solely, as the main source of illustration.

The total picture of public health in developing countries is available in many publications, and many papers pertaining to the role of the auxiliary or A.M.O. in the field have been written, which also are readily available. The World Health Organization, particularly, has contributed to many of the publications in print. Apart from one reference, the role of the feldsher in the U.S.S.R. has not been mentioned in the text. It should be noted also that few references have been made to the many social, cultural, and economic elements of medical care, and the reader is referred to other papers

for this information. The Appendices retain the British spelling of medical terms as actual copies are exhibited.

To simplify a reading and understanding of this report, some of the terms need to be defined. In addition, as titles describing personnel vary among countries, a nomenclature applying to all the schools in the study is adopted. The term *principal* is used to describe the person in charge of the educational program in the school. His equivalents are such persons designated as director of training and chief medical officer in charge of training. He is not referred to as dean although he is similar to the United States medical education concept of a dean.

Training center, medical center, medical college, and medical school are some of the titles used by the schools studied. In this report they are called *medical schools,* a familiar term. However, it must be emphasized that these are not medical schools in the accepted concept. They do not give an M.D. degree to their graduates, nor do they give a diploma allowing graduates to practice outside their own country or territory. The graduates are restricted to practice only within government service for specified lengths of time. Some graduates continue with postgraduate training in hospitals outside their own country. (Among the places they go are Australia, United States of America, and Europe.) However, on their return with their special training completed, they still are not *bona fide* doctors.

As all the graduates seem to perform at a similar medical level and although their titles vary from school to school, in this report they are referred to as *assistant medical officers.* No uniform title may justly identify these personnel. Many perform at the level of M.D. general practitioner while others are specialists, competent to pass perhaps even a specialty board examination used in the U.S.A.

Some of the schools studied were located in colonies, territories, and independent nations. In this report *country* will be the identifying term.

Finally, the study could not have been completed without the generous assistance of a legion of individuals. It would be difficult to enumerate all who contributed to the success of this study. Dr. R. Blackwell Smith, President, Medical College Virginia, and Dr. Kinloch Nelson, Dean, School of Medicine, Medical College of Virginia, recognized the importance of their faculty's contributing to the study of world health problems. On extremely short notice

they graciously granted us permission to undertake the study. The faculty of the schools and medical officers in the government medical service gave invaluable assistance and information. Special acknowledgment is made to Drs. Phillip Lee and Robert Wright of the Agency for International Development, United States State Department; in Fiji, Drs. R. Edmonds, the late A. J. Hibell, and Phillip Thompson; in Papua–New Guinea, Drs. John Gunther, R. F. R. Scragg, and F. L. C. Tuza; in Tanganyika, Dr. A. M. Rankin; in Ethiopia, Drs. Aseffa Tekle and Dennis Carlson; and Dr. Charles O'Colmain in Kenya. Other individuals in the United States and abroad were contacted and presented a wealth of information based on their personal experiences in the training of A.M.O.'s. The editing of the manuscript was under the able direction of Mrs. Karen K. Kevorkian.

To all of them goes our sincere appreciation.

E. F. R.
F. J. S.

Richmond, Virginia
March 19, 1965

THE ASSISTANT MEDICAL OFFICER

1

BACKGROUND OF STUDY AND MEDICAL SCHOOLS STUDIED

Supplying doctors to fill the health needs of emerging nations is currently a problem of both number and degree. Numerous factors—physical facilities, staff, an adequately educated pool of applicants, etc.—preclude the training of such physicians. Consequently, the initial number of graduates from a medical school of a new nation is limited. For these initial graduates the immediate task is to attack the more pressing, if not critical, health problems of the community.

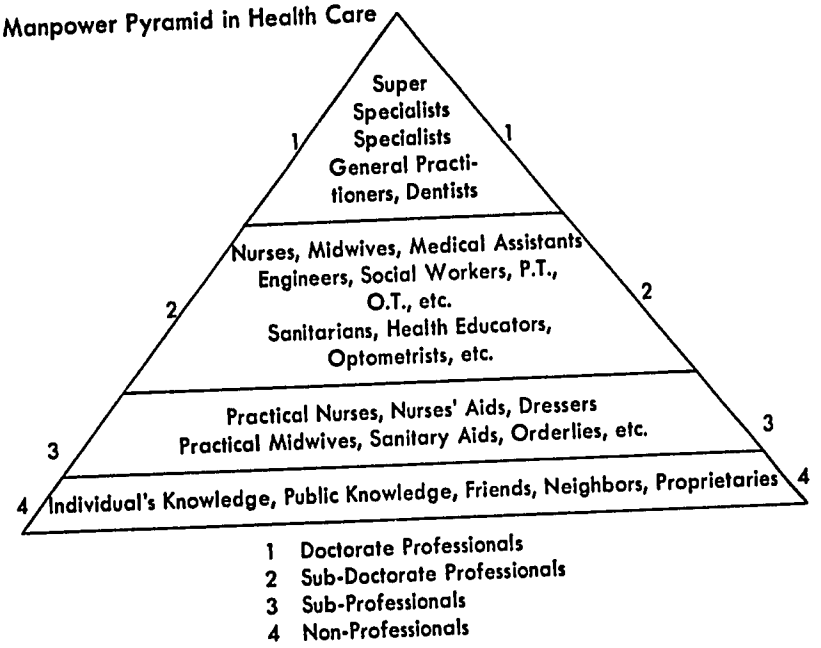
In the United States, the word "doctor" means a physician, usually with a Doctor of Medicine degree or its equivalent from a recognized university medical school. This is a stipulation of rather demanding requirements, for even highly developed nations with all the material and technical artifacts of their civilization have difficulty meeting their health needs with such rigorously trained personnel.

In recent years a renewed interest has developed in a possible solution to meeting a country's health needs. It is not a new solution but one that has been in operation for many years in several locations and has proved successful. It is the training of medical practitioners at a "level" below that of a medical doctor. Their titles vary from place to place; assistant medical officer, clinical assistant, and public health officer are but a few of their official designations.

Their duties in the hierarchy of medical personnel, from orderly to medical specialist, can be best appreciated in the "Manpower Pyramid in Health Care" developed by Dr. Robert Wright, formerly of the Agency for International Development and the University of Virginia School of Medicine. In Exhibit 1, the type of medical personnel just described (assistant medical officer, clinical assistant, and public health officer) theoretically functions below the doctorate professional but above the sub-doctorate professional. The qualify-

Exhibit 1

Manpower Pyramid in Health Care



The Journal Of Medical Education, Vol. 38, No. 6 (June, 1963), p. 512.

ing word "theoretically" is used deliberately; as this study demonstrates, the actual duties of these personnel vary a great deal.

With the education of these types of medical practitioners seen as a solution to meeting the health needs of emerging nations, data on their training and duties became a need of paramount importance. Isolated pieces of literature [1] that describe segments of some programs were available. However, a general description has been lacking. Furthermore, such data have never been critically analyzed to serve as a guide or model for the development of similar programs as the need arises.

This study, then, had two objectives:

1. To survey, collect, and summarize data on the training of these personnel.

1. A. R. Edmonds, "The Fiji School of Medicine," *Journal of Medical Education*, Vol. 37, No. 5 (May, 1962), 478–80; Franz W. Roza, "Training Health Workers in Gondar, Ethiopia," *Public Health Reports*, Vol. 77, No.7 (July, 1962), 595–601; The Use and Training of Auxiliary Personnel in Medicine, Nursing, Midwifery and Sanitation, WHO Technical Report Series No. 212, 1961. (See also Reports No. 69 and No. 109.)

2. To provide guide lines through which similar training programs can be initiated, accelerated, and improved.

The following report meets the first objective of this study—a summary on the training of these medical personnel.

Determining where these medical practitioners were being trained was the first task. Apparently no single health agency (World Health Organization, United Nations International Cultural and Educational Foundation, etc.) had a composite list of such training schools. Contacting individuals with experience in international medical education eventually began to result in the location of such training centers. The list expanded slowly. Except for isolated schools, little documented data on medical education programs was available.

As the list of schools grew it became evident they all could not be visited. It therefore was decided to select a sample of schools and study their programs in depth. The schools finally selected and the reasons for selecting them are as follows:

1. Fiji School of Medicine, Tamavua, Fiji. This was an old, well-established school that has had graduates, of one type or another, since 1878.

2. Papuan Medical College, Port Moresby, Papua–New Guinea. This was a new school training personnel at the same level as in Fiji. It appeared to have unusual financial support and was to be examined as a new, developing school.

3. Medical Training Center, Dar es Salaam, Tanganyika. This was a school in transition, from the training of medical officers to general practitioners with a registerable degree. It just had begun its program and the intention was not to study it in detail. Some insights into programs of transition were anticipated.

4. King George VI Training Center, Nairobi, Kenya. This, too, was an older established school with a known reputation. As the country was in a political transition, what was true in October, 1963, may not be at this time. Nevertheless, the program provided a great deal of information of a unique nature.

5. Haile Selassie I Public Health College and Training Center, Gondar, Ethiopia. As the college was part of a university and its training program with a different primary mission—public health—it was included in the study.

These constitute the schools in this report. Others could have been included but it was felt these were representative of the major types of programs currently in existence.

Concurrent with selecting the schools to be studied, the method of collecting the data for the report was developed in detail. In summary, this report had a two-fold purpose: (1) to obtain information on the educational program being offered, and (2) to obtain information on the way graduates of these programs functioned in clinical settings.

Before visiting the schools the outline of the study was submitted to A.I.D. where it was discussed and revised. The outline of the questions that were investigated is included as Appendix A.

As was cited before, the highest-level graduate up to the doctorate professional was to encompass the population of this report. Because of the limited information on the training programs in these schools, the principals of the schools were informed that the highest level was to be studied. On arrival at each school this stratum of personnel was immediately identified and studied while the training programs for other personnel were excluded.

At times this was difficult to achieve. While a demarcation between educational programs offered in some of the schools was clearly evident, the actual duties of the various levels of graduates overlapped and was difficult to distinguish. It was not unusual that in some situations only the individual's title identified him from his various medical colleagues.

In spite of such difficulties the first task in each school was to identify the highest level personnel trained and study them while at school or as practitioners. Each of these is identified and described further in this report.

In order to understand better the programs of these schools it is important to have some idea of the historical evolution of them. Their historical background has been a significant factor in determining their present objectives and curricular design.

The Fiji School of Medicine is located on the island of Viti Levu, the largest of the Fiji Islands. The islands lie in the Southwest Pacific between 15 degrees and 22 degrees south latitude and approximately 180 degrees longitude. The school traces its origin to 1878 when vaccinators were trained. Within ten years the original program was extended to a three-year course of study. Upon completion of it graduates were certified as native medical practitioners. While the original program accepted only Fijian youth, in 1928 applicants from other parts of the Pacific were considered and accepted. At present the students come from all the Southwest Pacific Islands except Australia, New Zealand, Hawaii, the Philip-

pines, and those islands under French administration. Most Papuan–New Guinians apply to their own school that just recently became operative. In 1931 the course of study was extended to four years and a five-year course was introduced in 1952. In 1957 the title of the graduates was changed to Assistant Medical Officer. Upon completion of all qualifying examinations a graduate is granted the Diploma of Fiji School of Medicine (D.S.M. Fiji). Graduates who are residents of the Fiji Islands must complete an additional one-year hospital internship before going into practice.

The Fiji school was organized to meet the immediate health needs of the population. At that time the need was to vaccinate the population against smallpox. As each need was met the training program was expanded to meet other needs, perhaps not such fatal or pressing ones but nevertheless crucial to the well-being of the population.

The evolution of this program was unique. The vaccinators were trained when, except for one or two European physicians, there was no medical program whatsoever on the islands. The vaccinators started from scratch; they offered the first-known medical care to the population. To add to the uniqueness of the program, the authorities had the foresight to recruit students from the indigenous population. This policy has continued and serves as a model for other schools to imitate. Through the years the standard of training has improved as has the quality of applicants.

After completing the internship the A.M.O.'s are assigned to various duty stations as part of the government medical service. In Fiji they are limited to practice only in the islands as part of the government service and cannot take up a private practice. They are licensed to practice *only* in the government service. Their duties, privileges, etc., are described in a later part of this report.

While the A.M.O.'s carry the burden of curative medicine in the islands, they have access to registered physicians who are also part of the government service. Except for the centers of population (Suva and Lautoka) where the large hospitals are located, the A.M.O.'s outnumber the registered physicians.

In addition to the A.M.O.'s the Fiji school trains other medical personnel. Some of these are included in Table 1.

In summary, the Fiji School of Medicine has evolved as the health needs of its society placed demands on the educational program. From training vaccinators to a school offering nine different courses of study has taken almost a century to reach.

Table 1

Some Training Programs Offered at Fiji School of Medicine

Training Program	Length of Training Program (Years)	Comments
Assistant Medical Officer	5	Plus one year of internship
Assistant Dental Officer	3	Excludes prosthetics
Physiotherapy	3	
Pharmacy	3	
Assistant Laboratory Technician	3	
Radiography	2	
Health Inspector	2	Examination set by Royal Society of Health
Assistant Health Inspector	1	Plus 1 year probation in territory
Dietetics	3	Competency as institutional housekeeper is certified

The Papuan Medical College is located at Port Moresby in the territory of Papua–New Guinea. This territory is approximately 100 miles northeast of Australia and 1,800 miles northwest of the Fiji Islands. The present training program, at least for A.M.O.'s, is modeled on that of Fiji. Before the opening of this school students were sent to Fiji for training. In 1963, there were still ten Papuan–New Guinians at the Fiji school.

It appears reasonable to classify the Papua–New Guinea College as a new school. As a concept, however, it began about thirty-five years ago. World War II interrupted plans that were being formulated to start a training program. Consequently, during that time students were sent to Fiji. After the war, lack of interest on the part of the government held up development.

At present all evidence indicates the Australian government is making up for lost time. If the physical growth of the school is an indication of the money being spent by the government, the sum must be considerable. One of the major factors restraining the school is the lack of capable students.

In 1961 a report on the development of the school was submitted to the Minister of Territories of Australia. This report was made by Sydney Sunderland, M.D., D.Sc., F.R.A.C.S., F.R.A.C.P., and

F.A.A., dean of the Faculty of Medicine, University of Melbourne; and Edward Ford, M.D., D.P.H., D.T.M., F.R.C.P., and F.R.A.C.P., director of the School of Public Health and Tropical Medicine, and formerly dean of the Faculty of Medicine, University of Sydney. The report dealt with the physical development of the school and outlined recommendations for the training of A.M.O.'s. A comparison of this committee's report and the outline of the present syllabus reveals little difference.

At present students attend classes in temporary quarters but new facilities are near completion. The amount of money being expended on physical facilities is extensive. When compared to what is spent in Fiji the amount becomes more significant.

The graduates will be called A.M.O.'s and after graduation will be required to complete an additional two years as housemen (interns). After that, graduates will be required to complete several years of government medical service.

In addition to the A.M.O.'s other medical personnel are being trained. It was difficult to obtain a clear and concise listing of these programs, however. Examination of the annual reports did not present a complete picture. Conversations with the teaching and medical staff revealed that other training programs are being given in addition to what is listed formerly in various reports. As far as it was possible to ascertain, the data listed in Table 2 are the programs in operation as of September, 1963.

Table 2

Some Training Programs Offered at Papuan Medical College

Training Program	Length of Training Program (Years)	Comments
Assistant Medical Officer	5	Plus two years internship
Medical Assistants	3	
Medical Assistants	1	In addition to 3 years basic general certificate
Aid Post Orderlies	2	
Hospital Orderlies	2	

Papuan Medical College, then, is an emerging school in an emerging country. It did not evolve historically but was planned as an entire program, encompassing a great number of health careers to meet many of the health programs of the territory in an immediate

and complete manner. It has been able to build on the experiences of others, to utilize outstanding expert help, and has had unusual support from a most generous government.

The training of medical assistants at Medical Training Center, Dar-Es-Salaam, Tanganyika, began about 1927, but was carried out by the government on a regional basis. The present school was begun in 1957 as an amalgamation for training nurses, health inspectors, and medical assistants. At that time the hospital at the center was begun and by 1958–1959 it was in operation.

A course for training A.M.O.'s similar to those in Fiji and New Guinea was instituted but ran into difficulty and is now defunct. As this course for A.M.O.'s had a ten-year certificate as a prerequisite, the number of applicants to the course of study was limited so that it was not continued. This limited pool of potential applicants found greater benefits and rewards in commerce or government service.

Consequently, a program of upgrading medical assistants to A.M.O's was begun. Through this program an experienced medical assistant now takes six months of additional academic work and three months of supervised clinical training. As in the other two schools described, the A.M.O.'s must work within the government service. This upgrading program currently is being re-evaluated as the pool of qualified medical assistants eligible for additional training also is limited.

Because of all the factors cited above, this school in 1963 embarked on the training of general practitioners who will be registered as "doctors" upon graduation. These will function as licensed physicians.

After considerable study it was proposed that the training program at this school be reduced to three main categories:

1. Medicine—medical doctors (M.D.), nurses, and rural medical aids
2. Health—health inspectors
3. Dentistry—doctors of dental surgery (D.D.S.)

At present there is such a proliferation of categories of training that any list at best is an approximation. Nevertheless, Table 3 attempts to categorize these courses. As in the other schools studied in this report, the list does not include nurses' training.

The school in Tanganyika, therefore, is shifting to the training of full-fledged physicians. Problems are associated with this transition but the school appears to be moving toward its goal.

Table 3

Some Training Programs Offered at Dar-Es-Salaam Medical Training Center

Training Program	Length of Training Program (Years)	Comments
Health Inspector	3	
Dental Mechanics	2	
Assistant Dental Officer	3	
Laboratory Technician		
Laboratory Assistants	3	
X-ray Technician	6 mo.	Graduates are not qualified for technician
Assistant Medical Officer	3	Defunct
Assistant Medical Officer	1	Open to qualified medical assistants
General Practitioner	5	Includes 1 year internship

King George VI Training Center has its main educational facilities in Nairobi, Kenya. The current educational program prepares medical personnel from dressers to clinical assistants, the lowest and highest grades respectively. Most of the indigenous population that has trained for an M.D. degree has done so at Makere University in Uganda. The majority of the physicians are European although this was changing with impending Uhuru. In October, 1963, a significant percentage of the European physicians had left Kenya or were planning to do so before the first of the year. In terms of historical significance this may be an important development. With their departure, more responsibility must be assumed by the clinical assistants, the equivalent of the A.M.O.'s of Fiji, New Guinea, and Tanganyika.

The training of clinical assistants is a recent innovation at the King George VI school. Before 1963, the highest grade of medical practitioner trained was the hospital assistant who received all his education at the training center. These hospital assistants functioned at, or above, the grade of nurse. To meet the increased need for medical practitioners a program of additional training for hospital assistants was begun. This training is all clinical with some lectures included. Upon completion of the training the graduates are assigned to hospitals for an internship where they are assessed further. Finally, after that experience they are assigned to duty stations.

At present no hospital assistants are being trained, but selected

nurses and dressers will be upgraded to hospital assistants. Hopefully, after they have had experience as hospital assistants, they can receive additional training for upgrading to clinical assistants. Therefore, through an upgrading of all the programs a pool of applicants will exist for some time.

As of October, 1963, the health training program in Kenya could best be summarized according to the listing in Table 4.

Table 4

Some Training Programs Offered at King George VI Training Center

Training Program	Length of Training Program (Years)	Comments
Registered Nurse	3½	Open to males and females
Assistant Nurse	3	
Microscopist	1	
Radiographer	2	
Dark Room Assistant	2	
Dispenser	3	
Assistant Physiotherapist	3	
Assistant Storeman	2	
Health Inspector	3	
Health Assistant	2	
Hospital Assistant	1	Defunct, nurses will be upgraded to this rank

King George VI Training Center has experienced a rather short history, but during that time it has attempted to meet the health needs of Kenya by continuously adapting the various programs to immediate and projected health needs of the country.

Haile Selassie I Public Health College and Training Center, Gondar, Ethiopia, was organized in 1954 as part of the Haile Selassie I University. Of the five schools included in this report it is the only one with a university affiliation. The university itself is located in Addis Ababa while the Public Health College is in Gondar, approximately 250 miles to the northwest. The college, nonetheless, enjoys the many benefits of university affiliation. Of course, the college is concomitantly subject to university regulations, but this does not seem to have infringed on any of the school's prerogatives.

Originally the college gave a diploma in public health to the graduates. This tended to restrict the number of students applying. Potential applicants were discouraged because, after four years of

training in a college with a university affiliation, they did not receive a degree. Consequently, a Bachelor's Degree in Public Health (B.P.H.) is granted now upon completion of the requirements.

This college can claim a number of distinctions. It was one of the first institutions put into operation through the joint effort of several governments and agencies: the Ethiopian government, the United States government, and the United Nations, to name a few. Too, it did not attempt to model its program on Western standards but adapted Western standards to meet the health needs of its own population. Finally, it clearly delineated the categories of medical personnel it was its objective to train. These are seen in Table 5.

Table 5

Some Training Programs Offered at Haile Selassie I Public Health College and Training Center

Training Program	Length of Training Program (Years)	Comments
Community Health Officer	4	Receive Bachelor's Degree
Community Nurses	3	Includes 1 year internship
Sanitarian	2	Includes 1 year internship
Dresser	2	Also called medical assistants

The community health officer again can be likened to an A.M.O., especially to those in Fiji. For here, as in Fiji, the health officer is trained in preventive medicine, curative medicine, health administration and health care, and education of the community. He is the elite of the Rural Health Team that consists of the health officer, nurse, and sanitarian.

The development of the school has been described by several authorities, although an article by one of the former directors, Dr. Franz Roza, is perhaps the most succinct and authoritative.[2]

The college faces several issues. The most important, perhaps, is the role it will play in the event the contemplated medical school in Addis Ababa becomes a reality. This college apparently will face these problems with the same resourcefulness it used in establishing itself as a college for training health workers.

This report, then, deals with specific medical personnel in various schools throughout the world: in Fiji, the A.M.O.; in Papua-

2. Roza, "Training Health Workers . . . ," *Public Health Reports.*

New Guinea, A.M.O.; in Tanganyika—in a most limited way—A.M.O. and general practitioner; in Kenya, the clinical assistant; and in Ethiopia, the community health officer.

The programs in each of these countries have taken distinct routes in their development but all are geared to meet the health needs of the population.

While exceptions can be cited as to the duties of these medical practitioners, the vast majority of their responsibilities and interests are directed to curative medicine. Time and personnel allowing, some will devote a greater portion of time to preventive medicine. While an examination of these schools' curricula will reveal a breadth of training, performance in a clinical setting often reveals a different picture.

The remainder of this report will deal with the who, how, and what of the educational program and the application in clinical settings of the various types.

From this point, a deliberate effort not to identify the specific schools will be made, i.e., the report will not cite such data as "in Fiji the following standards are set for admission of students." Because of variations in quality of students, faculty, facilities, and medical care, it seems imprudent to make specific comparisons. Also, the objective of this report is not to pass judgment but to quantify objectively what exists. Judgments inadvertently will be made; however, not referring to schools by name should reduce the tendency to make comparisons.

At times it will be necessary to cite a unique characteristic or procedure and identify it with the particular school. In such cases, no deliberate attempt will be made to criticize the procedure.

2

ADMISSION PROCEDURES AND EDUCATIONAL REQUIREMENTS

The countries in which these schools are located are in fact emerging, and accompanying this emergence is the development of the entire educational system. Where the history is more current, so, too, is the educational system. The standards of highly developed nations cannot be applied in countries in which the basic problem of illiteracy still is being fought.

Consequently, the proportion of the population completing a primary, least of all a secondary, education is small. This results in a limited pool of applicants qualified to pursue higher education. For the health profession the problem is further complicated. For those who complete a secondary education the allure of other careers—teaching, law, engineering, government service—is great. In some countries it is prescribed that a proportion of those entering higher education pursue a teaching career. This is done to increase the pool of applicants qualified for higher education. Such an approach, while alien to some, appears to be the best way to educate the populace.

With these factors present, it is inevitable that after admission criteria are enforced the pool of applicants for training at the sub-doctorate level will be small. As a matter of fact, one school has admission criteria but it is highly unlikely that they are met. The school takes the students it can get and hopes for the best. About 50 per cent are screened out in the first year of the medical school's preliminary courses. These courses are described later in this chapter.

Nevertheless, the medical schools make an effort to recruit the best possible applicants within the limited circumstances. One school is not allowed to recruit, as the number of potential applicants for higher education is so small that these students must be shared

with other disciplines and professions. In other schools the recruitment procedure follows well-defined steps.

First, all schools that are a source of applicants are notified and informed of the need of applicants for medical training. In one school there is a relatively well-designed recruitment policy. A brochure about the various curricula is distributed and faculty from the medical school visit the various secondary schools to describe the programs. A new approach to this policy calls for graduates who are practicing A. M.O.'s to visit these schools also to describe their duties and the educational program they completed. The results of this second approach are not apparent yet. In some cases the secondary schools notify the medical school of the eligible students and they are contacted by the medical school authorities. In other cases, the students are notified that the medical school has vacancies and the students communicate with the school. Usually, an application of the type in Appendix B is completed and the student is asked to submit supporting recommendations.

From here on the procedures vary. In some places, all the students are interviewed. In others, because of geographical location, only those with means to do so present themselves for interview. The interview has several purposes but its primary purpose is to obtain some impression of an applicant's ability to use the English language. The language requirement also is met by some schools by requiring the submission of an essay on an assigned topic.

While a transcript of grades usually is requested and submitted, few if any of the admissions officers pay any attention to them. As the quality of education varies from school to school within a country, these admissions officers require scores from a certified standard examination with well-developed norms. With such norms they can compare applicants on a more objective basis. Where a secondary-school system is developed fairly well the submitted grades are more valid, but even here a qualifying exam must be taken before graduation and it is this score that is considered.

Further varying restrictions are placed on applicants. In some schools, they all must be unmarried and remain so until the last year of school. Others accept married students but do not provide housing for couples.

Nowhere were there restrictions on the applicants' sex. Both males and females were considered on a par, but as in American medical schools, authorities had some reservations about females—whether they will get married and/or pregnant while in school and

the time they will practice after graduation are two major concerns.

No age requirements are set but most schools prefer their applicants to be between eighteen and twenty-five years of age. To increase the years of productivity as a medical practitioner most schools would like to graduate students who are twenty-five to twenty-seven years of age. But this is an ideal; for example, in a five-year course of study a large portion of the class can fail and, because of potential, be allowed to repeat one or two years. In one school, a student in his third year of study had been in the school six years. On paper he had two more years to go.

Another restriction peculiar to each school regards the sources of applicants. Fiji will accept students from most of the South Pacific area as will the school at Papua–New Guinea. New Guinea, of course, does not allow Australians. These two schools accept applicants from this broad area because the type of training they offer prepares graduates to practice a certain type of medicine that is applicable to the Southwest Pacific.

In contrast, another school restricts its applicants to its own country. As this government is developing a program unique to its own needs the educational program is geared to fit this approach. Individuals trained at this school would not fit into the medical care program of their own country.

This last restriction has a unique implication that is worthy of emphasis. Each school has either evolved or developed a program to meet objectives that are peculiar to its area. In the country just described, officials realize that they offer a particular program for their own national needs; the Papuan–New Guinea officials realize their graduates cannot transfer practice to Australia as Australia's problems are unique. Certain basic features may be applicable to all schools but variations in each program are inevitable and necessary.

There is one further observation about the selection of applicants. Because the pool of possible applicants is limited, in certain countries a general application form, applicable for all higher education, must be completed. The application form in Appendix C usually is issued by the Ministry of Education or its equivalent and returned to the ministry. On these forms a student lists his preferences in order. A student who lists engineering as his first, law as his second, and medicine as his third choice might find there are no vacancies in the first two fields and he must accept his third choice. Where such a policy exists it is possible to control the number entering a particular course of study. But if there is a pressing need for lawyers, engineers,

and other non-medical personnel, obviously the better qualified students will go to these professions. Thus, if a student's favorite field is full, he may accept his second choice or not pursue higher education at all. There are merits and faults in this system and its use obviously must be closely supervised to avoid abuse.

There are no other steps or procedures used for screening applicants. Conspicuous by their absence were any psychological tests. It was never documented whether cultural differences invalidate the use of psychological tests or whether adding another hurdle for admission would reduce further the number of eligible applicants. The only meaningful evidence, of a subjective nature admittedly, was the repeated comment by school authorities that to their knowledge the attrition rate among matriculating students could almost completely be attributed to academic difficulty. This academic difficulty was characterized by a lack of "brain power." No one was willing to admit that students failed for psychological reasons. Although some may have had personal problems, none were admitted to be of a psychiatric nature.

Once all the data on an applicant are available the final decision for admittance is made. Again, this procedure will vary from school to school. In one place it may be through committee action and in another the decision is left solely to the principal.

Even within these two approaches variations occur. When a committee is used, often a representative of the Government Education Department is a member of the committee. If the applicants are first screened by the Ministry of Education and then passed on to the school authorities, no such individual sits on the committee. In another variation of this approach, the committee consists of the principal of the school and the health administrator. Generally, the procedure of final selection is left in the hands of a committee.

In the situation where the principal of the school is solely responsible for accepting applicants, the pool of applicants is so small and of such questionable ability that the decision is hardly a decision at all. To paraphrase him, "We get what we can."

As the number and quality of applicants increases at this school and others, no doubt a committee action on applicants will have to be taken. Committees appear to be the best means through which the borderline applicants can be screened. There is a practical rationale for this approach, too. As the quality of the medical program improves, the pool of qualified applicants increases and the

number of vacancies in a class becomes smaller. School authorities often will have to decide arbitrarily who will fill the remaining vacancies. In such a case someone is left out. If one individual, for example, the principal, is making *all* the selections, the onus of a poor decision rests on him. It would be to his advantage to have a committee act on applicants and support him in the event of expected or unexpected pressure. This is a situation that may be a long way off for some schools. For others it is fast approaching.

One aspect of the admission procedures described is of paramount importance—the educational background of the students. As it plays such a crucial role in the type and quality of medical education program offered, the specific requirements need further elaboration.

As in any Class A medical or professional school the schools in this study would like to draw from a pool of applicants that would meet all their admission requirements. They would like not only those who meet the minimal requirements, but they would like to draw the superior students from within those that meet the admission criteria. As is the case elsewhere, this is more fantasy than reality. Drawing on a pool of absolutely superior students is the privilege of but few schools in the world. It must continuously be remembered that the schools training medical personnel below the doctorate level initiated their programs in order to graduate medical practitioners with as much dispatch as possible. This means, therefore, that students are admitted to the schools with but minimum preparation that is only adequate to meet the standards of the medical training program.

The first and major requirement for admission to these schools is a speaking, reading, and writing knowledge of English. This is an absolute necessity for several reasons: (1) most medical texts are written in English; (2) the majority of the instructors, regardless of their national origin, have English as a common language; and (3) native languages do not have equivalents of many medical terms.

The level of competency in English is another matter. If a student meets many of the other admission requirements but does not exhibit a proficiency in English, allowances are made and he is admitted. Seemingly, the admissions officer must decide whether a student's competency in English can be raised to a level high enough so that he can proceed with the medical courses. As English is critical to completing the medical curriculum successfully, courses in English *within the medical school* are offered. These are usually listed as preparatory courses of one academic year's duration. In some schools

this extends to two or three years before a student actually begins his pre-medical course work.

In Ethiopia, because the college gives a Bachelor's Degree and requires of all applicants a high school certificate, a course in English composition and reports is given in the first year. The Public Health College is the only school in which preliminary courses are not given.

Even in Kenya where candidates for clinical assistant are selected from the ranks of the hospital assistants, a proficiency in oral and written English must be demonstrated. When the same individuals were trained as hospital assistants, required courses in English were prescribed.

English, then, is required of all students in the schools studied. This is achieved in one or more of the following ways: (1) A minimum requirement always is set. (2) If the minimum requirement is not met, the students are enrolled in a preliminary course in the medical school that includes English. This course may be of one or more years' duration depending on the student's ability. (3) In schools offering a Bachelor's Degree upon completion of the medical program, an English course(s) is part of the total curriculum. (4) If the training program consists of few, if any, didactic courses, a competency in English must be demonstrated before the student is selected for this additional training.

In addition to the basic requirement of English, the schools generally would like to have all applicants complete the United States equivalent of a high school diploma (twelve years of preparatory education). This equivalent of a twelfth-grade education is determined in several ways, depending on the country: by the administration of the Senior Cambridge examinations (England), the Queensland Junior Public examinations (Australia), and/or a certificate from the high school attended, to name a few. Apparently this is a maximum requirement and the exception rather than the rule. It is not unusual, as was one school's case, to select students with the equivalent of a ninth-grade education. In such cases, again, preliminary courses to make up the deficiencies are offered in the medical school.

When the schools that do not require a high school certificate have difficulty in obtaining applicants that have met the twelfth-grade standard by examination, the preliminary courses will vary according to the ability of the students. Usually all students must take biology, chemistry, physics, mathematics, and English. Parts of

the syllabi included in these preliminary courses are included in Appendix D. These seem to be general courses that deal in breadth rather than in depth with the subject matter.

The preliminary program is often a one-year course of study. If a student fails to pass these preliminary courses but has potential, he is allowed to repeat. There have been cases in which some students have repeated for three years. Those without promise are dropped from school or are enrolled in other courses for training at a lower level. After passing the school's qualifying examinations in these courses, students proceed to the preclinical courses.

Table 6 is an example of the types of preliminary courses offered

Table 6

An Example of Some Preliminary Courses Offered in Three Schools

School A	School B	School C
English	English	English
Mathematics	Mathematics	Public Health (Sociology)
Physics	Physics	Biology and Chemistry as it relates to medicine
Physiology	Chemistry	
Chemistry	Biology	
Biology		

in some schools. The course in School C is of three months' duration. The intent of this course is simply to bring high school graduates up to the standard of one year of college so they can begin the academic medical work. In this school in 1963, of the original number enrolled in the preliminary course, 50 per cent failed.

In School B the course lasts one year. If a student fails he is allowed to repeat the entire year.

The program in School A is peculiar. The original intent was to spread these courses over a two-year period. The need for graduates was of such magnitude it was decided to shorten the course to one year's duration.

It should be evident that the quality and quantity of material covered in the courses in School A is suspect. Allowing for an eleven-month academic year and Saturday classes, it is expecting far too much that these courses are of substance. At best they are a *tour de force* of the subjects that only familiarizes the students beginning premedical courses with the necessary vocabulary.

The role of these preliminary courses needs to be understood fully, as they are peculiar to the schools observed. If the medical schools could rely on applicants who met *all* of their admission criteria, there would be no need for the preliminary courses. In spite of the tenth- or twelfth-grade requirement and/or acceptable qualifying examinations course, not all students come to the medical schools with a similar background. The quality of preparatory education varies, and consequently the quality of the students varies. The fact that students have had courses in English and mathematics, for example, is no guarantee they were of a level to enable them to carry on the work in a medical school.

There is still another reason for offering these preparatory courses within the medical school. The medical schools, as well as the better secondary schools, usually are located in the largest urban centers of these countries. It would be possible that if an applicant did not come up to the standard of the medical school, i.e., he came from a decidedly inferior secondary school, he could enroll in one of the urban secondary schools. Instead of the medical school, the secondary school could raise the student to the standard necessary for the preclinical courses. However, in some countries there are stipulations on an individual's education that make such an approach a time-consuming task. The most restrictive is that requiring a student enrolled in a secondary school to enroll in its full course of studies. He also must assume other responsibilities for the privilege of being educated. Often these responsibilities mean a student must work the school farm which, in some cases, is a school's major source of food and income. Under such restrictions, when present, a student cannot give full attention to his studies but must allocate his time. The medical schools do not have such restrictions. Consequently, a student can devote *all* his time to the courses that will bring him up to standard.

The difference in time between the two alternatives is surprisingly large. In one school, authorities claim a bright student can bring himself up to standard in one year. If he attended the local secondary school this would take three or even four years to accomplish. In the end this lengthens the time before he can become a practicing A.M.O.

These preliminary courses will exist until the quality of secondary education improves. At present there seems to be no other way to bring the applicants up to standard.

In summary, the admission procedures and educational require-

ments necessary to commence medical training as an A.M.O. appear to follow this general pattern.

1. The pool of applicants usually is small and of poor quality because (a) the total number being educated in these countries is small, and (b) other professions and careers draw on the same pool of eligible applicants.

2. Recruitment is limited, if not prohibited, because the pool of eligible applicants must be allocated among the various professions and careers. An equitable ratio of entering students among schools must be maintained.

3. All candidates must submit an application to either school authorities or the Ministry of Education. Questions asked on the application are routine.

4. Applications must be accompanied with letters of recommendation or references.

5. In some cases applicants must appear for an interview. Usually this interview is to determine a candidate's ability to use the English language.

6. A transcript of grades is required but, because of variation in the educational background of applicants, little attention is paid to it.

7. Standardized achievement examinations are used because the transcripts often lack validity. The kinds of examinations used will vary.

8. The marital state of applicants has little influence on their acceptance for training. Neither is there a restriction on the sex of the applicants although there is a tacit preference for males.

9. No age requirements are placed although it is hoped that applicants will graduate by the time they are twenty-five to twenty-seven years of age.

10. In most places the geographic area from which applicants are drawn is prescribed. Because each school offers a distinct program for an individual pattern of medical care, applicants must come from areas in which their training can be applied effectively to a similar pattern of medical care.

11. No psychological tests are given as part of the screening process and there is no evidence that matriculated students failed because of psychological reasons.

12. Proficiency in written and spoken English always is required. This is determined through interviews, essays, and recommendations.

13. A high school diploma is desirable but, because of the difference in the quality of secondary education, the diploma is incidental to admission. If students come from a secondary school with a reputation for excellence, the diploma's value is increased and it plays a crucial role in admission.

14. When all the required credentials are submitted a committee usually reviews them to pass on the applicant's desirability. The composition of the committee membership varies but a school official is always present.

15. Except for the school that offers a *bona fide* college degree, all schools require admitted students to take preliminary courses in the medical school. The objective of these preliminary courses is to enable students to begin the medical school's preclinical courses. After the educational requirements for admission are established, the medical schools *must* educate their accepted students in reading, writing, arithmetic, and science. Only through this approach could they get students to study medicine and meet the health needs of the country.

An amazing amount of similarity in admission procedures and the educational requirements exists among the schools studied. The only real difference was the degree to which the procedures and requirements were met, or better, the degree to which allowances were made. These varied from the flagrant, almost desperate, flaunting of the requirements, to a rigid "holding the line" attitude. By meeting the established preclinical course requirements, no doubt the education of the medical students can be hastened. As to the professional competency of those with less than desirable preparation, only a speculative answer can be given: the better prepared students function better in clinical subjects, *ergo*, they should be better clinicians. If the quality of medical care is to be a source of reference, obviously the better students will better satisfy that role.

3

COURSES OF STUDY

A remarkable degree of similarity exists on paper in the courses offered among the various schools. As will be seen in this report, the quality of teaching and the depth of subject matter vary considerably from school to school.

The number of hours devoted to didactic courses is relatively small. As these schools produce medical practitioners to meet the health needs of the country, it has been decided the educational emphasis should be on clinical experience rather than on formal didactic presentations. This does not mean that when the student is assigned to clinical work he no longer has formal classroom assignments. On the contrary, a formal lecture or demonstration is scheduled when it appears appropriate. In some schools formal lectures are scheduled throughout the clinical years.

If the standards of medical education in schools granting an M.D. degree were used here for comparison, the number of hours devoted to didactic courses would seem small indeed. The schools in this report have little need for formal didactic courses; they give the students the essentials and then in clinical settings the students learn by doing.

Learning theoretical concepts and making generalizations from differing facts are not demanded of these students. The educational program is not geared in this way, for the graduate is expected to take care of only basic health needs. This can be learned through intensive clinical experience; formal instruction in courses is not essential to achieve this goal.

As was cited, almost all of the students must complete one to three years of preliminary courses to bring them up to standard. After successful completion, they begin preclinical (basic) courses.

The following describes the preclinical and clinical courses offered in the five schools.

In the first school the preclinical courses, except biochemistry, are taught throughout the two semesters. The second semester biochemistry is introduced. Unlike other schools this one has introduced

sociology as a course of study. It was given one day a week—for a forty-five minute session in the first semester, and for one hour and forty-five minutes during the second semester. From the number of clock hours assigned the course content would seem to be extensive. As syllabi for these preclinical subjects were not available, it would be rash to give an opinion on the depth of subject matter covered, especially in so broad a topic as sociology.

It was learned from the faculty of this school that the sociology course also covered material in anthropology. In addition, a course in anthropology is given in the third year. When a school's graduates must fill the health needs of a social structure based on the tribal system, material on anthropology is appropriate. A course such as this can be of value only by dealing with sociological-anthropological problems and conditions that are indigenous.

Other preclinical courses in this school usually are prefixed with the descriptive word "practical," "Practical Anatomy" for example. As is universal in medical education a cadaver is used, but because of cultural taboos and closely knit family and clan units there is a shortage and students have little opportunity for dissection. Moreover, the space is limited in the school for the teaching of anatomy. The students—in 1963 numbering thirteen—gather around the instructor who does a demonstration. After seeing a demonstration some students dissect, read, or make relevant drawings. As a result, the students do not have an opportunity to dissect the entire cadaver, and the instructor must select the topics which he thinks will serve their greatest needs. Because of this selection process students receive practically no instruction in neuro-anatomy and little in embryology. Neuro-anatomy is limited almost completely to the special senses (gross) and examining the brain. These also are taught through the procedure just described.

The practical aspects of anatomy are continued in the second year (first clinical year) during the formal surgery course. At this time signs and symptoms are taught. To demonstrate important symptoms seen in the surgical ward the surgery instructor (who also teaches the anatomy course) takes the students back to the anatomy department and to the cadaver. For example, if a case of hernia was seen in the wards, this would be described in a classroom. In anatomy the students then would examine the testes of a cadaver, but with the cadaver shortage this is not always possible. Nevertheless, here as in other schools, the emphasis usually is on the practical

aspects of the subject. The fact that it is not always successful does not detract from its merits.

In this school some preclinical subjects are introduced in the first clinical year (second year). These include bacteriology and pathology. On paper this school also offers a course in statistics. As statistics represents a difficult concept for students of this cultural background to grasp, several faculty members of the school have questioned the value of such a course. However, if this course deals solely with recording of dates as was claimed, it would have practical value. Then the title "statistics" would be inappropriate. As outlines of the preclinical courses were not available, it was difficult again to evaluate objectively the content of these courses.

All the traditional preclinical courses probably could be offered and completed in the first year if statistics and sociology were not included in the curriculum of this school. This is the usual approach at most schools. But if the school authorities feel, as apparently they do here, that sociology and statistics are fundamental and essential to a successfully practicing A.M.O., then they should be offered. If the course of study for A.M.O.'s is to be of minimal duration so he can become a practitioner in the shortest possible time, precautions must be instituted to guard against the proliferation of courses that could detract from these schools' primary mission. Many school authorities in a perhaps unconscious quest for greater respectability and status will move these schools toward standards of full-fledged medical schools offering an M.D. degree. If they are to become schools offering an M.D. degree, their entire program will have to be re-evaluated and the schools' objectives scrutinized closely and altered. They then no longer train personnel at the sub-doctorate level.

The clinical course work begins at the completion of the year's work in preclinical courses just described. Transition to clinical experience is gradual with the students being exposed to an introductory surgery course related to anatomy. There are also surgical demonstrations as well as formal lectures in surgery. In medicine, signs and symptoms are taught in the first semester and these are followed in the second semester with clinical demonstrations. In this second semester clinical demonstrations in surgery continue. In addition to these clinical courses, practical pathology is taught.

As mentioned, the transition to clinical work is gradual. During

the first clinical year most learning takes place through formal lectures and demonstrations. Student contact with patients is limited.

Full patient contact comes in the second clinical year. In medicine students have case presentations, clinical clerking, and a correlation clinic. The correlation clinic makes use of patients and faculty who would deal with the disease or clinical manifestation under consideration. If a patient with a diagnosis of malaria was the topic, in the correlation clinic a bacteriologist, pathologist, anatomist, and someone from medicine would present findings or offer professional opinions on the subject of malaria that were related to the particular discipline. In addition to the correlation clinic students are allowed to attend the clinical pathology conference.

In surgery, students have ward rounds once a week for two hours and attend a surgical laboratory where they are taught to give blood transfusions and other practical surgical procedures. Specialty training in surgery begins in the first semester of the second clinical year with students assigned to the orthopedic clinic for approximately three hours a week.

The first semester is rounded out with courses in anesthesiology, epidemiology, child health, and health education. Four three-hour sessions are set aside to teach students how to create visual aids. What this particular and unusual course involves was impossible to determine.

The second semester, except for a course in environmental sanitation, is entirely clinical. The surgical specialty orthopedics is continued with students again spending approximately three hours in the out-patient department working in orthopedics. Obstetrics is added to the course of study with three lectures a week being given to this subject. Pediatrics lectures are given once a week. The pediatrics and obstetrics courses seem to be entirely didactic with students finally doing clinical work in these two specialities during the last year in school.

The second clinical year involves additional work in medicine and surgery. In medicine, formal lectures as well as tutorial sessions are scheduled for the students. The correlation clinic continues during this semester for three hours a week. Surgical rounds are scheduled for one afternoon a week, and during another afternoon surgical procedures are again scheduled.

During the clinical segment of the educational program a twenty-lecture course in tropical medicine is given. This was the

only course in which a printed syllabus was available. This course includes two lectures on bacterial diarrheas, four lectures on malaria, three on malnutrition, two on anemia, and single lectures on amoebiasis, maternal health, infant and child health, filariasis, leprosy, tropical skin diseases, insect borne diseases, and other virus diseases. If this appears to be a relatively small number of lectures for so broad a topic as tropical medicine, an examination of the detailed content of the lectures gave the impression that the subjects were adequately covered.

Another clinical year has been added to the course of study at this school. No information on the kinds of courses to be offered was available. It seems safe to assume the majority of the work will be clinical with students perhaps getting experience in pediatrics and obstetrics, a logical follow-up to the lectures they receive in these two courses.

It is felt by the school authorities that the five-year course of study will be equivalent to other schools' six-year programs because of the reduced number of holidays and the holding of Saturday sessions.

Various outlines describing the courses of study in this school have been printed and each outline has courses either added or deleted. One listed courses in psychiatry, normal psychology, dermatology, E.N.T., pharmacology, materia medica and therapeutics, social and preventive medicine, hematology, and parasitology. Whether these were to be formal courses or part of the major clinical subjects—medicine and surgery—was never determined. The information given here about this school is based almost entirely on the printed time table of scheduled classes students were actually attending in the first semester of 1963 and on conversation with the faculty responsible for the majority of the teaching program.

In spite of several shortcomings in the data collected at and about this school, the following appears to summarize its course of study. (1) A preliminary course of one year's duration is given to bring students up to standard. More often than not students repeat the preliminary course. (2) The usual preclinical subjects—anatomy, physiology, biochemistry, pathology—are given. (3) The transition to clinical subjects is gradually made with lectures on various clinical subjects preceding work in the wards, clinics, and out-patient department. (4) Specialty courses such as pediatrics, orthopedics, etc., are included in the clinical years. (5) All clinical teaching is limited to the hospital associated with the school. (6) A large number of "special" subjects are listed. Whether these subjects are

special courses or parts of the major clinical subjects of medicine and surgery was not determined.

A closer examination of the course of study offered in another school should shed more light on the content of preclinical courses. The course of study in the preclinical year at this school is not as ambitious as in the school just described. Anatomy includes histology and biochemistry. These two sub-courses are taught in conjunction with physiology. There is a deliberate attempt to correlate and to integrate histology, biochemistry, and physiology. Only gross anatomy is taught as an entity; even here, as difficult as it is, an attempt is made to relate the gross anatomy to other subjects.

The course in anatomy consists of forty hours of general anatomy including tissue histology and early embryology. Topographical anatomy is assigned one hundred hours and runs parallel with dissection. Dissection is given throughout the entire year for 360 clock hours while histology is scheduled for 34 hours. Practical histology, including sessions indentifying histological and embryological slides, is assigned 60 hours. Applied anatomy is scheduled during two clinical years for a total of 70 hours and is described later in this chapter.

While the course of study in anatomy is not prefixed by the word "practical," a close look at the two qualifying examinations in Exhibit 2 and Exhibit 3 give the impression that practical information about anatomy and histology is required.

Exhibit 2

Anatomy

Time—3 hours

Answer *four* questions

1. Describe the anatomy of the male urethra.
2. Describe the shape, size and position of the normal adult uterus.
   What variations occur in it throughout life? (Omit microscopical details.)
3. Name the groups of muscles associated with the following movements and give their nerve supplies:
   (a) extension of wrist
   (b) opposition of thumb and little finger
   (c) dorsiflexion of ankle
   (d) contraction of anterior abdominal wall
   (e) movements of the vocal cords.
4. Describe the anatomy and relations of the (extra-hepatic) biliary tract.
5. Name and draw diagrams of the broncho-pulmonary segments.

Exhibit 3

Histology

Time—2 hours

Answer *all* questions

1. **Describe the histology of the lower part of the small intestine.**
2. **Describe the histology of the ureter and bladder.**
3. **Make short notes on:**
   (a) **oxyntic cells**
   (b) **cardiac orifice of the stomach**
   (c) **dermal papillae**
   (d) **sebaceous glands.**

Examinations are described in some detail in Chapter 5, but it is interesting to note that the examinations in Exhibit 2 and Exhibit 3 are qualifying examinations that must be passed by all the students in order to be promoted. The examinations are a good indicator of the depth in which subjects are pursued in this school.

The course of study in physiology is presented in its entirety as Appendix E. The entire syllabus is presented—in outline form—as a model to demonstrate how various preclinical subjects can be integrated within one course of study. Included in this outline are such histological subjects as "properties of cardiac muscle" and "comparison of skeletal, cardiac and smooth muscle." Biochemical topics include "electrolytes, acids, bases, and buffers" and "introduction to metabolism." Each week a laboratory or practical session is assigned also. As in the first school little time is devoted to neuro-anatomy. In this school some neuro-anatomy is covered in the dissection sessions but the majority of the subject matter is handled in physiology. Here the topics of "divisions of the nervous system," "receptors and neurons," as well as other basic information in neuro-anatomy are covered.

Limited coverage in neuro-anatomy is justified by the argument that it is a highly specialized subject. If a patient's ailment has its roots in the neuro-anatomical system, it invariably will call for the service of a medical specialist. Therefore, all that students need to know is when to make a referral on matters involving the neuro-anatomical system.

The physiology syllabus included, as Appendix E indicates, what this school states as its course of study in physiology. The examination in physiology shown in Exhibit 4 again demonstrates what the

Exhibit 4

Physiology

Time—2 hours

Answer *four* questions only

1. Discuss anoxia.
2. Write an essay on haemoglobin.
3. Draw a diagram illustrating the events in the cardiac cycle to show: the aortic pressure, ventricular pressure, auricular pressure, and ventricular volume. Comment in detail on the changes in the ventricular volume.
4. Discuss the way the kidney handles urea.
5. Discuss water diuresis.

physiology instructor thinks the students have learned in his course. This is but one examination in a series that culminates in a final qualifying examination.

The remaining (so-called) basic sciences are given during the clinical years. Pharmacology is included in the anesthesiology course and deals with basic drugs and therapeutics. Clinical pathology is part of regular clinical work when students are assigned to the hospital laboratories. Included here is work in bacteriology. The theme of these courses is practical with lectures included as the need for them develops. Pathology is covered through formal classes at the school and at the hospital with postmortems providing the practical work.

Still another unique feature exists in this school. It is a course described as operative surgery but more appropriately it appears as a course in practical surgical anatomy. Because of its uniqueness, the entire syllabus is included as Appendix F. This course takes place in the medical school's anatomy laboratory during the last clinical year. The objective of the course is to develop in students knowledge and skills in basic surgical techniques and further understanding of anatomy. Several years have elapsed since the students had anatomy in the first year, so it appears to function additionally as a refresher course.

As the graduates of this school will be dealing with patients requiring a vast array of surgical techniques, and as surgery requires an assortment of skills, by having this course at the conclusion of the school program the students will not lose the "fine edge" they developed in surgery. Were it given earlier in the medical school course of study, students might not remember the material so well. From a learning point of view, it has a further value; after working

with patients students should be able to see the need for developing this surgical skill. One of the major problems in all medical education is instilling in students the need for learning certain material. Too often they ask, "Why should I know that?" Here students have dealt with patients and should see the necessity of learning these techniques.

On paper this course is ideal. A practical problem exists in animating it—again a shortage of cadavers. This course is given if a cadaver is available; but here, as in several other schools, a shortage of cadavers is a pressing problem. Consequently, this course is not given each year. The available cadavers are used in the regular anatomy course and if there are others operative surgery is given. This does not, however, detract from the value of the course; it is an ideal to strive for.

As this school has a fairly compact and comprehensive preclinical year, except for preventive medicine there is little necessity for students to return to the school campus after completing the preclinical year. If there is a need for formal lectures they are given in the hospital affiliated with the medical school.

In this first clinical year introductory medicine and introductory surgery are given. The students are divided into two groups; one a medical group, another a surgical group. In medicine the students receive on the average two lectures a week and make ward rounds with their instructors twice a week. These rounds take approximately three to four hours, and ward patients whom the students or the house staff previously have seen are visited. In addition to the medical lectures and rounds, during an average week students are assigned to medicine ward duty for approximately thirteen hours. A comparable schedule is set up for the surgical group.

In the medicine and surgery assignments, both groups convene for classes in applied anatomy, applied physiology, materia medica, therapeutics, and pathology. Usually, these are one-hour sessions and are scheduled throughout the week.

The second clinical year continues with formal lectures in medicine, surgery, applied physiology, and applied anatomy. Lectures in gynecology, obstetrics, and environmental hygiene are added. Approximately thirty-five hours of lecture and two weeks of field demonstration are part of the environmental hygiene course. The course covers food inspection, mosquito identification, latrines, garbage disposal, control of filariasis, death certificates, and housing standards, to mention some of the topics. Medical and

surgical ward rounds continue and assignments to wards are made also. A clinical surgery demonstration and a fracture clinic, each held once a week for two hours, are added during this year.

While students are scheduled for ward duty during this year as in the previous year, now they have the added responsibility of duty in the various clinics, the out-patient department, and at least a two-week assignment in a hospital laboratory. Pairs of students are assigned to twenty-four-hour labor ward attendance and during that time they are excused from all other assignments. Special lectures in public health are scheduled for two weeks and these are attended first by one group of students and then by another. The two-group assignment continues through the final clinical year. The formal lectures in medicine and surgery continue, and additional work in the specialties of obstetrics and gynecology is given.

Gynecology ward rounds are made with specialists in gynecology, and students have the opportunity to perform complete gynecological physical examinations. Additional surgical demonstrations are given and students are assigned duty in such special subjects and clinics as ophthalmology, diabetes, psychiatry, leprosy, tuberculosis, and child health. Anesthesiology is also given and pharmacology lectures are part of anesthesiology.

More intensive courses are presented in preventive medicine. In the final year of preventive medicine the syllabus covers such topics as immunization procedures, village inspections, venereal diseases, industrial inspections, family planning, poliomyelitis, nutrition, and maternal and child welfare. During this course students are assigned to a special dispensary and to a home for the chronic sick in which they are expected to function as general practitioners. A total of seven full weeks plus fifteen hours of lectures are allotted to this course.

This then rounds out a student's educational program. From preliminary courses and preclinical courses to clinical assignments the students follow a well-prescribed syllabus and time table. The experiences are varied in order to prepare a graduate as a generalist who is capable of handling most of the routine health problems of the community in which he will serve.

Upon graduation a one-year internship is available to the students.

Graduates can practice only in the government service, and there is no allowance for a graduate to go into private practice after a set

number of years. Graduates stay in the government service until retirement.

This school is definitely making an effort to recruit better students. When this is accomplished, the medical education program—especially in the preclinical courses—can be expanded. The objective of this expanded program will be to produce still better graduates so that a greater number can go into specialty postgraduate training.

The curriculum at this school can be summarized as follows: (1) Preparatory courses must be taken by all students. The courses can last for two years depending on the ability and the potential of the student. (2) An attempt is made to give the preclinical courses—anatomy, physiology, biochemistry, histology—in an integrated and correlated fashion. (3) The preclinical courses are compact, all given in one year with practical anatomy and practical physiology as part of the first clinical year. (4) The clinical phase is divided into lectures, ward rounds, and regular ward assignments for both medicine and surgery. (5) Preventive medicine is presented during the last two years in a block that combines field work with lectures. (6) The specialties of obstetrics, gynecology, and ophthalmology are covered in lectures and wards. (7) Such specific subjects as tuberculosis, leprosy, poliomyelitis, maternal and child care, and anesthesiology are included in the last year. (8) The program is designed to give each student a breadth of experience preparing him for a role as a medical generalist. (9) A one-year internship is available. (10) Graduates may, and do, go into postgraduate specialty training; but until the preclinical courses are expanded the number pursuing additional training will be limited.

The program in this school obviously is not as ambitious in the number of hours it requires when compared to the first school described. Basically they have the same program; however, each school's objectives will dictate the courses offered and the specifics of these courses.

The course of study in the next two schools pursues a different approach: in one school the program is one of upgrading, and in the other it is a program being instituted. The students entering the upgrading program come with several years' experience behind them plus a diploma from another training program. Most of the students in the upgrading program graduated from such courses of study as nursing and aid-post orderlies. In the upgrading programs most of

the students have been thoroughly screened so their chances of successfully completing the course of study are excellent.

The school embarking on a new curriculum, like the other schools in this study, establishes admission requirements that are often difficult to satisfy. Consequently, an upgrading course is given that consists of survey courses in zoology, social aspects of medicine, history of public health, and anthropology.

As in European and American medical schools the first two years of medical education here are devoted to the traditional basic or preclinical sciences. These include anatomy, physiology, biochemistry, and histology. These courses are offered in the first year. They include lectures, dissections, practicals, and tutorial sessions. Saturday classes are scheduled although some free time is allotted during the middle of the week.

The second-year students take pathology, pharmacology, preventive medicine, and begin their introduction to clinical medicine by being exposed to medicine and pediatrics. Included in pathology will be bacteriology. In this school, although the curative aspects of medicine will be given adequate coverage, increasing emphasis will be placed on preventive and pediatric medicine. Again the orientation of this school is to meet the particular health needs of the country. Therefore, it is felt that pediatric and preventive medicine should be given stress.

From this brief outline it is apparent that the depth with which the preclinical sciences will be studied is considerably greater than in the other schools described. A full two years is devoted to the preclinical sciences. Since the student will ultimately be required to pass university requirements for admission to this school, the quality of students will be higher as will their preparatory education. Under such circumstances it will be relatively easy to devote more time to the preclinical subjects.

To appreciate more fully the different depths in which the preclinical subjects are pursued, the two laboratory experiments in physiology and biochemistry in Appendix G should be reviewed in their entirety. The physiological experiment in "Water Diuresis in Man" and the biochemical experiment of "Determination of Blood Plasma and Blood Volume by the Dye-stuff Method" are clearly in the class of those conducted by medical students in the full-fledged medical schools. Necessary to carry out such experiments are students who come to school with an adequate background in the

sciences and adequate coverage of the material in their preclinical subjects—physiology and biochemistry, respectively.

With this more thorough grounding in the preclinical sciences the students are able to pursue more varied work in the clinical subjects. In the third year formal lectures and clinical experience in pathology, medicine, surgery, pediatrics, and preventive medicine will be taken. For the preventive medicine work, students will be assigned to various hospitals and health centers throughout the country in order to orient them to the specific problems of this country and to developing countries in general. In addition, time will be spent in parasitology and entymology with practical application in the hospital and dispensaries. Adequate time is assigned to the various health centers after which students return to the school. During the third year students are given approximately a ten-week assignment each to surgery, medicine, and pediatrics.

In the fourth year the major clinical subjects continue but obstetrics, gynecology, and the medical and surgical specialties are included. Again students are assigned a short period of residence at one of the local centers where they put to use what they have learned.

In this school a fifth year is scheduled. Of all the schools studied, it is the only one contemplating the inclusion of electives. It is hoped that during the fifth year the students will elect to study in greater depth some segment of the medical course and complete the year with a term in surgery, medicine, and pediatrics.

As this is a new school, the schedule beyond the first year merely is a paper outline. Only the first year—anatomy, physiology, and biochemistry—is a reality. However, from the outline of these courses and the experiments in Appendix G, it appears as if what is proposed on paper beyond the first year will be of a quality similar to what is currently being given.

After completing the fifth year, which may be considered the internship, the graduate is committed to five years of government medical service. Since his schooling was provided by the government it is felt that this is an adequate compensation for the education received. Upon completion of the five-year term of service he will be allowed to go into private practice. The formidable problems of going into private practice are discussed in another chapter.

This school, then, is taking a new approach to graduating medical practitioners. It is an experiment testing whether students with a

Standard 12 education can successfully complete a four-year medical school curriculum not too dissimilar from European and American standards. When the caliber of applicants improves, a further improvement in the quality of the medical education program may be expected. Among other things, the brief preliminary course may be discontinued and the time saved thus may be used for preclinical courses.

This school claims it is not training A.M.O.'s, and it is not possible at this time to compare their graduates with those of other schools in this study. It is not until a reasonable number of graduates are in practice that an objective comparison in the quality of medical care will be possible. Until then, the course of study in this school must be viewed as a different approach in educating medical practitioners. Whether the result is a different and better medical practitioner remains to be seen.

The school is unique that produces its equivalent to A.M.O.'s by upgrading. As was previously mentioned, the program in this school utilizes medical personnel who have already been trained at a level below that of the sub-professional and have had considerable experience at this level.

This approach has merit for those countries which have a pool of personnel trained at a lower level and now would like to upgrade them to the A.M.O equivalent, for it capitalizes on an existing source of students. Because of this fact, upgrading has one decided advantage: it is relatively easy to select appropriate students because applicants already have exhibited their ability in another capacity. The attrition rate among students selected for upgrading can be held close to zero if a student has demonstrated medical ability in his previous assignment. In cases like this the faculty can devote more of its attention to educating the student rather than evaluating his ability to perform clinically.

The students selected for this upgrading program are immediately given a clinical assignment that lasts one year. Because the central medical training center is being used to capacity, students are sent to various hospital centers throughout the country to receive their training. At these hospitals the regular medical-surgical staff assumes the responsibility for their training.

The course of study in this upgrading program is completely clinical. No preclinical courses of any type are given. In some of the centers no formal classes are held at all. Students are given clinical assignments and given responsibility for patient care.

The principal of the school does not consider this a highly desirable situation. While the staff at the hospital centers has been given a free hand in the training of these students, the principal has suggested that some formal lectures be given on certain topics. He felt that some direction should be provided in order to prevent too large a discrepancy among the programs being given at the various hospitals. Exhibit 5 is the recommended syllabus in public health with a suggested number of hours to be devoted to each topic.

Exhibit 5

A Suggested Syllabus for Teaching the Public Health Course

Communicable Diseases	8 lectures
Elementary Epidemiology	3 lectures
Elementary Statistics (mainly vital statistics, returns, etc.)	2 lectures
Vulnerable Groups (young, pregnant women, aged)	2 lectures
Mental Health (preventive measures to be stressed)	2 lectures
Handicapped Group	2 lectures
Nutrition (food values, diseases related to nutrition, etc.)	6 lectures
Parasitology	4 lectures
Health Center Concepts (preventive, promotive, and curative medicine)	3 lectures

It was further suggested that with this syllabus one lecture a week be given with the students having an opportunity for "frank discussion and questions after each lecture."

This suggested syllabus generally was followed by most of the hospital centers. It varied with one center giving more time to lectures and another more time to clinical experience. The outline in Exhibit 6 is an example of the material covered in the public health lectures at one center. This center has expanded on the suggestion made by the principal. In another center different specific diseases might be included. The syllabus is merely a suggestion.

In medicine and surgery the central school leaves the various centers on their own; content and emphasis vary among instructor and center. In one center the specialist in medicine gave no formal lectures on medical topics and did all his teaching at the bedside. Another instructor in medicine combined formal lectures with bedside teaching. This syllabus, as seen in Appendix H, combines ward rounds, out-patient service, demonstration-tutorials, and formal

Exhibit 6

Public Health Lectures

Introduction—Health Center
Immunization
Simple Vital Statistics
Infectious Disease—General Principles
Maternal and Child Welfare
Environment and Health
Housing
Water Sewerage Disposal
Food—Inspection

Specific Diseases

Typhoid
Whooping Cough
Tuberculosis
Meningococcal Meningitis
Smallpox
Poliomyelitis
Bilharzia
Dysenteries
Tetanus
Anthrax
Diphtheria

lectures. Through these various approaches the material in Appendix H is covered by the instructor.

An instructor in another center gave elaborate lectures that included subjects such as anaemia, enlargement of the spleen, oedema, an approach to auscultation of the heart, and lesions of the motor neurons. To be certain he covered all he considered important, he developed a general syllabus (see Appendix I). Except for individual variations it gives an excellent summary of the general outline followed in medicine in this upgrading course.

As in medicine, the approach to teaching surgery will vary as will the syllabus. Again the school authorities have left to the discretion of each center and each surgical specialist what subject matter will be covered and the extent to which it will be covered. The usual approach requires the students to participate in ward rounds and attendance at the surgical out-patient department. Students also are required to attend the surgical theater two days a week and scheduled lectures.

As the entire upgrading course of study is for one year and the services rotate the students, the surgical assignment is usually for six

months. The entire course is divided between medicine and surgery with preventive medicine taught during the entire year.

The general topics covered in surgery are included in Appendix J. As can be seen, these are broad, general topics and the material in each can be expanded as the need arises.

Each student also is responsible for completing a history, a physical, and the pre- and post-operative care of approximately fifteen patients. The student has the added responsibility for the practical care of these patients.

Pediatrics usually is included in the medical service. In these hospital centers a clear distinction between pediatrics and general medicine is difficult to make. Except for most natal care and infant diseases, pediatrics and general medicine are combined for teaching purposes.

Psychiatry, likewise, is included in the assignment on medicine. Here, too, psychiatric care is handled by medicine. Mental patients in fact are handled by fairly primitive methods. The students learn "something" about alcoholism, depression, anxiety, hysteria, psychosis, addiction, and of late, psychosomatic illness. These subjects are treated sparingly and superficially.

As an extensive midwife training program is conducted throughout the country the students get little, if any, obstetrics-gynecology. They will not be expected to deliver babies—the job of the midwives who are well trained for this task.

An amazing aspect of this upgrading program is the amount of responsibility the students assume for patient care. Considering their experience is at a level slightly below what they are being taught, the amount of responsibility with minimal supervision is unbelievable. In many centers these students shoulder a major share of patient care in the hospitals. As will be seen in the chapter on teaching methods, the supervision often is limited to occasional ward rounds with the medical or surgical faculty. The amount of supervision will depend, of course, on the ability of the student and the number of medical faculty. Nevertheless, this is a striking fact that appears to have no deleterious effect on patient care. With a shortage of medical personnel these students often are an important source of medical manpower in these hospitals, and patient care would suffer without them.

Probably because of fairly limited supervision, upon completion of the training period graduates are assigned to hospitals where they are further evaluated during the next three months. During this

probationary period it is possible for them to revert to the position held before beginning the upgrading program.

In summary, the program at the school with the objective of upgrading medical personnel to the sub-professional (A.M.O.) level follows its own pattern. (1) It selects able, qualified students from the lower ranks. (2) Students are not trained at the school but are sent to various hospital centers throughout the country. (3) A one-year training program is given. (4) The entire course is clinically orientated. (5) Medicine and surgery usually share the year equally. (6) Psychiatry is taught on a limited basis as part of medicine, and pediatrics is included in medicine also. (7) The principal of this school suggests a syllabus outline where the centers can, and do, establish their own syllabi. (8) Formal lectures are given sparingly. (9) Preventive medicine is taught throughout the entire year. (10) After completing the one-year program, students must complete three months of probationary hospital work.

The curriculum of the last school in this study again is different than the others. Furthermore, its program is geared to train A.M.O.'s for working as part of a health team, which also affects the curriculum.

In no other school was the syllabus followed so closely. This is because of the amount of planning that went into the establishment of this school. In planning its courses of study, the administrators of the school and government officials made extensive use of consultants from which they drew expert advice. Not only was the course of study deliberately planned, but as will be seen in another chapter considerable thought was given to the teaching methods and materials used.

As a result of faculty turnover a need also existed for precise course definition.

The outline included as Appendix K was recently revised and took effect with the class entering in 1962. The earlier curriculum differed but little; certain courses were added, others deleted, and the number of clock hours was increased or decreased. The changes were of the type to be expected in any curriculum that is continuously being evaluated.

Anatomy, physiology, and physical diagnosis can be used as an example of how these courses are outlined.

The second academic year of this school's curriculum is discussed in Appendix K. Anatomy and physiology—two combined basic science courses—are scheduled for 192 clock hours. Exhibit 7 lists

Exhibit 7

Partial Syllabus for Anatomy and Physiology

Basic Facts of Physiology and Anatomy
Anatomy of the Muscular System
Physiology of Muscular Tissue
Anatomy and Physiology of the Peripheral Nervous System
Central Nervous System
Anatomy and Physiology of the Senses
Blood Tissue Fluid and Lymph
Anatomy of the Circulatory System
Physiology of the Circulatory System
Anatomy of the Respiratory System
Physiology of the Respiratory System
Anatomy of Digestive System
Physiology of Digestive System
Anatomy of Excretory System
Physiology of Excretory System and Water and Salt Balance
Regulation of Body Temperature
Anatomy and Physiology of Endocrine System
Anatomy and Physiology of Reproductive System

only the major subheadings to be included in this course. In the total syllabus, which is not embodied in this report because of its length, there are a total of approximately 130 items under the main headings. For example, under the heading of "Physiology of the Digestive System" included in Exhibit 7, such topics as foods, vitamins, liver, absorption, and metabolism are listed. These specific items prescribe fairly well what the subject matter content of the course should be. No doubt the instructor then can include whatever he wishes to beyond the outline. There appears to be little room in which to maneuver once the syllabus is adopted.

During the second term of the second academic year, physical diagnosis is assigned thirty-two clock hours in Appendix K. In a detailed syllabus of forty-two pages, one page is devoted to physical diagnosis. This specific outline on physical diagnosis is reproduced as Exhibit 8.

As can be seen, the course objectives are given, the textbook and references are listed, and an outline of the course is included. With such an outline any able instructor could teach the course. In cases of this type there is a guarantee that (1) each instructor will know what to teach, and (2) the prescribed subject matter will be covered.

This same approach is used to prescribe all the courses included in

Exhibit 8

Physical Diagnosis

Lecture Hours: 30

Objective: To teach the student:

1. The physical characteristics of the normal and healthy person
2. The orderly procedure of history taking, examination of patients, recording of findings and examination results
3. How to draw correct conclusions from the information given by the patient and the findings in order to diagnose and make prognosis
4. The significance of findings in relation to other family members and community

Class Text: Mimeographed lecture notes

Educational Aids: Patients in policlinic

References: Donald Hunter and P. R. Bomford, *Hutchinson's Clinical Methods* (13th ed.; London: Cassell & Co., 1956)
Charles Seaward, *Bedside Diagnosis* (3rd ed.; London: E. S. Livingstone, 1955)

Outline of the Course:

1. Introduction
2. Case taking, interrogation of the patient
3. Physical examination and recording of findings, general condition and appearance
4. Systematic physical examination:
   - *Alimentary system*
   - *Circulatory system*
   - *Respiratory system*
   - *Skin*
   - *Nervous system*
   - *Examination of eyes, ears, nose*
   - *Locomotory system*

the curriculum. In some the detailed outline of the course is narrowed even more specifically. In a course in obstetrics such specifics as occipito-posterior position and contracted pelvis are included.

While it is possible to prescribe subject matter content for formal courses, it is more difficult to do so for the practical or clinical work. As can be seen in Appendix K, the students are assigned to various situations so that a breadth of experience can be gained. These include out-patient departments, hospital wards, and schools. To obtain these experiences students are sent to various centers around the country where they accomplish their field work or clinical experience.

The fourth year is actually a one-year internship. The fourth-year class is divided into two sections and begins with the vacation period between the third and fourth year. Half of the students remain at the school, engage in clinical work, and attend lectures while the other half is assigned to various centers where they remain in residence for the one-half year to complete their clinical work. The two groups are rotated during the change-over from the first to the second term.

Because it is difficult to prescribe specifically what a student will encounter during his internship, and because such detailing appears undesirable, the school has developed a manual of procedures for the interns that should be followed during their residency in the health centers. The importance of these procedures—or job description—warrants their listing in entirety as Exhibit 9.

As was noted before, the objective of the course of study for the A.M.O.'s was to prepare them as members of a health team. While the specific course content could not be outlined, the job description fairly well prescribes what activities will be included during the internship. From this job description it is obvious that an attempt is made to focus the student's attention and activities toward community health and to being a leader of the health team.

While the school devoting its attention to a program of upgrading was characterized by the minimal amount of supervision given the students, the opposite is noted here. An effort always is made (although not always achieved) to supervise the students and to have the faculty available for consultation. Because these are college students with no previous medical experience, as the students previously described, this supervision is an essential part of the prescribed curriculum.

Upon graduation the students are assigned to various health centers around the country. They have no choice in their assignment and, because of receiving their education at the expense of the government, they are committed to its service. This committment is for three to five years.

The course of study in this school can be summarized by the following: (1) The curriculum is outlined by courses that require four years to complete. (2) Each course is prescribed in a detailed curriculum that includes the course objectives, textbook required, and subject matter to be taught. (3) The fourth year is an internship that provides on-the-job training. (4) During the fourth year, students are assigned clinical work at the college and at the health

Exhibit 9

Job Descriptions for Interns

1. To work with team members and total staff in planning activities, keeping within pre-arranged time assignments for field and clinic.
2. To participate actively in team meetings, staff meetings, and other gatherings.
3. To use every opportunity for individual or group teaching, and to plan well for such teaching.
4. To perform necessary activities in clinics. Examine patients, prescribe treatment and medications, do laboratory work, record, instruct. To co-operate with community nurse in treatment and follow-up patients.
5. To be conscientious in examining, prescribing for, and caring for in-patients.
6. To carry out field activities—community organization, work with sanitarians and the people in improving sanitary facilities, make home visits independently or with community nurse as need arises, health instruction, etc.
7. To work actively in spreading health services to people in more remote areas through itinerant health service program.
8. To develop efficient plan for follow-up services.
9. To work with team in developing good school health program and putting same into effect.
10. To work with team members in planning for and implementing prison health services.
11. To participate in Public Health Council as assigned by district H.O. and especially when related to own geographic area.
12. To be responsible for gathering vital statistics and keeping records, and for submitting pertinent information to administrative assistant health officer through team leader.
13. To be available for emergency, week-end, and epidemic services.
14. To take initiative in arranging for supplies through administrative assistant health officer.
15. To perform other duties as assigned.
16. To keep in mind at all times that he is a member of a team providing total health services (maternal health, child health, communicable disease control, morbidity) for the people in the geographic area to which he is assigned.

Note: One health officer will be assigned as team leader for a six-month period. This H.O. will participate actively in all above items and will take lead in items 1, 12, 14 above. He will oversee that members of the team carry out their duties according to plans made by the team.

centers around the country. (5) Considerable supervision is given the students during their internship. (6) The internship is prescribed by a manual and requires the students to function as a leader of the health team with orientation toward community or preventive medicine. (7) The graduates can work professionally only in the government medical service.

In the introductory sentence to this chapter it was stated that a remarkable degree of similarity existed in the courses offered in these

schools. The material that followed described some of the differences. While differences exist, they can be attributed primarily to two major reasons.

First, the objectives of each school will dictate, as they should, the courses offered and the content of the courses. The objectives themselves are determined through the health needs of the country. For example, the health needs of a country in the Southwest Pacific may not be those of a country in Africa. The basic need—more physicians—may be the same, but in one place they may be training midwives extensively and only a few in another area. Obviously in the former the A.M.O. will not need as much obstetrical training as in the latter. In the final analysis, it is apparent that the health needs of the country will determine the medical school's objectives and the objectives, in turn, will determine the courses and the content of the courses taught. Apparently most of the schools included in this study have kept this basic principle in mind. This in turn has had an effect on the types and number of courses offered. In most cases the schools have resisted the tendency inherent in most educational institutions to keep adding, but never subtracting, courses from the curriculum.

The second reason for differences existing among schools is a natural one—financial support. There are exceptions to this generalization, however. Regardless of the criteria used to judge the quality of an educational program, if they were applied to the schools in this study it would be obvious that the school with the least financial resources was carrying out one of the better programs. But many of the other schools, without their financial support, would not be able to offer even what they do at present. As a result of the amount of financial support, school authorities can effect their programs by hiring more faculty with more varied credentials, provide more space for the educational program, and as will be seen in the next chapter, utilize more varied teaching methods and materials.

Therefore, it appears that (1) the objectives of the educational program, and (2) the financial support received, are two factors that influence significantly the courses of study offered. Many other factors play a part but even they are influenced by these two major ones.

Remembering these points, the following represents a general summary on the courses of study offered in the schools.

1. Except for schools with a university affiliation and/or offering a bachelor's degree, prescribed preliminary courses are given. The

objective of the courses is to bring students up to standard so they can begin their preclinical or basic science courses.

2. The entire course of study is rather prescribed. That is, the subjects to be taken are specifically listed and in some cases rigidly outlined. In the upgrading course, however, the lack of specificity is the rule rather than the exception.

3. Anatomy, biochemistry, physiology, and histology are invariably given as part of the preclinical course of study. Variations are noted in how these courses are scheduled; attempts at integrating and correlating them are being made. The emphasis in these courses is on practical application.

4. Clinical experience makes up the bulk of the entire curriculum. In the clinical segment of the program a combination of formal and practical clinical work is maintained. Formal lectures are few and they are devoted to specific topics. Usually courses in pathology and therapeutics are given as part of the clinical segment.

5. Medicine and surgery are the clinical disciplines in which most of the clinical experience is obtained. Specialties—obstetrics, ophthalmology, pediatrics, diabetes, tuberculosis, etc.—are usually included in the medical and surgical assignment.

6. All schools give special courses in preventive medicine. The number of hours assigned and the kinds of learning experiences provided vary.

7. By any standards, the students, when assigned to clinical wards, are given a great deal of responsibility and authority for patient care. In some schools supervision of student clinical activities is held to a bare number.

8. The actual subject matter content of specific clinical courses varies, but generally the approach in these courses is to teach the rudiments. That is, history-physical diagnosis-therapy follow-up.

9. Upon graduation some requirements of internship or probationary assignments are made.

10. Capable students are encouraged to pursue postgraduate training in the medical and surgical specialties.

4

TEACHING METHODS

The similarity in the types of courses offered extends to the teaching methods used, but the similarity is greater. This tendency to systematize teaching appears to have its roots in two major factors.

First, most of the clinical faculty have been educated under the British system of medical education. If British medical education can be classified, the clinical phase is characterized by work at the bedside and clinic as opposed to formal clinical lectures, conferences, etc. This is not a distinct dichotomy but one that serves to describe British medical education.

Because the majority of the clinical staff in the schools included in this report has been subjected to British medical education, they had a tendency to use the same approach in training the A.M.O.'s under their care. Too, these schools deliberately gear their programs toward clinical bedside teaching, as the school authorities feel that practical work achieves their objectives of graduating generalists better than any other approach. Therefore, whether the instructional program in clinical work is determined by the orientation of the faculty and the medical services offered or whether the faculty takes its lead from the syllabus is a moot point. It can be concluded that in clinical medicine both factors—the faculty and the syllabus—determine the teaching methods used and they seem to be used with uniform ability.

The second factor contributing to systemization is especially apparent in the preliminary and preclinical courses. The difficulty of recruiting faculty, especially for preclinical courses, is described in another chapter. It is sufficient to say here that some schools' difficulty in recruiting and retaining capable teachers of the preliminary and preclinical subjects makes the quality of teaching suspect. In these subjects the less able teachers showed less imagination in the use of teaching methods and had a tendency to fall back on the classic lecture-laboratory approach, although in some cases the lecture was directed toward as few as five students.

The variation in teaching methods used can be seen best by examining first the preliminary courses (where offered), the preclinical, and finally the clinical phase of the A.M.O.'s education.

The content of the preliminary courses has already been described. In review, they usually consist of mathematics, physics, chemistry, biology, and English.

The English and mathematics courses are conducted traditionally. In mathematics the instructor lectures, demonstrates on the board the principle or formula he is describing, has students work some examples by themselves, the particular lesson is reviewed, and finally an outside assignment on the material covered is given. Frequent examinations are given to test students' mastery of the subject.

The universality of this approach was startling. It was generally agreed that the objective of the course in mathematics was to develop in students knowledge and skill in the fundamentals of mathematics. This knowledge and skill should be adequate to enable the student to complete the preliminary subjects of physics and chemistry and the preclinical subjects of anatomy, physiology, and biochemistry.

There is a unique factor contributing to the selection of this approach of teaching mathematics. Most of the faculty think that the cultural groups of these countries have difficulty grasping and understanding fundamental mathematical concepts. They give no supportive data for this statement other than personal experience with these students. If there is basis for this personal observation—that certain cultural groups do not possess quantitative mental ability—then indeed the teaching approach elected is appropriate to achieve the stated objectives. However, if the lack of quantitative ability is due to the lack of experience with such concepts in previous schooling, the problem has a different dimension.

Regardless of the source of the problem, students enter the study of mathematics with but rudimentary concepts of numbers. Consequently, the instructors fall back on the traditional approaches to teaching mathematics.

Except for the blackboard, other teaching materials were conspicuous by their absence. Charts, diagrams, and filmstrips were either unavailable or not used. The recent revolution in the new mathematics had not reached these schools. Most of the teachers were educated in the traditional concepts of teaching mathematics and would have to be re-educated in this new approach to teaching and learning mathematics.

The mathematics course, then, followed the prescribed traditional

approach just described, and it seemed that considerable time was required before the students grasped these fundamentals.

The English course was taught with the traditional approach. The single objective of the English course was to develop in students the skill to communicate clearly and precisely by the written word. As all the schools require a speaking, reading, and writing knowledge of English of the students before admittance, the English teachers are in a somewhat better position than the mathematics teachers—although not much better.

Again little imagination was used in teaching the subject. Drill and homework were the standard techniques employed. After the fundamentals of grammar were grasped by the students, a large portion of the time was devoted to writing compositions. Topics were assigned and students wrote short compositions on these topics. Assigned readings also were given and book reports on the reading were required. Oral reports on the readings were also made but emphasis usually was on the written word. With the objective of these English courses so explicitly stated as "to develop skill in written communication" no wonder the teaching approach was formalized.

In both the mathematics and English courses the methods described were used—with little variation—in all the schools studied. As the objective of the preliminary courses is to bring students up to standard so that the medical phase of their education can begin, perhaps this approach is justified. However, it should not preclude the use of other teaching approaches and teaching materials. With more variations in teaching methods the time required to bring students up to standard might be shortened. This shortening of time allotted to mathematics and English in turn would reduce the total amount of time spent in school and thereby get the graduates out to practice medicine sooner than they do now.

At present (1963), the number of students enrolled in the schools was small, the average size being approximately ten to fifteen. In addition, the quality of students varied considerably. In these two courses the tutorial approach was often used—i.e., individual attention to students was given by the instructor. In this approach the slow and the fast learners could be given specific assistance. When class size is relatively small this system can be used, but as the size increases it would not be so practical. Different approaches will have to be mastered to meet the increased class size. Opportunities for self-learning will have to be provided so that the teachers'

activities can be directed toward those students who need specific special help.

In physics, chemistry, biology—and general science and introductory physiology where they were offered—more variations in teaching methods were observed.

Biology in these schools usually is regarded as a preparatory course for anatomy and physiology. In some schools a close working relationship exists among these three departments while in other schools the desire to work together is not as obvious. Where an attempt is made to have biology as a preparatory course for physiology and anatomy, the subject matter and teaching methods used are as close as possible to what students will need, or be exposed to, in anatomy and physiology.

In general, the following procedure is used. Students are assigned a textbook at approximately a high school level of difficulty. The teaching assignment is divided between formal lectures and laboratories. The number of hours assigned to each varies little; usually five hours a week for lectures and five hours for laboratory. The lecture sessions vary. While there are scheduled lectures, the actual teaching method used at that assigned time differs from what is scheduled. In some schools one hour a week is used to review examinations; in others a session is set aside for individual student problems; and in others a lecture, in the traditional definition of the word, is given in all the assigned hours.

Again the past experience of the teacher and his knowledge of the subject matter play a role in the type of teaching method used. In one school a one-hour session is devoted to individual student problems, and the instructor is comfortable in handling such a situation, for he is knowledgeable in his subject. The examination review session is handled capably, for the teacher is confident in his ability to handle this type of teaching situation. If a question arises to which he does not know an answer he readily admits it and proceeds to find the answer for the student.

Both of these teaching approaches develop in students more than an acquisition of knowledge. They attempt to develop an understanding of the subject of biology which apparently the straight lecture could not achieve.

An instructor's lack of knowledge of subject matter was evident in the teaching of a subject in one school. The instructor gave a lecture that paraphrased what the students read in their textbook. When an attempt was made to illustrate on the board the topic being

presented, a student pointed out an error present in the diagram. The instructor became perplexed and recopied the diagram from the text, but this time holding the textbook conspicuously to see what he was copying. This same instructor said that a question and answer session was seldom or never assigned; the course he gave consisted of straightforward lectures and laboratories.

Of all the preliminary courses biology used audio-visual devices most extensively. The lecture sessions were supported by filmstrips, slides, movie films, diagrams, mockups, etc. Biology has had an old reputation for producing and using audio-visual techniques, so it was not unusual to see them in use in these schools. Individual differences were noted again between schools. Usually movie films and filmstrips are available through mail order catalogs and availability of funds is the only restriction on obtaining them. Yet some instructors made little use of them even when funds were available. Where funds were limited it was surprising to see the ingenuity of some of the faculty in making their own teaching aids. In one school, except for films, almost all audio-visual aids were made by the instructor.

So teaching aids were (1) varied, (2) sometimes in limited availability, and (3) often available but not used. Much of the teaching depended on the ability of the instructor and his application of imagination in his teaching program.

Laboratories followed a more formal pattern. The usual cookbook approach in which students followed an outline in a manual and recorded their findings was used. Frogs and toads were used in the experiments but dog experiments also were carried on. The instructor usually moved from student to student answering questions, asking questions, and offering individual assistance. The less able teacher usually seated himself at the head of the laboratory and attempted to have as little contact as possible with the students. The laboratory, by its very nature, was the one situation in which the instructor was almost forced into giving individual student attention; even the instructor who attempted to remove himself from the students had difficulty avoiding questions.

The physics and chemistry courses also followed a time-tested pattern. A textbook was assigned although most instructors were dissatisfied with the chemistry and physics textbooks currently available. Either the textbooks were too easy or too difficult. A composite textbook, suitable for these unique courses in the training of A.M.O.'s, was not available.

With lack of a composite textbook there is a strong emphasis on lecturing as a means of covering the subject matter. Printed outlines of lectures were distributed and these often supplied material not covered in the text. When the material was available in a textbook it still was covered in the lecture and in the printed outline.

As was the case in biology, the general teaching approach consisted of approximately five lectures a week with demonstrations included during the lecture time. An additional three to five hours a week are assigned to laboratory work. In some schools an evening period was assigned in which students reviewed a specific topic with the instructor. In other schools examinations were held during an evening session.

Unlike biology, the lack of charts, diagrams, filmstrips, movies, supplemental books, and journals was apparent. Such special equipment as radioactive detectors and polyometers also was lacking. Because of the shortage of—or the inability to use—this equipment, the laboratory experiments were reduced to essentials.

In the teaching of these courses "spoon- or force-feeding" was invariably observed. The subject matter is covered in a formal, mechanistic manner, but because of the small size of the classes, considerable individual attention is paid the students. Even this attention is reduced to a mechanistic manner. A large amount of an instructor's time is spent on drilling either with the entire class or with an individual student.

While the classes are scheduled as lectures and demonstrations are included in these sessions, drilling occupies an inordinate amount of time. Even the sessions devoted to reviewing examinations are characterized by drilling on material previously covered. Instructors interviewed regarding this technique almost invariably stated—from country to country—that it was the only way students learned the subject. Learning is the major objective of these courses; it seems that little attempt is made, other than in laboratories, to develop a genuine understanding of the subject.

Even in the case of a superficial course in the elements of physiology (this is not the preclinical but a preliminary physiology course on the human body that could almost be considered a course in personal health), the entire session was devoted to a lecture that could have been read in the textbook. Patients from an adjoining hospital could have been used to illustrate graphically several points being considered, but again the instructor slowly, deliberately, and repetitively emphasized the material in his lecture.

An unusual feature of many of the preliminary courses was the instructor's attempt to determine what a student knew about the subject through test or discussion in the first class session. This was done because students came from many backgrounds and had different levels of attainment, in spite of the admission requirements. After the instructor had determined what the students knew, the next few sessions were devoted to reviewing what they should have learned before admission. Few, if any, of the instructors take their subjects and students for granted; they always check the student's grasp of the subject before proceeding.

The majority of the teaching of preliminary courses can best be described as a lecture-drill type of operation. Students receive little indication of the course objectives and the teacher almost always proceeds in a mechanistic manner. The exceptions to this rule were often brought about by the subject itself; that is, the nature of the subject was stimulating enough to offset the teaching method.

One other observation could be made about the majority of the classes: discussion of the subject under consideration was seldom observed. Students were rarely challenged by teacher questions. This had its effect on the students. A tally made of the number of questions asked by students after observing approximately fifty teachers showed it was an insignificant number. The result of no student discussion (whatever its cause) is felt keenly by the preclinical teachers but more so by the clinical instructors when dealing with students on ward rounds and in the clinics. This point is discussed later in the chapter.

In summary, the preliminary subjects are taught in a formal manner. An emphasis is placed on drill, and student participation through discussion either is not encouraged or is difficult to obtain. Except in individual situations the teachers showed little teaching imagination. This lack relates a great deal to the quality and credentials of the teachers recruited. The question of faculty credentials is discussed in another chapter.

A decided difference is noted in the teaching methods of the preclinical subjects of anatomy, physiology, biochemistry, and histology. The reasons for this no doubt are numerous, but the major contributing factors are the nature of the subjects being taught and the faculty teaching them. Too, there is the phenomenon that all medical educators have been exposed to—students seem to enjoy subjects having clinical application. Interviews with students at these schools revealed that they preferred their preclinical courses

over their preliminary courses. The standard reply was that the students had come to medical school to be "doctors" and all this physics, chemistry, etc., had no bearing on their goal. Anatomy, physiology, etc., were a different matter because the students could see the relation between these subjects and being a doctor. The same attitude, but toward the clinical subjects, was expressed by those students currently engaged in clinical work when asked about the preclinical courses. Nevertheless, the students appeared to have a more positive attitude toward the preclinical subjects. This no doubt has its effect on how the subjects are taught and the students' response to them.

Anatomy, the most traditional of the medical subjects, is usually taught as it always has been taught, through the lecture and laboratory with an emphasis on the latter. The cadaver is present but a shortage of cadavers in certain countries creates problems of major proportion.

To compensate for the shortage of the prime teaching material unusual approaches in teaching were used. In one situation three students were dissecting the only cadaver; another student read from Cunningham's *Manual* while they dissected; another three students followed along in their copy of Cunningham; while another group of students drew the appropriate anatomical structure on the board or followed along on a chart. The students rotated the next day or when another part of the anatomy was covered. In this way all the students had an opportunity to dissect. Obviously this was not the best arrangement to achieve the teaching objective but, under the circumstances, it was the best possible approach.

In another situation where more than one cadaver was available one or two students dissected while two or three students observed. Variations in this approach were also made periodically.

In the laboratory students were given some freedom to work individually. Cunningham's *Manual* outlines and prescribes explicitly what should be done. An instructor or his assistant was usually present in the laboratory to answer student questions and to quiz students on what they were doing. While the number of hours assigned to anatomy may be considered limited, an attempt is made in most of the laboratory sessions to develop an understanding as well as a knowledge of the human anatomy.

Laboratory sessions were supported by lectures that were usually on the material to be covered in the laboratory. Often lecture sessions were set aside to clarify some topics previously covered. The lectures

were accompanied by visual aids of various types but again these varied. In one situation the instructor made excellent use of the blackboard to illustrate his lecture. Colored chalk graphically pointed up what he was covering and he deliberately paced his lectures and drawings to allow the students time to copy the material in their notebooks. Difficult words were printed on the board. Slides were used but more often these were run through rapidly and were cluttered with writing that was barely visible. Students had little opportunity to read the material on the slides. The purpose of the slides was often never cited.

As most of the anatomy courses are taught by surgeons, a deliberate attempt is made to relate much of the material in anatomy to clinical medicine. In the first year of anatomy much of this is done on a superficial basis but the instructors attempt to insert anecdotes of clinical experiences wherever possible.

Where anatomy is carried over into the clinical years the subject acquires a practical nature. On ward rounds or in the clinic run by the anatomy instructor, when a clinical case can be related back to the anatomy laboratory, the instructor makes a point of covering the topic again in the laboratory. If a postoperative appendectomy is seen in the ward it is possible for the instructor to return with the students to the laboratory for further study of the appendix on the cadaver. The cadaver shortage, however, limits this type of approach.

Anatomy as a subject has several decided advantages over other preclinical subjects. The cadaver has been, and continues to be, an excellent teaching aid. Learning by doing is stressed when using the cadaver. Skeletons, bones, charts, diagrams, and slides are obtained easily and are available to all the instructors. How they are used varies. Generally, little can be done to detract from the value of the cadaver as teaching material. If an instructor can relate as much as possible to actual clinical experience, the teaching sessions seem to have more value to the student.

As the training program for the A.M.O.'s is fairly prescribed, the amount of anatomical subject matter to be covered and the depth of understanding to be acquired is not as great as for an M.D. degree. The objectives in anatomy, therefore, are limited as they should be. The teaching methods and techniques in turn can focus on achieving these narrowly defined objectives.

Physiology cannot lean as heavily on the laboratory as can anatomy. There is a bulk of material in physiology that must be learned without the benefit of laboratory sessions. In most cases the

teachers lean heavily on lectures and demonstrations. The lecture sessions are much like those in accepted medical schools. Models are used and drawings, charts, and other visual aids. There is little of this material, however. Students acquire most of their information from the lecture sessions.

Often the lectures become recitation sessions; i.e., the instructor asks questions to determine whether the students have a grasp of the subject. This is an extremely effective approach as much of the material covered in physiology has to be memorized. Other than examinations, recitation is one of the better ways to appraise the progress of the student. Through use of probing questions the instructor can delve deeper into the student's grasp of the subject.

While recitations were attempted, not enough use was made of this approach. There seemed to be a reluctance on the part of some preclinical faculty, especially the preliminary course faculty, to engage the students in questions and discussions, and to use teaching approaches requiring the students to respond verbally. Because students have little experience in this type of teaching situation the clinical faculty is faced with a problem that is almost insurmountable—students are reluctant to respond to questions.

The physiology laboratories in some schools carried on experiments not too different from those to which medical students throughout the world have been exposed. Experiments on an assortment of animals and on themselves were common. These experiments generally were characterized by a cookbook approach of the type often seen in secondary schools. The entire experimental procedure was outlined, and in some cases the laboratory manual actually listed what the results should be. These types of experiments were supposed to develop in students a scientific method although it is difficult to imagine how this could be achieved through such an approach. Again Appendix G should be examined.

If a generalization about the teaching of the preclinical subjects can be made it is that, except for isolated instructors, little imagination was used in the teaching of these subjects. When a subject was listed with the prefix "practical" the instructor made an attempt to relate the subject matter to the practical application of the course. The students felt that such courses had more value. The bulk of the teaching was in a routine, traditional manner with little deviation from the accepted procedure.

This may have had its genesis in a lack of funds to purchase more adequate teaching materials. The lack of funds also precludes the

acquisition of experienced faculty. Combining these two factors can have a harmful effect on the quality of the teaching program. Combining these two factors with an individual who has no grasp of the fundamentals of his discipline can produce a devastating result.

While the library facilities in most of the schools were adequate the students seemed to make little use of them. This reluctance to use the library in the preclinical courses was symptomatic of a deeper problem; little opportunity for self-education was given. In some schools, students were encouraged to investigate the literature, but the usual procedure was for students to (1) study their lecture notes, (2) read the assigned work in the textbook, and (3) study the material in the laboratory manual. Students with special problems—slow learners and those not intellectually endowed—had little opportunity to improve their state of learning. In none of the schools were programmed learning materials available. In several schools they never had been heard of. The new teaching materials on the biological sciences were also conspicuous by their absence. There were many other teaching aids that could be used but, as cited before, they were not in evidence for many reasons.

The most unusual and striking factor was the attempt by some of the schools to "integrate and correlate" the subject matter of the various preclinical disciplines. Through this approach, a topic scheduled for physiology that had some relation to biochemistry and histology would be presented by the teachers responsible in an integrated fashion. In some cases the topic was integrated by one teacher who had to resort to his own knowledge of biochemistry, physiology, and histology. This was not as effective as the team approach but in this way at least the student did not receive the material in a piecemeal fashion.

The integrated approach to curricular organization holds tremendous promise for the training of A.M.O.'s. As the preclinical subjects usually are covered in one academic year, the subject matter could be interrelated. The relationship of the various disciplines on one body system, for instance, could be seen by the student in an immediate way. Much of the integration was accidental because of a shortage of qualified teachers. Proper integration should receive greater attention as a possible approach to accelerating the training of the A.M.O.'s.

The clinical subjects have the advantage of a long tradition. Teaching medicine at the bedside has been the time-honored

manner in which clinicians learn the ways of their professions. When the clinical teaching was done at the bedside, it was done well; when it took the pattern of formal presentations, it left much to be desired. This varied among schools and instructors.

The number of formal presentations was limited. The objective of the clinical years was to develop in students the ability to handle patients and to develop knowledge of the clinical subjects. The chief teaching method for achieving these objectives is through practical experience at the bedside. When certain material could not be covered at the bedside occasionally lectures were scheduled.

Surgery made greater use of lectures than medicine and again the quality of the lectures varied considerably. Two extreme examples can be used to illustrate what went on in the formal lectures in the clinical subjects.

In a session on goiter, the instructor, a surgeon, gave a forty-five-minute lecture. This consisted of reading from the students' textbook. The reading was directed toward five students who followed along in their textbooks and occasionally made notes in their notebooks. The instructor made no effort to move from his seat nor explain in his own words what he was reading. The blackboard was never used to draw material that was referred to in the book. The material being read had a definite orientation toward physiology and anatomy as it related to goiter. After the lecture, slides dealing with preoperative and postoperative aspects of carcinoma of the thyroid were shown. Other than picturing the thyroid the slides had no relation to the subject covered. The slides were of excellent quality but were poorly adapted to this particular session. They appeared to fill in a time gap in the lecture.

No discussion of the slides followed although the instructor did ask if there were any questions; he was greeted by absolute silence.

Numerous questions arise about this session. As this class was small, as are most in the clinical years, why were the students not asked to read this assignment and come to class with questions? What was the purpose in using the slides? Could someone else perhaps in anatomy and/or physiology, have covered the material? These are but a few possible questions.

This illustrates an extreme case, although it occurs too frequently that an instructor has not established his teaching objectives and selected the methods and materials most appropriate to meeting these objectives. This was not an isolated case, as this instructor, as

well as others like him, was scheduled to give many more lectures using this same approach.

The antithesis of this was seen in another surgical session at another school. Here the group of students was large and it could be anticipated that the class was going to hear a lecture. The instructor stated his objectives before he began his presentation and lectured in a straightforward manner. As the class was large, approximately thirty-five students, it appeared that the method of lecturing was appropriate to achieve his objectives, which were to develop knowledge and skill on dislocation of the shoulder. He paced his presentation, stopped frequently to ask if there were any questions, and allowed himself to be interrupted by the students. He used disarticulated bones to demonstrate how a shoulder can be dislocated and went through the demonstration several times. Notes were distributed to the students and they entered the drawings he was putting on the board in their notebooks. The board drawings were clear and colored chalk was used effectively. The disarticulated bones were passed around the room and all the students had an opportunity to study how the shoulder bones function. Pictures of patients with dislocated shoulders were shown to illustrate the types of shoulder dislocation. X-rays were shown to demonstrate further the types of shoulder dislocation. After this material was presented and discussed, resetting a dislocation was considered. A student was used to demonstrate the various ways shoulder dislocations can be reset. The demonstration was performed several times until the instructor felt that the students had a clear understanding of the technique. At the end of the session he asked again if there were any questions.

These two cases are used to illustrate a most significant point in relation to the teaching program in the clinical years. Both these instructors were surgeon-physicians and when they taught at the bedside both appeared equally good. At the bedside they function as surgeons dealing with the patient and the fact that students were observing them was incidental. It was natural to have students along with them on their rounds. This is also true of almost all clinical teachers; most teaching at the bedside comes naturally because they are carrying on their normal duties.

The two surgeons in the classroom session is another case: outside of the wards and clinics they were not equally good as teachers. The comparison just cited was not exaggerated. It emphasized the difference between the two extremes in teachers. Teachers

who have spent more time in classroom situations are better there than clinicians who might not feel as comfortable as they would teaching at the bedside.

If the clinical faculty is to assume more responsibility for classroom teaching they will need either experience or training in pedagogy. Being knowledgeable in your subject matter—although it is a prerequisite to teaching—is no guarantee that an individual will be an effective classroom teacher. Because most members of the clinical faculty were experienced physician-surgeons the clinical teaching at the bedside was of good quality.

When students first went into clinical medicine the instructor went with them on ward rounds and usually worked with a small group of students. They went to a patient's bedside and a student read the history that he or someone else had obtained on the patient. If there were gaps in the history the instructor asked the student to obtain the additional information from the patient.

The instructor attempted to discuss the findings with the student. After the history one or two students examined the patient while the instructor continuously asked questions about what the students found in their physical examination. If laboratory material was available it was examined also. With students being introduced to clinical medicine this was the general approach on the teaching rounds. The same technique was used on other patients scheduled to be looked at during the business rounds. When the number of patients to be seen was large the time spent on each patient was considerably shorter.

For the more advanced students the same procedure was used although in a more cursory manner. These students had to give a most brief history, state the physical findings, make the diagnosis, and prescribe therapy. The instructors might ask questions and they would move rapidly to the next patient. If it was not a scheduled teaching round but the regular business round the same procedure was used but at a much faster pace.

In most of these situations the instructors deliberately attempted to involve the students in a discussion of each patient. The instructors made attempts to gauge students' understanding of the history, physical, diagnosis, therapy, and other pertinent aspects related to the patient's problem. If it was a case of surgical mitral stenosis some instructors attempted to probe students' understanding of this from the anatomical, physiological, medical, and surgical points of view. Some succeeded but most failed here. There were

cases in which instructors actually perspired during their attempts to solicit student response. The teaching approach was excellent but it bore little fruit.

Of all things observed during this study the reluctance of students to answer probing questions or volunteer their responses was one of the most amazing. The first signs were noted in the preliminary courses but there the students had little opportunity. Most instructors in the preliminary courses were formal in their lectures. In the preclinical courses, especially anatomy and physiology, attempts were made to involve students in the learning process through questions and discussion. But this was exceptional. When it was attempted the instructors soon were frustrated by the pacificity of the students. Both the preliminary and preclinical courses could be carried out without student involvement if the instructors desired. The clinical courses, however, always have been based on the Socratic method of teaching. If students are reluctant to become involved in discussion, it is hard for the teacher to force the issue. At times it was the status of the instructor as the authority figure that was the only stimulus to answering questions.

This phenomenon was peculiar to all the schools studied. It occurred in varying degrees but was immediately obvious to anyone who spent time in the wards and the clinics with the students. Interviews with faculty supported this observation. It made bedside teaching of the type desired by the faculty most trying and exasperating.

Several possibilities were offered as reasons for this consistent and peculiar situation. First, the entire educational system, both at the primary and secondary level, precluded students developing ease in answering questions and challenging the teacher's point of view. Most of the educational system was based on a highly authoritative hierarchy and the teacher always appeared as the authority figure. Similarly, the teaching was highly authoritative and was based on a rote teaching and learning principle. As basic facts must be learned, the facts, with little sugar coating, were given the students. By the time students reached higher education they were conditioned to this type of teaching-learning situation. Any deviation from this pattern threw students into a conflicting environment. Adjusting to such a change was difficult for some and impossible for others.

The second reason for this situation may be traced to the culture of the people studied. Most of the faculty noted that the students came from a highly authoritative culture. In either the family or the

tribal unit authority played a dominant role. Orders were taken and rules were followed; any deviation from this pattern of family and tribal mores may result in retribution that varies from being ostracized to being physically punished.

The combination of these two factors understandably makes students tend to withdraw and submit, which makes the role of the teacher, especially the clinical teacher, demanding and frustrating.

The ward teaching in the specialties followed the same pattern as in general medicine and surgery. In going on ward rounds with the students the feeling is conveyed that they were given experiences extending beyond what medical students in the United States medical schools received. In gynecology, for example, complete gynecological examinations were made by the students under the supervision of the instructor and patients were followed-up by the students. In the diagnosis of cases such as complete involuntary abortion and chronic pelvic bleeding with large abdominal mass present, students were allowed to perform pelvic examinations and examinations of the abdomen. All the instruments necessary to carry out the examination were applied with little instruction from the teacher on their use. When a student had difficulty with an instrument an instructor proceeded to demonstrate the correct use.

The same approach was used in most of the other specialty subjects. On the specialty ward rounds invariably the number of students was small as they were assigned by sections. With a small group it was easier for the instructor to engage the students in discussion, but even under these circumstances it was often a trying experience.

The amount of supervision the students received on the wards differed among countries according to the type of educational program offered. In some countries it differed among hospitals where students were assigned for training. In one situation, because of a shortage of medical personnel, students were assigned the responsibility for approximately fifteen beds in the medical ward. They took care of the admission of these patients, prepared the history, performed the physical, completed a diagnosis, and prescribed treatment. The instructor in this case made a teaching round once a day. The other students assigned to medicine joined in these rounds and all saw each of the patients with a minimum of supervision. This was especially the case in the school having a course of upgrading personnel, and the minimal supervision was practical

because of the students' prior hospital experience. Full-fledged training programs for A.M.O's could not afford such a luxury. Even in those schools the amount of time devoted to the students by the clinical faculty varied considerably. It must be remembered continuously that the clinical faculty was not full-time as were teachers of preliminary and preclinical courses. They were first and foremost physicians and surgeons assigned to the government medical service with a responsibility for patient care. The students were a task they assumed in addition to their responsibilities as physicians. Their teaching assignments had to be fitted to their other duties and often classes had to be cancelled or rushed because of emergencies requiring their services.

In the out-patient department the student-teacher ratio was even smaller. Usually this was on a one-to-two basis and the instructor could assist students with individual problems. Because this assignment was part of the regular out-patient department the care and treatment of patients was the primary concern, and the training of students became a secondary goal.

It was not unusual in an out-patient department to have patients lined up outside the clinic from 9 A.M. until 5 PM. when the door was closed. This does not mean that all the patients were seen; on the contrary, many were still waiting at 5 P.M. The instructor and students had to care for the patient load in the clinic and teaching just happened. Usually students examined the patients, took a brief history, and made a diagnosis. The instructor either verified or rejected the findings and attempted to discuss briefly the patient and the next step to be taken in the treatment.

In spite of the rush and the haphazard teaching, these out-patient departments were excellent learning situations. In the case of a patient with hypertension, the instructor asked the students to examine the patient first while he was lying down and then while the patient was standing. He gave a brief elementary explanation of the patient's examination in both the lying and standing positions. He asked the students if they had any questions. As might be anticipated the number of student questions was small.

Patients at the out-patient department presented themselves with a typical assortment of complaints. Students made diagnoses of asthma, meningitis, Addison's disease, hypertension, undiagnosed heart trouble, spinal tuberculosis, tubercular meningitis, and other cases that might be seen in a typical out-patient department. The more exotic diseases such as leprosy and venomous snake bite were

few and the students handled these with the same degree of confidence as they did the others.

As can be seen from this brief description of the teaching methods used in the clinical subjects, and from the content of courses described in Chapter 3, the orientation of the clinical years is to expose the students to as much clinical work as possible. The approach of learning by doing is the theme throughout all the clinical subjects.

To carry out this approach students must be grounded in the fundamentals of the basic sciences and this appears accomplished. Before they can be made responsible for patient care, within the limitations set down for students, they must know what to look for in patients. To this end a grounding in signs and symptoms is given. For the remainder of clinical training signs and symptoms are emphasized.

Developing a proficiency in signs and symptoms is accomplished by giving the students experience in the wards, out-patient department, and in special clinics. Before this is done, however, the first few sessions in clinical work are devoted to an understanding of signs and symptoms. Developing this understanding frequently is carried out at the bedside. A group of three to four students will examine one patient with a specific complaint. If it is neurological, a neurological examination is made. As tests are performed each student is questioned about that segment of the examination. Each student is given an opportunity to perform some part of the examination. An attempt is made to discuss the implications of each finding. In these situations a further attempt is made not to allow any detail to go unnoticed. If in the neurological examination the students were attempting to determine the presence of a cerebral lesion, they would be checked, as they continued, to be certain they understood what they were doing.

The use of patients in these sessions on signs and symptoms added a great deal to the effectiveness of the learning process. This is where the clinical subjects have a decided advantage over the pre-clinical ones. The patient frequently was available to serve as a teaching model. If a clinical subject was discussed in a lecture the instructor would be certain to find a patient representing that particular clinical subject. The patient often became the teacher and the instructor merely had to guide the learning process.

After a grounding in the preclinical subjects and an introduction to signs and symptoms, students went to their clinical work with

varying degrees of responsibility, supervision, and teaching. Most of the clinical faculty are aware that their job is to help the students learn so they provide varied experiences to acquire this knowledge.

During the clinical segment of the training in all the schools some courses in public health, community health, health education, and hygiene are given. These subjects, more so than others taken at this time, are a combination of classroom and practical experience. The formal classes are usually a lecture although extensive use is made of movies, filmstrips, and slides. Students examine statistical data of the most elementary nature and often facilities are available near the school for students to work on mock-ups, miniature versions of community health problems to be encountered, and on local community problems. Village sanitation studies are carried out on field trips as are epidemiological studies.

In preventive medicine a definite attempt is made to combine the didactic with the practical. This can probably be attributed to the fact that most of the teachers of public health have a diploma in public health and were exposed to such teaching methods when they were students. The combination of classroom work and field experience appears ideal.

By the time students take their public health work they have been exposed to the practical aspects of medicine and patient care and are not too enthusiastic about returning to the classroom for straightforward lectures. The greater the emphasis on practical aspects of public health the better the students like it. Most public health faculty members are aware of student attitudes at this time and attempt to use a variety of teaching methods.

This chapter on the teaching methods can be summarized by the following:

1. Except for classes in biology the preliminary courses are handled in a traditional manner of straightforward lectures and drill. Little use is made of audio-visual equipment for in most cases it is not available. Biology fares better as it has recourse to more teaching aids. In the case of individual teachers with a talent for developing audio-visual techniques, they are used more often.

2. The preclinical subjects lean heavily on the lecture-laboratory approach. Anatomy has the advantage of using the cadaver (when it is available) as a teaching aid. A limited supply creates problems but these are often handled in ingenious ways. Anatomy does not resort as often to the lecture as the other preclinical subjects.

3. The physiology and biochemistry laboratory sessions can be

characterized as cookbook operations that do little but develop basic knowledge and some understanding of the subject by students. The laboratories themselves, because of the experiments carried on, have varied teaching aids that supplement the teacher.

4. The teaching of clinical subjects is universally good when done at the bedside. However, some clinical faculty members, when forced into classroom lecture situations, have difficulty carrying them off because of the lack of ability. In these formal clinical lectures individual instructor differences become obvious. When the ratio of students to faculty is small, as in the case of the specialty subjects and in the out-patient department, the quality of instruction is good because it is based on a tutorial system. The clinical teaching can be summarized as learning by doing.

5. The courses in preventive medicine given during the clinical phase of a student's education are usually a combination of didactic and practical work with an emphasis on field studies and individual projects in public health.

This respresents a brief description of the teaching methods and the materials observed to be used by some of the teachers in the five schools studied Little variation occurred from school to school. Perhaps the universality of medicine predisposes the teachers to this conformity. Exceptions were noted here and there, but these were based on individual teachers rather than on other factors.

Financial limitations and the competency of the faculty seemed to play a crucial role and because of these two factors some of the newer teaching techniques were not in evidence. Whether money can improve the quality of teachers remains to be seen; but it is apparent that teachers could be supplemented with some of the more acceptable teaching aids such as programmed learning, visual and audio aids, e.g., tapes of heart sounds and better organized textbooks. How well these would be used by the faculty is conjecture.

In the final analysis the teaching programs were good under the circumstances but could be improved. Some of the recommendations for improving them are listed in the final chapter of this study.

5

EVALUATION OF STUDENT PROGRESS

Evaluation, as a process, embodies four component parts: (1) stating objectives, (2) developing criteria, (3) measuring the extent to which the objectives are achieved, and (4) implementing the results of the measurement.[1]

The concept of evaluation is introduced here because it bears on the examination techniques used by the faculty in the schools studied. As the objectives call for the development of various abilities, *ergo*, the measurement techniques should vary. Following this, objectives calling for the development of skill will not be measured in the same way as objectives calling for the development of factual information.

Accepting this process of evaluation assumes that various measurement devices will be used to appraise student progress.

The use of a variety of measurement devices was conspicuously absent. The subjective essay-type examination was universally used to measure the acquisition of knowledge and an understanding of that knowledge. Clinical performance was appraised by the observation of student behavior. These two techniques comprise the teachers' complete armamentarium when they appraise student ability. Individual variations were the exception rather than the rule.

A closer look at questions asked on the examinations reviewed for this report should reveal the stereotyped nature of the techniques.

In public health the following questions are typical:

1. What way can health education help reduce the incidents of infectious diseases? Discuss briefly.
2. Describe the place of the nurse in the public health team.
3. What do you mean by handicapped children?

1. George E. Miller, Stephen Abrahamson, *et al.*, *Teaching and Learning in Medical Schools*, (Cambridge: Harvard University Press, 1961), pp. 193–204.

Some of the commoner questions in medicine follow:

1. How would you treat a patient with a diagnosis of lobar pneumonia?
2. Describe the circumstances which cause infantile gastro-enteritis.
3. What condition is predisposed to pulmonary tuberculosis?
4. Write an essay on syphilis.

In surgery such questions as the following are often seen:

1. Write short notes on the treatment of the following: (Here four diagnoses are presented.)
2. Discuss varicose veins and their treatment.

The specialty of obstetrics attempts to measure student ability with such questions as these:

1. What are the causes of postpartum hemorrhage?
2. Why are pregnant mothers advised to attend ante-natal clinics?

All of these are examples from clinical subjects. Little difference is noted in the type of questions asked by the preclinical faculty.

In pathology such questions as the following are seen:

1. Write brief notes on the following: (Here some terms are given.)
2. What is hardening of the arteries?

Materia medica-gauges gauge student knowledge with such questions as:

1. Name one drug used in the following diseases, the doses and route of administration: (Here some diseases are listed.)
2. Write the type of treatment you would use for a case of mild cardiac failure due to mitral stenosis.

Examples of questions asked in physiology and anatomy can be seen in Exhibit 2 and Exhibit 3 on pages 30 and 31. Here again the ubiquitous essay question is used to appraise student progress.

As can be seen, the tone of all these questions is similar except that students are asked in some cases "to write," in others "to discuss," and in still others "to describe."

The use of the essay type of examinations seems to reflect the type of examination questions to which the faculty had previously been exposed. This report will not become involved in a discussion of the merits of the essay versus the multiple-choice examination. This study clearly shows the dominance of one type of examination question over another, however. In some situations it was stated

explicitly by the school authorities that they would not tolerate any deviation from the essay examination question.

The use of the essay questions has merit. Those objectives calling for the development of understanding can be measured here. However, in many of these schools the faculty stated unequivocally that they were interested in developing the A.M.O.'s factual knowledge; whether they understood the material was irrelevant. As in this case, when objectives call for the acquisition of knowledge, measuring understanding through essay questions seems superfluous. There may be a more efficient way to measure factual knowledge.

All of this returns to the matter of evaluation. Measurement techniques cannot be developed until the objectives are stated explicitly. In these schools the faculty was often at a loss to define the teaching objectives. They could only say they were there "to teach" the students.

As mentioned, differences in the types of examination questions used was noted, but these were not novel. On an English examination, a descriptive paragraph was given and questions were asked about it. This examination was one of the rare cases in which one-word or short-answer questions were accepted. Such questions as the following were asked about the descriptive paragraph:

1. Identify the transitive and intransitive verbs. Explain the difference between the two.
2. Identify a gerund and a participle. Explain the difference between the two.
3. Derive any nine of the underlined words in the paragraph.

In physics, a question such as the following was not unusual: A man weighing 140 pounds stands in a lift. Calculate the force exerted on the man by the floor of the lift when the lift is moving (a) upward and (b) downward with an acceleration of two feet per second.

In chemistry and mathematics, questions that solicited specific answers often were used. Biology, however, tended to use the essay type of examination question.

If distinctive difference in the type of test questions was apparent, it was on the examinations in the preliminary subjects. In these subjects the teachers tended to ask questions often requiring one-word answers. The stated objective of these courses was the development in the students of knowledge adequate to begin their preclinical subjects. In this case, the drilling and rote learning that

characterized the teaching of these courses is reflected in the type of examination questions used.

The clinical teachers could benefit from some of the types of examination questions used by the teachers of the preliminary courses. The English examination question on a descriptive paragraph could be modified for medicine. For example, a very brief history, physical, and laboratory findings on a patient could be presented. After the presentation, specific questions about the case could be asked. A series of questions measuring both knowledge and understanding could be devised such as that just suggested. Answers could be the multiple-choice type, or if they were not acceptable, of the short-answer variety. The point is that the essay question is not the only type of examination question possible.

Essay examinations have value as mentioned before. Of course, they are easy to construct but difficult to score. If a teacher has delineated clearly what is expected or will be accepted in an answer, scoring is reasonably simple. If the words "describe, "discuss," "explain," and "tell" are used in these questions, students must assume they know what their teacher expects in an answer. In such circumstances students will parrot what the instructor wants to hear. In the end this is not a measure of student understanding—the reason adherents of this type of question selected it originally. So here the essay question apparently is unsatisfactory.

Essay questions were used requiring students to give rather specific and detailed answers. Discussion with faculty members who use these questions revealed that most have a rigid idea of what they will accept as answers. These teachers have developed standards for each answer and students must meet these standards. When such standards are set down and a faculty member is convinced of them, then the essay examination question can be a more objective measure of student ability.

Additional examples of examination questions are included in Appendix L. Students appear to be tested frequently, with paper and pencil tests at least. Tests are administered in all the courses from preliminary to clinical courses. These tests provide data on which the decision to fail or to promote students is made.

Clinical ability, that best can be described as a skill, is not so comprehensively examined. The appraisal of clinical skill is left almost totally to an instructor's personal judgment of the student's behavior in the wards or clinic.

As in some schools the amount of contact between teacher and student is limited, the objectivity of the instructor's judgment is

suspect. In one school a clinical instructor saw each student on an average of one to two hours a week during business or ward rounds that covered a total of almost forty patients. The same instructor had to pass on the student's clinical knowledge and skill.

It is agreed by most clinical teachers that the best way to judge student clinical ability is through observation. But here, as in essay examinations, the teacher must know what to look for: did the student ask all the pertinent questions during the history? Did he palpate the liver for the patient with an ache in his upper right quadrant? What laboratory test did he order? If a student misses an important procedure, or does one poorly or excellently, the instructor also should note it. These are ideal ways to judge the clinical ability of students and some record of their performance should be kept. A record can be referred to as a source of information in counseling the student and as the basis on which he is promoted or failed.

No such records that list student strengths and weaknesses in clinical subjects were seen. If a decision on a student's ability had to be made it was based, as previously mentioned, on the instructor's perception of the student and his performance on a written examination.

The failure to measure the clinical ability of students through more objective means can be justified. The responsibilities of the clinical faculty as practicing physicians are so great and directed toward so many other activities that the A.M.O. student can receive only perfunctory examinations. School authorities must depend on the ability of the clinical faculty in deciding who is an adequate student and ultimately a competent A.M.O.

While the essay examinations are inadequate, at present they are almost the sole means of objectively appraising student progress. As stated, in clinical work it is only the instructor's personal judgment that evaluates the student's ability.

Little else can be said about the examinations used. Most of them are of the essay type and are used in all subjects. Clinical skill is judged by the clinical faculty through observation and personal judgment. The clinical faculty also administers essay examinations and often uses these to decide which students will pass and which students will fail.

The examinations are classified into such categories as preliminary, intermediate, final, qualifying, and certifying. The classification depends on the school and there is no discernible difference in the difficulty of the examinations because of the classification.

The preliminary examination in some schools is given before the

course of study begins. It is not solely a test to determine what a student knows so that the instructor can plan the course of study. It is intended as another entrance examination. What happens to students who fail this examination, however, never was determined.

Most other schools use the preliminary examination as a guide for the course teachers. Most instructors do not rely on what their students know; they determine it in the most objective way available.

Term examinations are the first major examinations students take. There are the usual short quizzes given by many instructors during the week, but the term examination is the first one of importance. Rules governing the administration of these examinations are posted in some schools. In others the rules are very tenuous. In one, a term examination must be at least two hours long. The questions that compose the examination are created by the teachers of the course and graded by them. If a laboratory is part of the subject, the laboratory work is considered in determining the final grade. Notebooks, if kept, also are examined and included in the final grade.

Differences are noted in the examinations given at the completion of a subject. In the preliminary and preclinical courses both written and oral examinations are usually given. In some cases, instead of an oral a student is given a laboratory exercise to perform and is graded on his performance. The grading usually is based on how well he keeps notes on the experiment assigned to him. The instructors tour the laboratory during the exercise; obviously their personal judgment on what they observed plays some part in determining the grade on the laboratory performance.

Again the rules governing these final examinations vary. In the school with a prescribed protocol on examination procedures, minimum standards of at least (1) a three-hour written paper, (2) an oral or practical examination, or (3) a combination written and oral is required. These rules further stipulate that the written examination should cover the entire syllabus of the course. If a practical examination was not possible because of a shortage of laboratory equipment, an oral examination should be substituted. In final examinations an equal weight is usually assigned to both the written and the practical or oral part.

Some schools refer to the final examination as an annual examination. The examination may be written, oral, practical, or any combination of the three; they are similar to those described above.

The clinical subjects vary in the examination rules. In the schools in which students are assigned to hospitals or health centers around the country, the faculty at the centers makes the examination, and this faculty is the final judge on student promotion.

This procedure varied further in one school. The faculty from one hospital center went to a second center to examine the students; in turn the faculty from the second center examined the students of the first. This system appears to produce a tremendous amount of confusion and anxiety in the students. As cited in Chapter 3, the subject matter covered differed among centers; when the examiners arrived they had no concept of the teaching objectives of the center they were visiting. Strangely, many of the instructors felt they could examine another center's students but that only they could examine their students. This system created much disorder, and the school authorities were attempting to change it. They felt that the examiners should be sent from the central school to all the centers. While this is not an ideal situation, the school officials felt uniformity in examination procedures would prevail in place of the current haphazard approach.

Still, as the school had little control over what was taught in the centers, the examiners would expect difficulty in examining the students. But here the school officials could arrive at minimum standards for reference; in the other situation each visiting examiner would examine on the basis of his teaching as opposed to what the students had actually been taught.

An amount of relief was voiced by students in this school when they knew of a contemplated change in the examination procedures. The anxiety experienced anticipating the arrival of examiners from another center was complex. Interviews with some showed a bitterness toward the entire educational program. The students' first choice was examination by those who taught them. From an evaluation point of view, this is sound educational thinking. But as the school did not control what was taught at these centers and the quality of the programs would vary, students would pass at the instructor's discretion, whether or not he had covered the material required by the school authorities. That examiners were to come from the central school made the students less bitter but they continued to question whether the central school authorities could adequately test their knowledge. Did the central authorities know what their teachers had covered?

This type of situation is chaotic. It illustrates clearly the types of

difficulties that can arise when (1) teaching objectives are not made clear and (2) criteria are not determined. Appraisal of student progress assumes mystic qualities and it is not objective as it should be.

All questions to be used in the written final examination in another school are sent to the principal. He screens the questions and the central office prepares the final examination. In this situation the principal can eliminate questions that he—subjectively—decides are too difficult or too easy. In another school the principal follows the same procedure but returns the questions to the faculty with his approval or disapproval. The policy in the former school is looked on with scorn by most of the clinical faculty. The consensus in this school can be summarized in the opinion of one of the clinical faculty members who stated, "If Dr. ——— insists on publicly stating that our school is training A.M.O.'s at (one country's) standard, then he should give us the right to test them at (the same country's) standard." What he is saying is that the stated objectives are not in harmony with the examination procedures; the examinations are measuring at a level decidedly below that stated in the objectives. These individual school problems are compounded because no policy on examination procedures is published. It is obvious, too, that an academic environment is not present in this school; the faculty has no voice in the way the students will be examined on what they have been taught.

Somewhat rigid examination rules seem necessary in all the schools. The reasons for having these rules are probably the same as those stated in Chapter 3 where it was noted that the courses of study were prescribed with some rigidity. Where rules are absent a great deal of confusion exists and both faculty and students are discontent.

Examinations in the clinical subjects show further minor variations. The final examination in clinical subjects usually consists of a written examination developed by the instructor responsible for the course. In some schools a consultant is used, an external examiner who can be appointed by the principal or whatever academic faculty board exists at the school. The teacher develops the questions and reviews them with the consultant. Any disagreements with the consultant are arbitrated by the principal or the academic board.

After the written examination is completed the instructor conducts a clinical examination. The student must do a complete work-up on a patient, and the instructor examines the student orally.

If laboratory data are required, the student must do the necessary laboratory work and likewise be examined orally on his findings.

In the school in which the use of an external examiner is set by policy, the external examiner and the faculty member responsible for the clinical course jointly conduct the oral examination. Together, they also decide on the final grade that is to be assigned each student.

In the clinical subjects where the number of formal teaching hours is greater, the weight assigned the written clinical examination also is greater.

Assigning weights to various types of examinations reveals one of the major inconsistencies in these schools. In the clinical subjects in all of the schools the emphasis is on learning at the bedside. Practically no formal classes were held in some cases. The objectives of such clinical experiences can best be described as "to develop in students understanding and skill in patient care." The emphasis of the objective is on the word skill. Yet when it comes time to appraise the students in their clinical work, the faculty relies heavily on the student's ability to answer formal written examination questions that deal with knowledge *per se*. The bulk of the student's grade thus depends on how he performed on a written examination rather than how he did at the bedside where the learning took place. It seems safe to conclude that, in the clinical subjects, the examination techniques are not in agreement with the over-all objectives of the training programs for the A.M.O.'s.

These qualifying examinations, whether in the clinical or preclinical subjects are actually qualifying examinations. They are taken at the end of the subject or at the end of the academic year, whichever occurs first. They determine whether a student will continue with his course of study or graduate; they determine in large part his future.

While these qualifying examinations play an important role in charting a student's career, a human element fortunately is introduced in some schools. This human element takes the form of a board of examiners, academic board, or promotion board. Where these boards exist, they review every student's record and are the final judges as to whether a student will continue in his academic work. If a student misses his examinations, the board can recommend that a supplemental or make-up examination be given. If the board decides that a student failed an examination because of extenuating circumstances (sickness, personal problem, conflict with

examiner, etc.), they might recommend and make arrangements for a supplemental examination. These boards also have the power to permit a student to repeat an entire academic year despite failing all of his qualifying examinations. The power of these boards, therefore, is broad and discretionary; they sit in final judgment on the student's academic ability.

Because of the variety of faculty with varied teaching experience and knowledge of subject matter, the differences in examination questions asked, the broad range of experience to which the students are subject, and the discrepancy in the quality of students themselves, this type of promotion board appears a basic necessity. With educational programs subject to so many vagaries, promotion boards are a stable force giving some continuity. The boards can sift through a vast array of data on a student and arrive at a more reliable conclusion than that of any single examination or teacher. The boards, of course, also are subject to prejudices, but a wise selection of board members can minimize the disadvantages in such an arrangement.

The boards, whatever their title, make the final decision. In some cases they stipulate how students will be examined and how the grades will be recorded. Generally alphabetical grades are required, but in one school the faculty had such difficulty assigning a letter grade that a percentage grade was submitted and the promotion board converted it into a letter grade. The promotion boards in some schools also determine how much weight should be assigned each type of examination procedure, although this usually is a policy decision made by the school principal. The autonomy of the boards will vary. Where a decidedly authoritarian principal reigns, the power of the promotion board (or any school board for that matter) is limited.

After the board makes its final decision, the student is either: (1) failed, (2) allowed to take a make-up examination, (3) given an opportunity to repeat the year, or (4) graduated if he has completed his entire academic course of study.

The evaluation of student progress, in summary, follows this general pattern:

1. The essay examination seems to be the standard type of examination used to measure both knowledge and understanding.

2. The essay examinations are similar in both the clinical and preclinical courses. Little variation is noted in the type of questions asked.

3. The directions in the essay examinations are somewhat vague with terms such as "describe," "discuss," and "tell" used to direct the students in answering the questions.

4. Some preliminary courses—especially English, mathematics, chemistry, and physics—use more of the one-answer type of question. Biology has a tendency to rely on the essay type of question.

5. Students' clinical ability seems to be judged primarily on the student's ability to answer written examinations. While the students are observed in the wards and in the clinics, no records are kept of student performance in these clinics. Well-defined criteria are conspicuously absent.

6. Examinations are divided into three classifications: preliminary, intermediate, and final examinations. The final examination is functionally a qualifying examination.

7. Regulations governing examinations exist in some schools. Where these rules are established they can be rather rigid. In others a great deal of freedom is allowed in the types of examinations used, how they are scored, and the grades assigned.

8. Measuring clinical ability varies among schools and hospital centers. Where students are assigned to hospital centers throughout the country to receive their clinical training, examinations usually are left to the individual faculty members at the centers. Some principals make an attempt to create examination questions that they distribute to these centers, but they are of a most general nature and seldom used.

9. Most schools have some sort of academic board that makes the final judgment on the students. These academic boards decide whether a student takes a make-up examination, repeats a particular course, repeats the whole year, or fails the school program entirely.

10. Most schools assign letter grades as a final measure of a student's achievement. Schools in which the faculty has difficulty in assigning letter grades use percentage grades and they are converted by the academic board to a letter grade.

6

THE STUDENTS AND THE FACULTY

All of the educational activity described so far has at its nucleus the basis of any educational endeavor—the students and the faculty. In an educational experience as unusual as that of training A.M.O.'s, the differences in these two groups is striking from country to country.

As it is the students for whom the educational program exists, a brief examination is in order concerning their (1) origin, (2) personal background, (3) school privileges and activities, (4) financial support, and (5) situation after graduation.

Although some countries are small in terms of square miles, a distance of one hundred miles or less can produce two entirely different groups of students. The tribal system is the standard unit around which groups cluster. The cultural background, mores, and value systems of the tribes differ so markedly that, at times, it is difficult to distinguish whether the various tribes are citizens of the same country. With such differences prevalent it is understandable that the range of problems encountered in selecting students is great in one country. At times it appears the cultural chasm between two tribes never can be bridged.

In the South Pacific the problem is further complicated. The schools in Fiji and Papua-New Guinea draw on a student population that inhabits hundreds of thousands of square miles. The different types of students that occupy this area is even greater. Only in the Fiji Islands proper where two distinct cultural groups compose the population does a clear demarcation exist between students. But as the Fiji school draws its students from an area outside of Fiji, student differences are compounded anyway.

The conglomeration that such a student body presents to the medical school authorities and to the faculty complicates the educational problems that already are formidable. These students come from educational backgrounds that run from abysmal to

excellent. As described in the admission procedures, a diploma equivalent to a secondary school education is no guarantee that a level of ability and performance commensurate with such a diploma will be demonstrated by a student. Because a student has had eight or ten years of English also is no assurance that he will be able to state his thoughts clearly in a written composition or in an oral presentation. The same applies to mathematics and the sciences. The educational standards adapted at the school he attended may look acceptable on paper but the living proof speaks louder than the written record.

Recommendations from the students' teachers also should be subject to scrutiny. When a teacher recommends a mediocre student based on a comparison with inferior students, the recommendation will likely contain unjustifiable superlatives.

Further complications arise as these students come from an assortment of public, private, and church affiliated schools. Not only is there a vast range between the caliber of the educational program of these schools but there are particular differences. That of the Christian church schools is perhaps the greatest. Those religious denominations whose primary objective is to educate the students in the secular, with the spiritual goal achieved because of the secular objective, will better educate the student. Those whose primary and often sole purpose is the spiritual, *ergo,* conversion, will have an educational program of a lower quality.

Differences in educational background are not the only differences complicating the picture. As mentioned in Chapter 4, customs, mores, and taboos set down by the tribes from which these students come pose further problems. The information cited in that chapter indicated that students are reluctant to ask questions, rarely engage the teachers in discussion, and almost never challenge the instructor's point of view. Such an educational environment is hardly conducive to the Socratic method of teaching that characterizes clinical medicine.

Interviews with several students—and interviews were difficult for the reasons cited above—revealed that students considered it insubordination to question an instructor. One student, when asked what he would do upon hearing an instructor make an erroneous statement that did not agree with the textbook, replied, in effect, that perhaps the text was wrong.

In one classroom situation observed, a student identified an error in a drawing that the teacher had made on the board and asked if

it was correct. Comparing it with the one in the textbook the teacher realized an obvious error was made on the blackboard. This was corrected and the teacher proceeded with the lecture. An interview with the teacher was held after class in the hope of determining why the student had corrected the teacher—the only time such an incident was observed during this study. The teacher pointed out this was a common experience for her because the students took subdued but great delight in seeing an error made by a member of the opposite sex. The majority of the students in this class came from backgrounds in which the women played a secondary and menial role. Here their respect for authority—the teacher—was sublimated to their dominance over the teacher—the woman. In this case, challenging a point of view was not an intellectual endeavor but had its roots in a more personal and cultural rationalization.

This vast array of backgrounds from which students apply to medical school forces the schools to establish standardized procedures for screening the applicants. The standardized achievement tests that either are created by the school or are available from other countries become a basic necessity. At best they only establish minimal standards to give some assurance that the accepted students are trained adequately or appear trainable.

It seems safe to conclude that no generalization, other than that these students differ markedly, can be made. Until the primary and secondary educational programs of these countries are standardized and upgraded, students training as A.M.O.'s will always represent a heterogeneous group of backgrounds and abilities.

With diverse backgrounds students arrive at a medical school in which conformity and uniformity are the established rule. From the time they enter to the time they graduate—except for a brief vacation period—they are virtually wards of the school. School officials justify this because of the government's total responsiblity for their education. They say that the government has the right to protect and to channel its investment so it will bear dividends as soon as possible. This is the case in all of the schools; they are government operated and supported. This means that the faculty is paid with government funds, the buildings are built with government funds, the hospitals are operated by the government, the clinical staff is furnished by the government, and student aid is supplied by the government.

In most places student aid consists of the following: tuition is paid by the government to the school or no tuition fees are charged. In some places the students receive their uniforms and in others they

get an allowance to purchase clothes for school. Full board is also provided and a small living allowance.

The living allowance has caused difficulty in some schools. In one the students receive a lump sum assigned by the government which approximates $7.50 a week. From this allowance the school authorities subtract boarding cost and what remains is a student's spending money. The students obviously are not as happy with this arrangement as the students who are given board plus a spending allowance. Where the boarding costs are subtracted from the government allowance some students feel they are not getting enough spending money.

In another school students must purchase all their personal belongings with their allowance. This means all belongings except board and school supplies which are furnished by the school. A similar approach with modifications has been proposed in another school. In this school a student would receive approximately $700 a year and from this allotment he would have to purchase books, uniforms, and all school supplies, leaving him about $250 to live on for the whole year. It is hoped that this approach will develop more independence in the students.

Where students are in school for the purpose of upgrading they continue to receive the salary they did in the position held before their return to school. Many in the upgrading program are married and have family responsibilities. Although they live at the school they have the responsibility of their family who may be living in another village. Bachelors going back to school and continuing to get paid at their previous salary obviously have many advantages.

A further variation in providing living allowances was noted. Students with a higher educational certificate (background) receive a larger allowance. So a student with a certificate attesting ten years' previous schooling receives a higher allowance than one with a certificate for five years' schooling. Allowances are based on previous education and are set down in school policy.

All of the students are accommodated in dormitories. The number of available dormitory spaces often determines the number of students enrolled in a school. In others the dormitory space is available but the number of qualified applicants is limited. However, most school officials are pleading for more and better dormitory accommodations. Of course, many other factors will determine the class size, and not the least of these is the availability of qualified teachers. This is discussed later in the chapter.

For most students the dormitory life is a luxury they have not

experienced before. The meals are substantial and also are a luxury for many students. The students appear to enjoy the communal dormitory life and appear to behave like any boarding-school students.

Recreational activities are limited and usually are not guided or supervised by the school. Most students engage in soccer, rugby, volley ball, tennis, ping pong, and cricket. Activities are almost totally student directed as funds cannot be appropriated for additional personnel, and the operating funds are too limited to permit such a luxurious fringe benefit. All recreational activities are on student time and are accomplished before classes, during lunch, or after classes. When students are in the clinical phase of their education the opportunity for recreation becomes even more limited as many are on duty at the hospitals and clinics during the evening hours.

The supervision of student free time also varied. One school was almost totally paternalistic with students, allowing them but little time to go to town. In another school they could go to town as often as they wanted but had to be in for a bed check at a specified time. Controlling student behavior, then, depended largely on the school authorities.

It must be assumed that students spend most of their time studying in the dormitories or places other than the library. The library in most schools had limited reference material and was confined to a small area. Not all of the students could be accommodated in the library in the event they all wanted to make use of it. Librarians also said the students made little use of the library during the evening hours when it was open. Further complicating the problem, most schools had their library resources divided between the school and the hospital. When the hospital was miles away from the school it was difficult for students to get to the hospital library. Too, the hospital usually had the better library. Where the hospital and the school were contiguous the central library facilities were usually larger and contained more varied volumes. In general, except for one school, the libraries left much to be desired.

Students' vacations also will vary. In one place they were given a six-week vacation at the end of the school year and a one-week vacation during the year. In this school there also were the regular national and religious holidays. Here the students' classes usually began at 7:45 A.M. and ran until noon. After a lunch break students

returned at approximately 1:15 P.M. and continued in class until 4 P.M. One class also was held on Saturday morning and there was talk of expanding the length of the Saturday classes.

Another school allowed a two-month recess at the end of the school year and did not have any Saturday classes unless scheduled by individual faculty members.

The major vacation period generally was dictated by the climate. As these countries enjoy sub-tropical or tropical climates, the vacation occurs during the rainy season. Attending classes at that time in most cases would create additional problems.

Where upgrading programs were in progress students attended their clinical duties like other members of the hospital staff and had no extended vacation during the term of their training.

Because some students do not complete the course of study despite all the screening procedures and opportunities to repeat failed courses, provisions are made in some places to rechannel the student's educational program. In these schools students failing the A.M.O. course of study can transfer to another health discipline within the same school which will perhaps not be as rigorous. Some schools, however, discourage such a procedure and others prohibit it.

Allowing students to transfer has some value. Again the argument is offered that a great deal has been invested in these students and it should not be wasted. This argument seems to have merit. The contrary opinion is that allowing failing students to transfer develops a hierarchy of health workers with implied or real status. This also has merit. This second argument becomes unimportant when compared to the need for health workers in all ranks and of all abilities.

Most students who fail the A.M.O. course elect to withdraw from school completely. There is a stigma associated with failing and remaining in the same school. But some students who fail feel the stigma of returning to their own villages is even greater. Students who fail must decide which is the less embarrassing situation. The decision to remain and pursue an education in one of the other health disciplines appears practical when considering the need for health workers.

The limited pool of applicants for training A.M.O.'s is a problem that will become larger. As repeatedly mentioned, this problem has its roots in the quality of the elementary and secondary educational programs of the countries. The medical schools must share with

other professions from the total pool of qualified applicants. Because the total pool is small, concomitantly the pool for training A.M.O.'s is smaller.

In recent years many of the countries have begun to contemplate building medical schools that will bestow a *bona fide* M.D. degree on graduates. These schools presumably will be built according to standards adopted by the older and more highly developed nations. If such a medical school becomes a reality, the pool of applicants for training A.M.O.'s will decrease further. Brighter students will select an M.D. program rather than one merely giving them the official title of A.M.O. while performing the duties of an M.D. without any of the privileges. If these M.D. medical schools are built the position of the A.M.O. medical schools will be tenuous. The training program for A.M.O.'s would be faced with several options: (1) the program can be downgraded and open to less qualified students, (2) the program can be an avenue by which students enter the M.D. medical school, (3) the school can work in conjunction with the M.D. program, and (4) the school can cease to exist. If the fourth option is elected, then only an M.D. elite will be trained. Problems would arise in such a possibility and they are discussed in the next chapter. However, if the M.D. program is not built on the standards established for medicine in other countries, these M.D. programs can make a significant contribution to medical education. What is necessary for the U.S.A. or Europe may not be necessary for Africa or the South Pacific.

These problems already have arrived and currently are being discussed and settled in some countries; in others they are forthcoming and are causing consternation among the school authorities, students, and faculty.

Recruiting faculty is one of the major problems facing all schools. Each school has an active recruitment program that consists of personnel advertisements in the journals and professional papers, health agencies, government bureaus, and through word of mouth among the profession.

The recruitment of the preclinical faculty is the most difficult. Preclinical faculty are at a premium in all countries in the world so competition for them is keen. Consequently the pure basic science Ph.D.'s are a rarity in these schools. Usually the preclinical instructors are M.D.'s trained in European or American medical schools who had developed an interest in the preclinical subjects and decided to investigate job opportunities in these subjects.

Obviously the ability of teachers of the preclinical subjects depends a great deal on their knowledge of the subject matter, and it is safe to conclude that all are not of the same ability. Some individuals have truly remarkable ability, however. The anatomists are often former surgeons or still-practicing surgeons. They seem to understand better what students should know in anatomy to be a practicing A.M.O. than an anatomist without a clinical background. Not all surgeons are equally good in their knowledge of anatomy; as their ability as surgeons varies, so does their ability as anatomists.

The other preclinical faculty—physiology, biochemistry, etc.—also are recruited from the M.D. field. They are usually young men who were practicing physicians in their own countries. Upon hearing of the opportunities for teaching preclinical subjects and perhaps being bored as clinicians, many look on these teaching positions as an adventure. While some become good teachers and remain at the school, the majority stay on for one or two years and move on to other schools or return to their own practice in their native countries. Others return to further their education in the particular preclinical subject they are teaching. In general, the turnover in the preclinical faculty is rapid with only a few individuals becoming mainstays of the medical schools.

The recruitment of preclinical faculty always will be difficult. The shortage of such personnel is acute and qualified people will always be expensive to recruit. Those who currently are at universities will only reluctantly leave a university center to come to a school that often has no university affiliation and is training students at a level lower than that of an M.D.

This lack of university affiliation also is viewed as a drawback by those preclinical faculty members recruited from the ranks of physicians. Some planning academic careers for themselves like to have university experience. They view medical schools training A.M.O.'s as extensions of secondary schools. Even those physicians who are induced to teach preclinical subjects have a preference for schools with university affiliation.

While all the problems cited are being considered by the principal, there is always the fear—expressed or implied—that much of the selected faculty will be composed of individuals who have personal problems or are incompetent. The principals therefore spend a great deal of time recruiting and screening the preclinical faculty.

Well-established schools seldom have such problems for the

preclinical faculty largely is content in what it is doing and the turnover is small and infrequent. When vacancies occur, they are easily filled. Perhaps once all of the schools are well-developed and have established reputations, the difficulty of recruitment of preclinical faculty will not be of such large proportion as at present.

The pool of candidates for positions as teachers of the preliminary subjects—mathematics, physics, chemistry, biology, etc.—is much greater. These individuals at most possess bachelor's degrees with little if any previous experience as teachers; thus the pool is larger because the educational background is not so demanding. A faculty member teaching the preliminary courses usually has credentials meeting all of the minimum requirements. The number of individuals with such credentials who are adventurous and willing to come to remote places to teach also is greater. These advantages give the principal the opportunity to select those best qualified.

The group of preliminary teacher applicants is larger than the pool of candidates for preclinical positions, for here there is no such thing as a pool; the principal takes what he can and hopes for the best. In selecting preliminary-course teachers there is at times a possible choice from several applicants.

The reputation of the school plays a part in the type of individuals attracted. In one school an interview with one preliminary-subject teacher proved revealing and shocking. When asked how long the individual had been teaching the answer was one month. He had never taught before arriving at this school. When asked how much academic work had been taken at the university in the course he was teaching, he replied that as a student he had "sat in" on some forty clock hours of lectures in this course. Beyond that no other academic work in this discipline was taken. This teacher's major subject at the university was not the one that he was teaching now and was in a discipline completely unrelated to his present situation. When asked why he applied for this position with his limited background, he replied that the advertisement for the position looked good in the journal so he applied and obtained the job without any trouble. When observed in the classroom he did not appear qualified. At this school other preliminary-subject teachers were suspect as to qualifications. One actually admitted he had been hired under false pretenses, for he applied for one position and found on arrival he had to fill a gap and teach another subject.

While the recruitment of preliminary-subject teachers does pose problems, the future looks hopeful. As the entire educational system

of these countries improves and is upgraded, more of the indigenous student population will attend universities at home and abroad. These university graduates will be able to fill the ranks as preliminary teachers. The medical schools will not have to depend on the recruitment of personnel among European, American, and Asians as they do at present. The schools will develop an even greater national character.

The problem of recruitment of clinical faculty nowhere nears the proportions of the other groups. Of course there never will be enough physicians so that no matter how large the clinical faculty grows there still will not be enough.

The clinical faculty usually is not recruited or hired by the principal of the school. The principals, except in isolated cases, have little to say about the clinical faculty. They are recruited, hired, and salaried by the government medical service. The clinical faculty's first and major responsibility is to their patients and to the hospitals and clinics to which they are assigned. The clinical faculty is the clinical staff of the medical service. The members give their time voluntarily to the teaching of the A.M.O.'s; if other duties are more pressing, students have to wait. During the course of this study it was not unusual to have clinical classes cancelled because a teacher had an emergency in the ward, clinic, or surgery.

In most schools this arrangement seemed to result in no undue hardships. Most of the clinical faculty had excellent working relations with the principal and with the preclinical faculty. This usually is because the principal and the preclinical faculty invariably are physicians and the relationship between the two groups should be harmonious.

In one school the relation between the principal and the faculty was strained and here a deliberate effort was being made to recruit a core of clinical faculty with full-time appointment in the school who would be directly responsible to the principal. The future of this plan was in doubt at the time this study was made.

While there are arguments for and against a full-time clinical faculty, there appears to be no argument against the appointment of a liaison physician between the school and the hospital staff. Often on completing their preclinical courses students move away from the school and have little if any further contact with it except when receiving class and ward assignments. Students have no one with whom to identify, for the clinical faculty is too busy to assist them other than in their routine teaching assignments. With a faculty

member serving as a liaison between the school and the clinical teachers and the students, better relations between the school and the faculty would be maintained and the students' interests would be looked after by the school. It would be ideal if such a person could undertake this as a full-time obligation but the shortage of faculty precludes such an arrangement. Where a hospital is located next to the school, such a person usually is unnecessary.

Clinical faculty members are recruited through the government service. As when recruiting other faculty, notices are placed in professional journals, newspapers, and with various government agencies.

In only one of the schools was the teaching hospital under the jurisdiction of the medical school principal. Here the clinical staff was screened as was the faculty of the school. The names and credentials of the candidates were sent to the principal, and he examined them and decided whether to hire. His decision, however, is somewhat limited. As these clinical faculty members were also registered physicians, they had to be sent to the capital where a medical board passed on their qualifications as physicians. Usually this was a routine procedure and approval was automatic. With the shortage of physicians in this country, it was highly unlikely that anyone, unless grossly incompetent, would not be approved.

The teaching responsibility of clinical faculty is further complicated in some schools. In schools where there are programs other than for A.M.O.'s, clinical work is often part of the program. Therefore, the same physicians who teach the A.M.O.'s must work with other groups. It is not unusual to have the clinical faculty responsible for three or four different groups of students at various levels. Coupled with its responsibility for patient care the clinical faculty is busy indeed and frequently overworked.

All of the appointments, whether in the clinical, preclinical, or preliminary subjects, or whether appointed by the principal or the director of the government medical service, are under government civil service regulations. These vary from country to country and are too numerous and too detailed to describe here. The salaries for these faculty members are based on civil service scales and they also receive all other benefits commensurate with their appointment and rank.

Only in the school with a university affiliation was an academic title given. Here all the academic titles usually associated with a university were established and promotion in the school was guided

by university by-laws. In all other schools the only type of academic rank assigned is *instructor*. It appears that this title is automatic with appointment. As academic promotions are not possible in these schools, benefits are received on the basis of years of tenure, experience, and civil service rating.

Faculty members are left alone. The teaching load for the preclinical and preliminary teachers is heavy by any standard; therefore, the school authorities do not impose on the faculty's time too greatly. Some committees are in existence but meetings are infrequent. Whether the principal of the school is autocratic will determine the extent to which the faculty is involved in school affairs.

Faculty members are largely left alone to pursue the teaching of their courses as they see fit. As the course content usually is prescribed, the only variation that can occur is in the way the course is taught.

In one school the principal decided with his faculty what was taught and how it was to be taught. He checked on the faculty by observing how students occupied after-class hours. If the students were having too much free time or indulging in too many personal activities other than schoolwork, he checked with the instructor of those students to determine if they were being given enough work. This is an isolated case; all the other principals seem to leave their faculty alone.

After teaching a full day there is little that the preclinical and preliminary faculty have time to do. For most of these teachers the day begins with a class at approximately 8 A.M. or earlier and runs continuously with a lunch break until 4 or 5 P.M. These faculty members do not have the luxury of one or two one-hour classes a day. If they have any free time, they often assist in their colleagues classes or sometimes work with students on individual problems. Evenings also are occupied with working on student problems.

After putting in a full day's teaching, working on student problems, and preparing the next day's lesson, there is little time for other scholarly pursuits. Although the preclinical faculty would like to engage in research, they find they cannot devote the necessary time to it. It is a rare teacher who does research. If any is done it is descriptive in nature and not of the controlled experiment type. Some schools maintain a division of research, but it is a part of the government health service and not directly affiliated with the medical school.

The clinical faculty also works a full day and often more. Under such circumstances they too do little research unless it is clinical, describing some peculiar or particular disease entity. The faculty has all it can handle with regular teaching assignments and responsibility for patient care. Anything beyond that is more than can be expected. Until the number of faculty increases little more than meeting basic requirements can be expected.

The students and faculty, then, seem to be characterized in the following:

1. Students come from various cultural and educational backgrounds. A wide range of backgrounds is noted even from those schools that select students from their own country.

2. The background influences students behavior. Differences in behavior are manifested in their (a) relation with the faculty, (b) attitude toward schoolwork, (c) performance in the classroom, and (d) personal activities.

3. The life of the student is regimented. Dormitory life and other regulations on personal activities are evident. The amount of regulation varies from school to school.

4. The length of vacation varies from school to school. The major vacation period usually occurs during the rainy season.

5. All costs for educating the individual are assumed by the government. Tuition is either paid for, or waived, by the government; uniforms and school supplies are provided; board is given by the government; a personal allowance is provided. All of these privileges are granted the student but the way they are executed differs from school to school.

6. Students who fail their courses in some schools have the option of completely withdrawing from school or of entering one of the other health disciplines. In some places failing students have no recourse but to withdraw from school.

7. Recruitment of faculty is one of the major problems facing administrators. Recruitment of preclinical faculty is most difficult with recruitment of preliminary faculty second in difficulty.

8. The majority of preclinical faculty are physicians. Practically no basic scientists (Ph.D) are members of the faculties. As the preclinical faculty is usually physicians, it assists in maintaining rapport between preclinical and clinical faculty.

9. Recruitment of preliminary faculty is not so difficult. A bachelor's degree is required to qualify for these positions. In addition, as the educational system in these countries improves more

of the indigenous population will be receiving a higher education. They in turn will qualify for positions as preliminary faculty.

10. The clinical faculty members are recruited as part of the government service. They give their time to teaching the A.M.O.'s on a voluntary basis. In only one school does the principal exert any control over what clinical faculty members are hired. This was possible because the hospital was affiliated with the medical school.

11. All appointments, whether of the preliminary, preclinical, or clinical faculty, are guided by government civil service regulations. Salaries, therefore, are based on the civil service rating held by the individual.

12. Only the school with a university affiliation gives its faculty academic rank. At this university-affiliated school appointments run from instructor to professor. All other schools automatically give the general title instructor to all the faculty.

13. Individuals on the faculty have little opportunity to do anything other than teach. The teaching load of the preliminary and preclinical faculty is demanding. Consequently there is no opportunity to conduct research. The major responsibility of the clinical faculty is to the hospital and patient care. Teaching the A.M.O.'s is on a voluntary basis. Little definitive research is accomplished. One school has a division of research that is part of the government service, and it is not affiliated with the medical school.

14. Principals of the schools exert little control over the faculty. In only one school was it observed that the principal made it a point to exercise some control over what the faculty was doing in the classroom.

15. Because faculty time is taken up with regular teaching duties, few if any of the extra-curricular assignments asssociated with teaching are expected.

7

THE A.M.O. AS PRACTITIONER

THE LEGAL BASIS OF AUXILIARY MEDICAL PRACTICE

The evolution of modern medical care has been accompanied in all countries by the recognition that the place of the medical practitioner in society requires legal definition. As the assistant medical officer (A.M.O.) in the developing countries is the medical practitioner, it is imperative to insure that he is recognized legally as the "people's doctor." There is wide variance in requiring legal registration that is proportional to the length of time that the program of medical education for A.M.O.'s has been in existence. The Fijian A.M.O. is awarded a Diploma of Fiji School of Medicine (D.S.M., Fiji), while in New Guinea no legal recognition is accorded the practitioner. In neither instance, however, can the A.M.O. seek reciprocity with foreign medical registration authorities. On the other hand, British Commonwealth degrees are recognized in most of the countries which formerly were, or still are, British colonies.

One exception to the granting of reciprocity to A.M.O.'s by foreign countries has been made in Australia, where the State of Victoria allows Fijian A.M.O.'s to act as registrars (residents) in hospitals. Many Fijians are receiving postgraduate training while working in Melbourne hospitals as registrars. The distinction between this form of postgraduate training and that of attending a course at, for instance, the London School of Hygiene and Tropical Medicine should be noted. As a registrar, the A.M.O. performs the same duties as those of his Australian M.B., B.S. counterpart, using his clinical judgment as a doctor and making the many decisions necessary in patient care. As he therefore is practicing medicine, his employer, i.e., the hospital, is liable to litigation. The Victorian medical authorities' high opinion of the Fijian A.M.O. is shown in that they are willing to accept this responsibility.

In practice, the A.M.O. is invariably a member of the government

medical services and is classified as a civil servant. He acts as the representative of the director of Medical Services. This means he is legally responsibile for any health laws, rules, or regulations of the central government, unless the same laws exempt him from enforcement duties, either totally or in part. The Fijian system of legislation is unique in that there is a clearly defined separate group, the Department for Fijian Affairs, with the power of promulgating and enforcing legislation for the indigent Fijian population as opposed to the Indian immigrants. This department controls all administration within Fijian villages, including public health. The Fijian Affairs Regulations (1948) contain 19 of 201 pages which are directly connected with health. The pertinent sections are entitled "Registration of Births and Deaths," "Fijian Public Health," "Yaws," "Ringworm." Appropriate excerpts from these regulations are quoted in Appendix M.

Usually the A.M.O. is responsible for reporting infectious diseases while vital registration is dealt with by a separate registrar. The A.M.O. is responsible only for reporting deaths where he has been in attendance. This, of course, is the customary practice throughout the world. It is significant in Fiji that the central government has appointed the A.M.O. as its official representative in enforcing laws of environmental health. In most of the other countries visited, this is part of the local authority regulations.

The role of the A.M.O. differs with the structure of the medical department in which he serves. In general, where the director of Medical Services is a physician, which is normal, positions of most reponsibility are filled by other physicians. The A.M.O. thus acts either as an assistant to a qualified physician or as a completely independent practitioner subject to minimal supervision. An understanding of the differences in these two positions is basic to the intelligent use of the A.M.O. In Viti Levu, the main island of Fiji, reasonably adequate supervision is possible and specialist advice is readily available. Here the A.M.O. may be looked upon as a triage officer, treating most of the patients he sees and referring a minority to specialists. On the outer islands the A.M.O. of necessity is forced to use his clinical acumen much more fully, as the only method of obtaining specialist advice is by subjecting the patient to an arduous sea voyage, often in a canoe, or, in an emergency, he may use the excellent transportation services of the few remaining flying boats of the Royal New Zealand Air Force. Therefore it is impossible to define the legal limitations of clinical practice for the A.M.O. The

hospital A.M.O. is under constant supervision. It is unfortunate that the curse or blessing of specialization draws the best A.M.O.'s into hospital service, while those of lesser merit are farmed out to vegetate on the outer islands of Fiji or in the bush of Kenya or Tanganyika.

The factors precipitating the training and use of A.M.O.'s contribute to his legal status in society. The A.M.O. in Tanganyika, spawned by the British Groundnuts Scheme, came into being under a set of circumstances which are entirely different from those of the Fijian A.M.O., who was originally a public vaccinator. The Fijian from the beginning had a definite legal obligation to fulfill, whereas the A.M.O.'s in Tanganyika were merely members of the health team necessary to care for the laborers employed in an agricultural project. The structure of legal enforcement in Tanganyika is developing correspondingly along the more usual lines of Western public health with the use of sanitary inspectors. In Fiji, the A.M.O. is directly responsible for environmental health in Fijian villages, although Indian sanitary inspectors are used in local authority programs.

The requirement of the A.M.O. to report his activities to the central health department is almost universal. This not only allows his superior to determine what work he is doing, but also insures that he reports morbidity patterns as they occur in his district. In the same way, his regular requisition orders for supplies may be used to indicate how he is conducting his practice and whether he is using excessive amounts of supplies. As in any other government service, it is not unknown for the A.M.O. to sell supplies in order to procure a financial supplement to his usually inadequate salary. In fact, the selling of government supplies figured among the few reasons for discharging A.M.O.'s. Disciplinary action is not common and dismissal from the service is usually only resorted to after all other methods have been tried. When action is necessary, it is usually a combination of ethical and mundane reasons which precipitate it. The whole question of salary supplements is a vexing one, as the A.M.O., unless closely supervised, has many opportunities for selling his services or supplies to the local population. As a government civil servant, the A.M.O. must limit his practice to patients seen within that service, and, on paper, is not allowed to accept payment for outside services of any type.

It is not usual for written legislation to be enacted limiting the practice of the A.M.O. In one country he can do anything he likes except sue for fees. As it is undesirable to allow the A.M.O. complete

freedom of practice it is imperative that methods of control be introduced in other ways. The easiest method is to withhold certain equipment and drugs. For instance, it is customary to confine the use of obstetrical forceps to centers where persons competent to use them are available. This does not mean that the wielder of the forceps may not be an A.M.O., but it does mean that he has been trained in obstetrics. His colleagues in the field, with less training, have been alerted to the necessity of referring patients immediately upon recognition of the difficulties being encountered in labor.

It would seem that the prime factor in the training of the A.M.O. is to arouse in him the knowledge of his limitations. This cannot be done by legislation. There are naturally some circumstances in which he must act with uncertainty, sometimes from lack of experience and sometimes from inadequate knowledge. By inculcating general principles of medicine, surgery, and obstetrics into him he at least can be made to act with less brashness than his fellow who has been trained only in the recognition of specific local disease entities. In obstetrics, for example, a postpartum hemorrhage accompanied by a retained placenta must be dealt with at once. The degree medical graduate in other countries would usually hesitate to interfere unless the patient were in a hospital with full supportive measures available. In the developing countries this emergency is not confined only to treatment by the A.M.O. The nurse-midwife performs the necessary maneuver, in most instances, successfully. In this and many other emergencies the patient cannot be transported across a mountain range or along mud tracks to the nearest medical center. The A.M.O., therefore, must be trained to act and to act intelligently.

The arbitrary methods of devising ways to limit practice must vary with the capability and training of the individual A.M.O. Legislation may be used indirectly to introduce limiting factors, and, as noted, this is done by requiring that A.M.O.'s report their drug inventory at regular intervals. This permits the central authority to forbid the prescription of certain drugs that may be used incorrectly by the A.M.O. An example is the central government's formulation of the policy concerning the obtaining of contraceptive supplies from the A.M.O. In one country, it is the government's intention not to initiate clinics for birth control advice. In another this is a progressive part of the health services, and clinics are advertised in the local newspapers.

Historically, the formation of a guild or trade union has accom-

panied the expansion of every profession or trade, including medicine. This is occurring in all the countries visited which are developing ethical professional organizations for A.M.O.'s. The assistant medical officers' associations are becoming increasingly important in determining the policies of government in its dealings with the working conditions of the A.M.O. In the more fully developed programs of Fiji and Kenya, for instance, there is an Assistant Medical Officers' Association, while in Papua—New Guinea, and Tanganyika, the formation of an organization is being considered. Ethiopia, so far, does not have any nucleus of A.M.O.'s who are desirous of forming a professional organization. The advantages of a representative group are too obvious to mention. One fear that was voiced by an A.M.O. is that the professional organization might be used by one or two unscrupulous A.M.O.'s desirous of obtaining power. However, the A.M.O.'s are aware of this possible trend and are guarding against it by demanding a strong central committee that maintains an independent and non-political organization. One area in which it is almost certain that the A.M.O.'s associations will be active is in determining the response of the government to the requests of A.M.O.'s to indulge in private practice. This transition from government service to private practice is an inevitable development of the A.M.O.'s practice and should be met realistically by the authorities. It is not reasonable for the government to increase the training and competency of the A.M.O. without allowing him to increase his field of practice, particularly when this is demanded by the emerging elite of a country. In addition to the local A.M.O.'s organizations it is customary for the British Medical Association to extend associate membership to A.M.O.'s in countries that have connections with the British Commonwealth. This is readily welcomed and accepted in Fiji, but in the newly independent countries the British Medical Association is classified as a foreign association with no close relationship to the country.

The A.M.O. is looked upon by the people among whom he practices as their doctor. As a government civil servant, registration is unnecessary, although for the prestige of the A.M.O., it is desirable for him to possess a diploma or degree. Unfortunately, the A.M.O. is often the local enforcing officer for health regulations. It is very difficult for him to reconcile his position as a friend and adviser of the people with that of a policeman. Limitation of the duties of the A.M.O. is a legal impossibility, but indirect methods may be employed by the central government to insure that the A.M.O. does

not exceed his capabilities. Finally, the formation of A.M.O.'s professional organizations is leading to a struggle for recognition in most of the countries visited.

TERMS OF EMPLOYMENT

It is axiomatic to say that an individual works best when satisfied with his working conditions. In modern society, these conditions hinge upon the salary paid to the individual. In the developing countries, the A.M.O. is usually among the better-paid members of society, although he is paid as a civil servant on a scale delineated by the central government. In countries in which most individuals still are reliant upon subsistence agriculture for existence, the civil servant becomes a member of a privileged group.

In the countries visited, reasonable salaries are being paid to A.M.O.'s. These salaries sometimes are supplemented by benefits in kind, particularly in the provision of housing. Ordinarily, a native type of house, i.e., a house built of local materials such as wood, mud, and reeds, is considered to be part of the A.M.O.'s benefits without extra payment. In the more developed A.M.O. programs, there is a definite trend towards improving the housing facilities available to A.M.O.'s. The building of a house of brick or stone, or other desirable local material, is usually begun concurrently with the building of a new health center. In Fiji, these houses consist of a large living-dining room, two bedrooms, a third room that may be used as a study or bedroom, a kitchen, laundry, and a separate room for servants' quarters. The construction material used is cinder block. Obviously, an A.M.O. receiving a house like this will be charged rent or allowed a loan that will be repaid from his salary. It is certain, however, that A.M.O.'s will prefer to do this rather than exist in a native hut that consists of a mud floor with matting and usually no partitions dividing the eating, sleeping, and living quarters.

A particular hazard of housing in primitive areas is the cooking of food within the main structure. Consequently, fires are extremely common and also accidental burns of children and old people. Villagers are therefore encouraged to build separate kitchens and, in some places, this is a legal requirement. Apart from accidental hazards, the smoke-filled dwelling contributes to conjunctival irritation, thereby precipitating eye diseases that are already prevalent in the area, e.g., trachoma. The provision of improved housing for A.M.O.'s demonstrates the desirability of a better environment and is thus an indirect method of health education.

The question of housing is only one of the many areas in which

the benefits of the A.M.O. must be considered. To begin with, it is illegal for the A.M.O. to receive income from sources other than the government. On occasion the A.M.O. may be attached to a mission or industrial organization and his salary will be paid by that organization. Generally, the A.M.O.'s total salary comes from the central government. In imitation of Western administration, there is a distinct move in most of the countries visited to encourage participation of local government in the payment of the A.M.O. This is particularly true in Kenya where local government has reached a well-developed stage of organization. Money available for payment of individuals performing services in local government structure is scant.

Although the A.M.O. receives a reasonable salary, it is natural for him to wish to increase the amount of money received by indulging in private practice or by some other method. Many of the A.M.O.'s have talents that allow them to increase their income. Although on paper this is prohibited, there is nothing that can be done about an A.M.O. who uses his wife's name for a small business. This type of evasion of government regulations is usually looked upon with some complacency by the central government. Disciplinary measures are required, however, and vigorous action ensues when the A.M.O. tries to supplement his salary by deliberately using fraudulent methods. One European medical officer estimated that about two-thirds of the A.M.O.'s in his district were using government drugs in semiprivate practice. This is comparatively easy to do although a drug inventory is required. With adequate supervision this undesirable method of obtaining extra money can be circumvented. In the already under-staffed medical services, complete supervision of A.M.O.'s is impossible. One result is that the A.M.O. in remote areas may resort to primitive methods of practicing medical care—using his medical knowledge and supplies for personal gain by catering to the superstitious beliefs of his fellows.

In the medical services seen, patients were charged for both in-patient and out-patient care. The out-patient fee charged is always nominal, but most patients are unable to pay even the small amount requested. The European medical officers do not think the A.M.O. is diverting these fees to his own pocket, partly because he is required to give a receipt to every individual seen in the dispensary or clinic. Government employees are exempt from payment. It also is customary to charge for in-patient services, although again the amount of money that may be obtained from individual patients is

usually small. When a patient cannot pay the A.M.O. must report this in his returns to the central authority. In one country this necessitated a considerable amount of paper work whereas in another it was looked upon as being of minimum importance. It is debatable whether the time spent in fee collecting and reporting is justified by the small revenue obtained. The Western notion that "charity" is unacceptable to most individuals is not applicable in the developing countries, and it is questionable whether this subjective viewpoint should be introduced as a desirable component of ethical values.

It can be seen that the governments are cognizant of the welfare of their medical personnel. The provision of housing is part of the fringe-benefit program for the A.M.O. In most countries there are sick-pay benefits and a retirement scheme from a contributory pension program. Vacation pay is generally part of the personnel policy. In some instances this is extremely liberal. In the oldest program, that in Fiji, the A.M.O. receives ten days of paid local vacation annually, and every three years he is allowed four and one-half months' paid leave in Australia or New Zealand. After ten years of service, one leave is allowed in the United Kingdom on which the A.M.O. may be accompanied by a wife and child. Other benefits such as car allowances generally are not applicable. The A.M.O. on tour conducts his journeys either on foot or horseback. Uniforms are not looked upon as the responsibility of the government and the A.M.O. pays for his own uniform except when serving in a hospital where jackets and laundry facilities are made available. Usually, when on official tour or safari, the A.M.O. is allowed a subsistence benefit if he is away from home.

It is interesting that no malpractice suit has been brought against an A.M.O. in any of the countries visited. Undoubtedly this will occur and it will be well in any new A.M.O. program to devise methods to deal with this eventuality. In the developing countries it is unlikely that litigation will be entered into while the population is continuing at a subsistence agricultural level. None of the officials questioned could answer the query of how a malpractice suit would be met by the government. The general idea was that the A.M.O., as a government employee, cannot be sued without the government's consent.

Promotion was a possibility in all the programs seen and was based upon units of time served. Accelerated promotion and retardation were considered definitely to be within the bounds of the decision of

the director of Medical Services. It must be remembered that in some countries A.M.O.'s sometimes are recruited from lower orders of medical personnel, particularly from what is known in the English-speaking countries as the male nurse. This is unavoidable in schemes for medical care in developing countries. In these instances promotion is based upon the assessment of the individual's ability to benefit from further education. This may be undesirable as it means that persons with a modest basic education may ultimately be working side by side with those of more education. Still, the need for trained medical personnel is so great that the practical aspects far outweigh the theoretical.

DUTIES

As previously stated, the duties of the A.M.O. are not limited by law but by indirect methods. The actual hours of duty are designated in government regulations, but these cannot be looked upon as binding, as the A.M.O. must work beyond these hours upon many occasions. The usual working week consists of eight hours a day Monday through Friday, one-half day Saturday, and the rest of the weekend as time off. As a professional worker, the A.M.O. naturally is led to understand that he must be on call at all times and must not consider himself the equivalent of a clerical worker in an office.

Many of the A.M.O.'s are disturbed by the amount of paper work that occupies their time. In some health centers clerks are being used to allow the A.M.O. more time to devote to his practice. Despite this, the A.M.O. spends a considerable amount of time in administrative duties. The authorities everywhere realize that the A.M.O.'s time should be used to its fullest extent in his professional work, and they are attempting to rectify current procedures to allow this.

It is universal for an A.M.O. to have under him one or more servants responsible for maintaining the cleanliness of the health center and its environment. In some rural hospitals, the A.M.O. is supposed to see that local produce is grown in the land surrounding the hospital for the use of the patients. However, in one country this is thought to be an uneconomical way of feeding the patients and the distribution of food from a central area is being instituted. The A.M.O. is encouraged to have a small garden for his own use and this generally is accepted by the A.M.O.'s as the most economical and easiest way to obtain their personal food. This also reflects the closeness of the population to a subsistence type of agriculture.

The A.M.O. is encouraged everywhere to indulge in postgraduate

study, but the actual time and resources available are limited except on paper. It is practically unknown for A.M.O.'s to have postgraduate instruction unless they are called in to serve as registrars in hospitals where European specialists work. Attempts have been made to establish a program of continuing instruction by means of radio; this means that the A.M.O. must have a good radio receiver, bought and maintained at his own expense. Although the transistor radio is as common a sight in many of the developing countries as it is in the United States or Europe, most of the sets have a limited range of reception, particularly where mountains intervene between the transmitting and receiving sets. The use of a postgraduate medical seminar also has been initiated in Fiji but this is limited to ten A.M.O.'s a year, i.e., two from each district and two from the central office.

Unless postgraduate instruction is pushed, there is a tremendous possibility that the rural A.M.O. may revert to the superstitious practices pertaining in his district. This was particularly evident in one country in which the native population has emerged from a Stone Age civilization within the past thirty years. The status of the A.M.O., possibly already great before he is brought into the training school, is enhanced by his return with more powers of modern medicine and "magic" at his disposal. Once again, the absolute necessity of adequate supervision is evident, coupled with the difficulty in under-staffed medical services of providing it.

A great deal of emphasis is placed upon practicing preventive medicine and public health in the training of the A.M.O. Although in some schools this appeared to consist of stylized lectures in public health, in one country a Department of Preventive Medicine, endowed by the Nuffield Foundation, has organized comprehensive courses in preventive medicine. These courses are built around the standard methods of lecture and discussion but also include a full environmental health survey of villages. This survey, although intended primarily for A.M.O.'s, is also used to train health inspectors. A six-months' postgraduate course in public health and preventive medicine is part of the teaching program in Fiji, selected A.M.O.'s being called in to attend the course. Some criticism has been voiced because generally the recently graduated A.M.O.'s are being nominated for this course. These A.M.O.'s ultimately become clinicians in the central hospital. However, this well-based criticism has been brought to the attention of the authorities and is being corrected; the course is now aimed at the rural A.M.O.

The application of public health and preventive medicine in his

daily routine work is the duty of the A.M.O. on tour or safari, where it is recommended that he be accompanied by a sanitarian and nurse. In one country the A.M.O. is required to spend at least two days a week in the field and a similar plan prevails in other countries. When the A.M.O. and his team enter the village, the A.M.O. is supposed to deal rapidly with the few sick people who require attention and then turn his energies to improving the sanitary environment. The nurse in the meantime works principally with women and children in the maternal- and child-health program.

The A.M.O. also is instructed to engage in health education, both in the schools and in sessions with the elders of the village. Unfortunately, because of the vast numbers of sick people in the villages, it is almost impossible for the A.M.O. to do anything more than practice clinical medicine during his visits. Most of the medical officers in the central government realize this and do not attach too much significance to what is written in the instructions to the A.M.O. Some medical officers appear to be convinced that the A.M.O. actually is practicing good preventive medicine and public health in the villages, although the visitor to the village can see plainly that this is not so. Coupled with the necessity of practicing curative medicine goes the lack of power to enforce health regulations. It is comparatively easy to see that government-sponsored campaigns such as yaws control and immunization for tetanus are being managed well but that community environmental health services such as sewage disposal are progressing very slowly.

On the whole, the A.M.O. practices well within his limitations. The type of practice encountered is strikingly similar to that of a general practitioner in any country, and particularly to that in military medicine. The rural dispensary is manned by an A.M.O., a nurse, occasionally a sanitary inspector, and a carrier or other servants to deal with the menial tasks of maintaining cleanliness. It is understood that whenever the A.M.O. is on tour, the nurse will remain at the dispensary and handle any cases that come in. This of course negates the suggested team approach to village health programs.

The rate of hospital referrals varies considerably in different countries, usually approximating one referral per 150 to 200 patients. One European medical officer said he thought referrals were made more often than this. It is unusual for specialists to visit the health centers. Occasionally a consultant may come on tour and patients will be brought together at one point for diagnosis and

treatment. Centralized clinics, *e.g.*, for tuberculosis, are common in some areas, but generally patients are referrred to hospitals and many require admission for treatment. The caliber of medicine practiced varies with the individual, but on the whole it is good.

As already stated, the ability of the A.M.O. in Fiji probably is better than anywhere else because of the length of the program in that country. The Fijian registrars are looked upon as the equivalent of European registrars by the European consultants in the central hospital. The superintendent of the central hospital in Fiji remarked that the Fijian registrar specialist is completely competent to deal with any of the conditions met in every-day practice. At the time of visiting the central hospital, the laboratory was in charge of an A.M.O. as the pathologist was on leave. This was also true of the radiological department. The Tamavua Tuberculosis Hospital, which is close to the Fijian medical school and contains some 350 beds, was being supervised by an A.M.O. when visited. The caliber of care appeared to be excellent. It was particularly noticeable that the bugbear of hospitals in many parts of the world, i.e., the transmission of information to practitioners when the patient is discharged from the hospital, was being met very realistically.

Apart from postgraduate instruction received locally in tuberculosis, some of the A.M.O.'s working in the hospital had been sent to London for postgraduate training in radiology. The superintendent of the central hospital said his regard for the A.M.O.'s in Fiji had increased immeasurably since he came to the islands some years ago. He stated that he deferred to the judgments of the A.M.O.'s in their specialties and considered they knew far more about their particular fields of work than he did. The superintendent is a physician with a higher qualification in medicine and a leprologist of international reputation.

At the other extreme, a rural A.M.O. often is allowed to regress in the more primitive surroundings of the native villages. Occasionally it may be necessary to place an A.M.O. in a locality where he offsets the influence of a witch doctor or medicine man which persists in many parts of the bush. The practice of magic is by no means defunct in many parts of the world, and it is hard to see how an indifferent A.M.O. can combat this well-established menace to health services. It was pointed out on several occasions that the way to sell health services to primitive people is to concentrate upon the curative services first and then to attempt to apply preventive measures. In some countries the use of the yaws campaign to

establish health services was proven, the hypodermic needle being associated with more potent magic than that available locally. The A.M.O. cannot possibly deal unaided with magic, and all the local authorities must help in the battle. Ideally, use is made of the local witch doctor, but this requires considerable patience, tact, and local knowledge.

Even when the overt magic has been overcome, it often is evident that the superstitious beliefs of the people may inhibit their acceptance of so-called Western medicine. This applies particularly to those sanitary practices that are foreign to the primitive inhabitants. In some parts of the world, for instance, it is considered dirty for all members of one family to defecate in one privy, the mixing of the excreta being looked upon as offensive and, in some instances, dangerous to the well-being of the individual members of the clan.

It is impossible to review the whole aspect of culture and disease in this report. Appendix N contains some examples. One other factor is worth mentioning. In New Guinea, tuberculosis was unknown in the highlands until a few years ago. At that time, with the development of roads and other methods of transportation, particularly flying, many males from the highlands were lured to the coast to work for the trading companies in the lowland area. This migrant labor movement was boosted by the taboo forbidding the New Guinea female to indulge in sexual intercourse while lactating. As the baby is breast fed for up to two years, the male migrates during this time. The introduction of tuberculosis in the coastal areas occurred before trade relationships had been established with the highlands, and the highlands remained free of tuberculosis until the migrant laborers returned from the coast. The New Guinea authorities are attempting to screen all migrants before they move from the highlands to the coast and again on their way home. This is impossible because of the devious routes by which they may move, but a reasonable percentage is being examined with chest X-rays and tuberculin tests. B.C.G. vaccination is being used extensively in those with negative tests or X-rays.

This is just one of the many facets of medical care in the developing countries. Although a native of the country, the A.M.O. is often unaware of local peculiarities and superstitions and therefore cannot practice medicine to the best of his ability. The constant change of location of the A.M.O. also contributes to this lack of understanding of local customs. It is not uncommon for an A.M.O.

to be sent to a different location after a long leave, and this means he may not spend more than three to four years in any one place. Differences in national customs, and also customs among the same people who have been isolated for years by mountain ranges or other physical barriers, are not conducive to allowing the A.M.O. to practice good medicine.

One of the areas in which it is very difficult for the A.M.O. to gain the confidence of the indigent population is in obstetrics. It is usual for most of the obstetrics to be handled by a nurse-midwife. Ostensibly, the A.M.O. is well trained in obstetrics and can deal with any complications of labor that the midwife may refer to him. In actual fact, the A.M.O. often does not have the opportunity to practice obstetrics routinely and his skill diminishes with time. In a rural hospital the A.M.O. usually is delivering patients and can become well-versed in obstetrics. In a dispensary the A.M.O. does not deal with many obstetrical cases and must rely upon the nurse-midwife to recognize and refer emergencies to the nearest rural hospital. On the whole, the nurse-midwife can deal very well with most obstetrical conditions and her work has contributed greatly to the lowering of maternal and infant mortality rates. The practice of setting up maternal and child-health clinics in areas where the nurse-midwife is touring has produced extremely beneficial results. Often the nurse-midwives are unaccompanied by an A.M.O. They do not, therefore, work as a team but as individual members in one particular field of medical care. Their duties include administering immunizations and antimalarial drugs. Both these measures have helped to lower the infant mortality rates.

In another area of health care, the A.M.O. is forced to practice dentistry although he limits his dental work to that of extracting teeth. The training of assistant dental officers (A.D.O.'s) is proceeding in most countries and these individuals work in the same capacity as a graduate dentist in other parts of the world. The A.D.O.'s are mostly located in hospitals, although they tour whenever possible. The emphasis of the program is upon maintenance of dental health in school children.

The A.M.O. practices the same type of medicine as a general practitioner in other countries. His practice is confined by the facilities available to him, and in most instances these are intentionally limited by the central authorities. Within his capabilities, he practices good general medicine. Ultimately, the position of the

A.M.O. in the medical services within the governmental and political structure of each country in which he works must be determined.

EQUIPMENT AND FACILITIES

It is somewhat unfortunate that the developing pattern of medical care in the emerging countries is fashioned upon that of Western society. There are indications that some countries, particularly in Africa, are beginning to look at their programs with the intention of devising completely different methods of medical care. These will be based upon a dispensary or aid post, which refers patients to small rural hospitals. These then send those patients who require further specialist care to central hospitals. This pattern of referral necessitates a well-organized tranportation service.

The provision of transportation for patients in isolated areas has been met in several ways. Where roads exist they are used, although at certain times of the year they are reduced to seas of mud which are completely impassable. Methods of transportation must vary with the geographical factors of the country. In Fiji, the necessity of transportation by sea has resulted in the formation of an air-sea service. In non-acute cases, the patient is transported by the family or friends in an open boat, sometimes for considerable distances. Accommodation for the patient and his relatives or friends is available in the homes of the Fijian families scattered throughout the islands, and almost every Fijian has someone who will provide accommodation near the central hospital town of Suva on the main island of Viti Levu. A specialist consultation in Fiji must be looked upon as occupying some one to three months of the patient's time, varying with his distance from the central hospital.

Emergencies in Fiji are transported by the flying boats of the Royal New Zealand Air Force. It is of considerable concern to the Fijian authorities that these flying boats are rapidly approaching obsolescence and are to be withdrawn from service in a few years' time. There is apparently no move to build further flying boats and some members of the New Zealand Parliament have asked that special construction of flying boats for the Fiji service should begin. As this is improbable, emergencies will be transported by means of land-based aircraft, most probably by small planes that can land on local air strips rather than helicopters. A similar situation is being met in New Guinea by the use of charter planes, but even with this

service, flying conditions can become so hazardous that planes cannot always land or take off when required. It would seem that the consideration of methods of transportation is basic to the formation of an A.M.O. program or, for that matter, any medical care program in the developing countries.

The health centers visited varied from small mud and thatch huts to modern brick buildings. It was again evident that the length of the service had something to do with the type of construction used, the countries with older services having health centers built with better materials. In one recently developed country, however, modern cinder-block buildings have been constructed in the teaching health centers and are obviously well-made buildings.

There was some variation noted in the way in which the surrounding areas were kept in the several countries. In one, cleanliness was the rule and all villages seen were in spotless condition. This included the insides of the houses, where the mud floors were covered with matting. This was also true to a lesser extent in the other countries visited, with the exception of one country where weeds had been allowed to become numerous in the courts formed by the buildings of the health centers. On the other hand, this was the only country in which screening had been included in the health center construction. This was of no great use as the patients and even medical personnel are in the habit of not closing doors to the buildings when they enter. This is understandable as their native huts are built without doors.

The interior of the health centers or aid posts varied from country to country. In one country, for instance, the hut constructed of native materials contained very primitive furniture that stood on a mud floor. The medical equipment was modern, and it was evident that the authorities had every intention of sending the best materials available for the use of the A.M.O. Most of the drugs were in the form of mixtures, the individual bottle of medicine for the patient being diluted from a stock mixture that was kept in the dispensary. The "bottle of medicine" was used extensively, and it was no easy task to maintain a sufficient number of bottles for the patients. It would be more practical to use drugs in the form of tablets or capsules whenever possible. It was noticeable that the mixtures and minor drugs used were largely those which would be seen in a British Army Medical Inspection Room. In addition to the standard mixtures and drugs for local application, penicillin, chloroquine, and

sulphaguanidine were in plentiful supply for treating the infectious diseases that largely constituted the total number of illnesses seen. There was apparently no difficulty in the A.M.O.'s obtaining whatever drugs or equipment were needed, unless the requests were obviously excessive or unusual. On the whole, the dispensaries or aid posts were well equipped for the work that had been designated as their responsibility, i.e., the treatment of out-patients. Some centers had four or five "holding beds," but no patients were kept in the dispensaries for more than a few days.

Most dispensaries did not contain any laboratory facilities. Apart from the inability of the A.M.O. to perform most laboratory tests, his method of practice is in the tradition of European medicine in which the senses are used to arrive at a diagnosis to be confirmed or refuted by means of the laboratory. This also applied to a lesser extent to the rural hospitals, although in one country an auxiliary worker known as a microscopist is being trained and sent to rural hospitals. This individual is capable of doing routine urine and blood tests, including those necessary for the diagnosis of many parasitic diseases. X-ray equipment was universally not allowed in small dispensaries or aid posts and, in fact, usually was confined to the central hospitals. In some places it was customary for rural hospitals to include dispensaries in their organizations. Dispensary duties unfortunately occupy a considerable part of the A.M.O.'s time in these establishments. In these rural hospitals there are also facilities available for delivery and postnatal care.

It was unusual to see any facilities for practicing obstetrics in the dispensaries or aid posts. The majority of deliveries in primitive areas still take place in the home of the pregnant woman, and very often no skilled attendant is present at the birth. The nurse-midwives are performing heroic deeds in bringing pregnant women to health centers for antenatal care, although, as in many parts of the world, the postnatal follow-up is neglected by the patient. In addition, the midwife attempts to get out into the villages and deliver women in the home where this is possible. In some countries, the nurse-midwives have reduced maternal and infant mortality by these methods to an unbelievable low considering the conditions in which they work. The prenatal clinics sometimes reach an enormous size, one in Africa dealing with up to 150 women at the weekly clinic. The place of a nurse-midwife in the obstetrical services is an absolute necessity.

It must be emphasized in this context that the nurse-midwife is a well-trained individual and not the type of "granny" midwife usually met in the United States. The nurse-midwife training programs encountered during the trip were comprehensive and well taught. Historically, it is worth noting that the intrusion of the doctor into midwifery has occurred only in the past two hundred years. European countries still rely heavily upon midwives for maternal care. It is therefore natural to expect midwifery in the developing countries to be dealt with by the skilled nurse-midwife. Inasmuch as she is a part of the health team, she cannot be ignored in any study of the A.M.O. In many instances, she performs the routine obstetrical work that is encountered in rural practice and often is more competent than the A.M.O. in this field. Some variation was noted in the obstetrical knowledge of the A.M.O.'s in the countries visited, ranging from obviously competent A.M.O.'s in rural hospitals to those in the dispensaries or aid posts who had never used, and therefore had forgotten, most of their obstetrical training. It should be noted that the nurse-midwife not only confines her services to the pre-natal care and delivery of the patient but also to the postnatal care of the mother and the health of the infant child. Some A.M.O.'s signified that the role of the European health sister in this organization is somewhat difficult to define.

Until the training programs of developing countries can be completely supervised by indigent teachers, some of the teaching must obviously be done by expatriate individuals. It often is very difficult for the European or American worker to bring his or her ideals of medical care down to those which are practical for an area with a more primitive type of existence. It is somewhat pointless, for instance, to teach routine public health nursing methods to nurses when they cannot possibly practice them because of lack of water. The routine of hand-washing during patient examination is desirable, but where the amount of water obtainable locally is small, the public health nurse will not endear herself to her patient by using it liberally for hand-washing purposes. Another example of misguided zeal was the construction of two palatial cinder-block privies that were to be used as models for the local population. As most of the indigents could not possibly obtain even one cinder block this was completely unrealistic. It must be stressed again that the application of methods of Western medical care to the developing countries cannot be realized from the beginning. The phrase "adapt not adopt"

has been used in conjunction with the programs of medical care in developing countries, but perhaps a more realistic slogan would be "creation not imitation."

RELATIONSHIP TO THE DEGREE MEDICAL PRACTITIONER

As stated, the A.M.O. practices the same type of medicine as does the general practitioner in Europe or the United States. Consequently, he must enter into a relationship with the degree physician, either in a hospital or in private practice. The relationship with the hospital physician was uniformly good. The only complaint of the A.M.O. was not having the opportunity to discuss his patients with the consultant as often as he wished.

Private practitioners of medicine are few in number in the countries visited. A distinction must be made between the physicians who indulge in private practice for personal gain and those who practice as representatives of churches in missions. The mission doctors on the whole accepted the A.M.O. as a vital part of the country's health services. In some places the mission hospitals act as training centers for nurse-midwives and assist in the training of the A.M.O. There is always the possibility that some resentment may be engendered by appointing an A.M.O. as the district medical officer for an area in which mission doctors are practicing. This was evident in one place where the position of an A.M.O. as district medical officer was causing some ill feeling between him and the degree mission physicians in his district. In theory this A.M.O. was the superior officer of the district consultants, and this naturally was producing some adverse criticism, not only locally but in an adjoining country with a well-established medical program of the traditional European type. This is just one of the many facets of the changing role of the A.M.O. as he develops into a full medical practitioner.

It is not improbable that the A.M.O., in time, will become the professional equivalent of the degree physician in many of the developing countries, at least in the eyes of the government. This will be accomplished by granting the same license to all practitioners of medicine, whether they have a degree from an American or European university, a local university, or are graduates of an A.M.O. school. The establishment of this type of system is being considered in parts of Africa.

Unquestionably, there must be some method whereby the A.M.O. can improve his status as a medical practitioner. It is unrealistic to regard the A.M.O. as an inferior type of practitioner

when his training has reached the equivalent of a degree physician. This already has happened in Fiji, and the Medical Department there is aware of the fact. Obviously, upgrading cannot be applied to all A.M.O.'s, individual variation in competency occurring as in any other profession. It is true that the British system evolved in this way with the degree of the Society of Apothecaries, the conjoint degree of the Royal Colleges, and the university degrees being accepted by the General Medical Council as equivalents. Undoubtedly, it is possible that the paternalistic governments of developing countries can accomplish this. In doing so it may be necessary to abolish private practice as understood in the Western world.

On the whole, the reactions of private practitioners to the A.M.O. were not too unfavorable. The practicing physicians in the countries visited are concentrated in the main centers of urbanization, where they practice principally within the European population. Any encroachment of the A.M.O. upon this practice is unlikely. In one country, patients referred to the central hospital are dealt with by specialist A.M.O.'s, although the private practitioners do not consult directly with the A.M.O. but refer their cases to the European specialists. They realize that the bulk of the diagnosis and care is allocated to the A.M.O. by the European specialists. As already noted, the European consultants are completely confident in the work that the A.M.O. is doing in the hospital services. There was some criticism by general practitioners of the lack of training and experience of the rural A.M.O., and this probably was justified Criticism also was aimed at the lack of basic education of the A.M.O., inasmuch as he was not looked upon as having the humanitarian training necessary for a physician. This point of view is debatable in that the technical training of the A.M.O. in the developing countries appears to be needed more than his education as a well-read citizen.

The private practitioners did not consider that the A.M.O. was assuming, or attempting to assume, the status and privileges of the degree physician in the community. Most of the general practitioners seen thought the A.M.O. would be a valuable assistant in their practice, although they were not sure that this would be true without adequate supervision. There was a difference of opinion among the doctors about the ability of the A.M.O. to benefit from further training, whereby he could obtain a degree in medicine at a university. These opinions were based mostly upon the variation of individual A.M.O.'s to benefit from further training. It was gener-

ally agreed by the doctors that many of the A.M.O.'s could absorb the training necessary to become degree physicians. Some of the doctors thought this the best method of recruiting doctors, rather than importing trained European physicians. Most of the practitioners considered that the A.M.O. must play a necessary part in the developing health services of the country. In the minds of the local doctors, the training of the A.M.O. is probably adequate for the work he is doing. The realization that the A.M.O. ultimately will demand recognition as a medical practitioner was subscribed to in every country visited. The physicians were of the opinion that attempts should not be made to eliminate the A.M.O. from the country's health services, his position varying with his ability to withstand further training.

The A.M.O.'s agreed with the physicians concerning most of the points already stated. The average A.M.O. generally was satisfied with methods of consultation that were established, although in some instances he said he did not receive the necessary information from the consultant when the patient returned to his care in the rural area. He was satisfied with his ethical relationship to the physician and generally accepted the methods of treatment that were advocated by the consultant. This was particularly true in the communicable diseases of leprosy and tuberculosis, where the consultant physician often is responsible legally for the continuation of treatment. In these diseases the A.M.O. is subject to disciplinary action if he does not follow the directions of the consultant. In the other diseases, however, the A.M.O. is allowed to use his discretion in interpreting the consultant's opinion that is transmitted to him by letter. The A.M.O. stated that he would like to work as a full-time assistant to a physician, principally to learn more about medicine but not to act as a permanent assistant. The A.M.O.'s definitely felt the lack of contact with physicians and invariably desired to have more opportunities to discuss cases with consultants. Surprisingy, several A.M.O.'s thought they did not receive the amount of supervision that they should have, not only clinically but also administratively. Although most A.M.O.'s realized they were competent to deal with the matters within their district, they did seem to want a shoulder to lean upon, particularly a doctor with whom they could discuss clinical and administrative matters.

It was interesting to note the difference in the A.M.O.'s desires to continue training toward becoming degree physicians. The older graduates of the schools did not consider that they had the ability to

benefit from further training although this was the sole objective of most of the recently graduated A.M.O.'s. This undoubtedly reflects the improved methods of teaching described in the first part of this report. Naturally, the ability to accomplish the objective of becoming a physician varies with the basic education of the A.M.O.

In Fiji, teachers in the school estimated that at least one-third of each graduating class could pass the final M.B., B.S. degree of the Australian or British universities. This opinion was also voiced to a lesser extent in the other countries. Some doubts were expressed that the basic education of the A.M.O.'s would allow them to benefit from the type of instruction necessary to attain the standards of a British, or local, medical school.

The A.M.O.'s varied in their expressions of satisfaction with the training received in school. Again it was evident that those more recently graduated were more satisfied with their schooling. It was notable that many of them did not think they had received sufficient instruction in public health and preventive medicine. They realized they could not have applied the knowledge gained in their routine work, at least under the conditions of their practice. The A.M.O.'s uniformly were dissatisfied with the opportunities for postgraduate training. They said the only time that they received any instruction after graduation was when transferred to central hospitals where they worked with European consultants. It was not surprising to notice that this criticism was voiced most strongly by those with aspirations towards becoming degree physicians, principally those in the larger health centers and in the less rural areas.

The A.M.O.'s considered that their position and role in the health programs were services that would be needed for many years to come. Some expressed the idea that they might be advanced in their profession and thereby become supervisors of a lower order of A.M.O. with some other name, who would indulge in the type of medicine that they were now practicing in the rural areas. Almost without exception the A.M.O.'s said they had no contact with the schools in which they had been trained, apart from some radio broadcasts, and they were desirous of further contact with their schools. In a few instances, exceptional A.M.O.'s were being used in training programs although this is not publicized as a method of advancement for the A.M.O. The practice of preventive medicine was not popular with A.M.O.'s, and this is almost certainly a result of the emphasis upon clinical medicine that is taught in the training schools. Although on paper the A.M.O. may spend several days a

week in practicing preventive medicine, closer questioning revealed that this was more in word than deed. It must be remembered, however, that the understanding of the term "preventive medicine" varies from country to country, and personal protection from disease by immunization is a large part of the work of many A.M.O.'s. The application of scientific principles to environmental health was singularly lacking in most of the rural areas visited. This is not necessarily the fault of the A.M.O., as in most areas he has very little support for legal enforcement of the existing regulations. Satisfaction was expressed with the type and adequacy of equipment in the dispensaries and rural hospitals, and the A.M.O.'s were well pleased with their ability to obtain equipment and drugs upon request.

RELATIONSHIP TO OTHER HEALTH PERSONNEL

The almost universal use of the A.M.O. as a member, and usually supervisor, of a health team made it necessary to investigate his relationship with other members of his team. Although the principal purpose of this study was not to determine the structure of the health services, this factor cannot reasonably be ignored if the position of the A.M.O. in society is to be delineated. The vast number of health personnel with whom the A.M.O. must work includes not only his fellow workers in the field, *e.g.*, nurses, midwives, sanitarians, but also those in hospitals such as physical therapists, pharmacists, dentists, laboratory technicians, and x-ray technicians. Inasmuch as the A.M.O. usually is responsible for members of only two other health professions, i.e., nursing and sanitation, it was decided that these would be the groups interviewed in the small amount of time available.

The training and competency of the native nurse-midwives encountered in the various countries was impressive. In one country particularly, the scheme for training nurse-midwives was outstanding, possibly because this particular part of the health organization had been developed as a self-contained unit by a competent physician administrator, ably assisted by an English health sister. The training of the nurse-midwives in other countries was acceptable, and the field work was exceptionally good throughout. The use of the nurse-midwife in rural obstetrics is definitely established in most parts of the world, and in the bush the nurse-midwife works without any support from the A.M.O. In the rural hospital she works closely under the supervision of an A.M.O., and it is in these instances that the A.M.O.'s knowledge of obstetrics must be

sufficient to allow him to act as a consultant. As noted previously, either because of lack of training or personal disinclination, only too often the rural A.M.O. is unable to act as a competent consultant to the nurse-midwife. This was particularly noticeable in one African country, where it was openly acknowledged that the A.M.O. was principally a supervisor of the team and not necessarily an obstetrical consultant. It must be understood, however, that in this country a qualified physician could easily be reached for consultation. This was not true in the other countries. The emphasis upon recognition of factors likely to cause abnormal deliveries is therefore repeatedly emphasized in the training of the nurse-midwife.

Acceptance of the nurse-midwife by the indigent women is often slow, and it was noticeable that the maternity wards of the rural hospitals did not contain many patients. This is understandable when the cultural conditions in which the midwife is practicing are considered, particularly in the more remote and primitive areas. It was evident that some degree of acceptance had been reached in many parts of the countries visited. In Africa, for instance, at a rural health center that conducts a maternal clinic once a week, some fifty patients were waiting for examination. The small room where the clinic was being conducted contained a desk, a chair, and a small examination couch. It was not unusual for deliveries to take place during the clinic. On a visit to one of these clinics, one woman had just been delivered of a normal baby and another was in labor and being placed upon the examination table, presumably to be delivered while the clinic was in progress. This naturally disrupted the clinic, but as no beds were available, which is the rule in practically all health centers, nothing further could be done. The newborn baby and mother were transferred to another room as soon as possible so that the clinic could continue. It is not uncommon for one hundred or more patients to be seen in these antenatal clinics.

These patients constitute only a small number of the pregnant women in the areas surrounding the health center. Naturally, those nearest to the health centers come in for advice. Those further away in the bush, unless visited by the nurse-midwife, resort to the time-honored methods of delivery that are found in undeveloped terrain. It is usual to see the A.M.O.'s working in these health centers while the nurse-midwife is conducting the antenatal clinics, as the A.M.O. is fully occupied with handling the day-by-day routine clinical practice.

On the whole, the A.M.O. works closely and reasonably well with

the nurse-midwife. The sanitarian, or sanitary inspector as he is more usually called, may be placed in a somewhat different category. The better sanitary inspectors are trained to the standards of the Royal Society of Health, England, or the American University of Beirut, Lebanon, and these individuals usually work in or around the more populated areas. Once more, it is unrealistic to look for complete and adequate supervision of the sanitary inspector by the A.M.O. The A.M.O. has not received the necessary training to understand completely the work of the sanitary inspector and, because of the lack of an advisor in sanitation, very often cannot deal with matters that may arise during attempts to improve environmental health in the communities. The general impression of the work of the sanitarian was that a great deal of time was being spent in what may be termed "health education" but that there was practically no real ability to enforce existing regulations. In some instances, local customs or religious beliefs were used to circumvent the programs initiated by the sanitary inspectors. In others, he, as a member of the indigent group, was not in complete accord with the principles he was to expound.

In rural areas the A.M.O. works with only the nurse-midwife and sanitary inspector. Apart from Kenya, where microscopists are used in the rural hospitals, other medical auxiliaries are few outside the larger central hospitals that are usually under the direction of expatriate medical officers. As already stated, the use of laboratory methods in diagnosis of patients in the bush is exceptional. This is partly because the clinical teaching is based upon the traditional British and European method of using fewer laboratory techniques than in North America. In a way this is beneficial as laboratory facilities cannot be supplied to A.M.O.'s in the field. This does not mean that the A.M.O. is not capable of doing simple routine tests, many of which are learned in the training school. Lack of application, however, soon renders their usage negligible.

Conversation with nurse-midwives and sanitary inspectors revealed that on the whole they were satisfied with their relationships with the A.M.O. Some midwives did not consider that the A.M.O. had sufficient experience in obstetrics to be of any real use in emergencies. This was not true for all A.M.O.'s and in all countries. It seems that where an A.M.O. is interested in obstetrics he is able to increase his knowledge by serving as a registrar in the central hospital and concentrating on the study of obstetrics. The sanitary inspectors were somewhat distant about their relationships with the

A.M.O. Some of them seem to consider themselves on a par with the A.M.O. as a leader in the scientific field in their communities and countries. This was particularly noticeable in Fiji, where, because of ethnic variation, there was very little co-operation between the Fijian A.M.O. and the Indian sanitary inspector. It should be remembered that many of the sanitary inspectors have received diplomas from the appropriate organizations in Lebanon, Australia, New Zealand, or Britain. They are thus experts in their field and, as such, can be considered as scientific leaders. It was exceptional to be told by any auxiliary that the A.M.O. did not have a place for many years to come in the developing health services of his country.

The relationship of the A.M.O. with other medical auxiliaries was generally good. However, there were some misgivings on the part of other auxiliaries that the training and experience of the A.M.O., particularly in obstetrics and environmental health, was not such that he could be useful as a consultant. The position of the A.M.O. as the titular head of the health team may be in some jeopardy, as he does not enjoy the complete confidence of the other members of the team.

THE TRANSITION OF THE A.M.O. TO PHYSICIAN

It can be realized now that one of the most difficult questions to be answered in the developing countries is how to maintain the health services that are currently based upon the A.M.O. while at the same time encouraging him to occupy the place of a degree physician. It is inevitable that this condition will have to be met by all developing countries. In Fiji approximately seventy-five years have elapsed since the formation of the school. Only during the past ten years has any real change taken place in the status of the A.M.O. It is unlikely that the other countries, faced with the speed of modern technology, will wait seventy-five years before deciding what is to be done with the A.M.O. as he approaches the knowledge, experience, and status of a degree physician.

There are several factors to consider in deciding which way the government services will move. It is certain that an elite will emerge in all the developing countries, whether it be in government, industry, the professions, or all these sectors of society. This elite will require and obtain the best medical services available. In turn, it is possible that these services will not be maintained solely by government, thereby opening the door to the private practice of medicine. At the moment, private practice is restricted to expatriate

doctors in those countries where the colonial structure still exists. In many places, a small amount of private practice is present, but most of the consultants still come from other countries. The crucial question is whether the A.M.O. type of physician, with less basic education and a more practical medical education, can be looked upon as fulfilling the needs for medical care of the developing elite. In Fiji it would appear that this is so. It must be remembered that the basic education of the Fijian is comparable to the education of a high school graduate in the United States. He is therefore able to benefit from the most progressive medical teaching.

One suggestion is that the private practice of medicine should be abolished completely within the country. This is distinctly possible under the paternalistic regime that is necessary to allow full technological development in the emerging countries and may be one solution to the dilemma. Should this be so, it is likely that a schism may develop between the "degree" physicians of the West and the "licensed" physicians of the developing countries. There will also be some resentment of a system of this type within the medical services of the country. The degree physician, who has worked for his degree in a full medical school, usually outside his country, may regard the locally trained A.M.O. physician as an inferior practitioner. Although this was denied in one African country, its neighbor was less optimistic.

As already mentioned, the historical evolution of medical practice in Britain has allowed three types of physicians to become licensed by the General Medical Council. Even in Britain there is sometimes a feeling among medical students that the university degree is the best degree and that the pass degrees of the Royal Colleges and the Society of Apothecaries do not have quite the same status. It is true that this varies throughout the country, but in many medical schools, graduates look upon the conjoint degree of the Royal Colleges as the degree to be obtained if one is unable to satisfy the university examiners. A sufficient number of doctors entertain this view to cause doubt that the system in Britain can be copied harmoniously in the developing countries. It is not insignificant that the evolution in Britain occupied several centuries and that the degrees of the Royal Colleges and the Society of Apothecaries preceded those of many of the universities. In the developing countries, the proposed scheme to license graduates of foreign schools and local A.M.O. schools simultaneously is something that will have no precedence anywhere in the world. In the formation of such a system it is likely that

consultant practice will still be the perquisite of the foreign graduates and the work in the field, particularly in rural areas, the lot of the A.M.O. There will still therefore be a hierarchy within the profession, presumably composed of degree physicians.

Medical authorities in most of the countries appeared reluctant to send students abroad for training, although this would be cheaper than building and staffing an indigent medical school. This may reflect the student's standard of education, and the fact that most medical schools today are full and cannot accept students from outside their countries. It is an added disadvantage that training received outside one's country does not necessarily fit one to work within the disease pattern of the country of origin. It was repeatedly asserted that students who had attended postgraduate courses at, for instance, the London School of Hygiene and Tropical Medicine received excellent instruction but could not apply this knowledge. They had been taught principles of medicine and public health that were foreign to the needs of their particular countries. It was suggested that all postgraduate courses, or courses of any type, conducted outside the country should be supplemented by instruction in methods of application upon return to the country. This latter course should be taught by extremely competent instructors, expert in the field, who thoroughly understood the country in which they were working.

The medical authorities were still doubtful that students sent abroad for training would return home to practice. This was particularly true in Fiji where students sent to Australian medical schools could reasonably look for employment in other areas of the Pacific. Despite contracts entered into between the government and the student, this is a factor that cannot be dismissed lightly when considering instruction abroad.

There is a distinct feeling in the countries visited that it was a mistake to pattern medical care services upon those of Western society. This may be true, and it is possible that the idea of using the A.M.O. as a degree physician may be the basis of a completely new form of medical care. In these days of specialization it is unquestionably true that there must be consultants. There also must be medical personnel who act principally as screening or triage officers, treating the bulk of the minor illnesses met in daily practice.

It was disturbing that a marked fractionation of services had already developed in some of the countries. In one country, for instance, starting with the lowest and least trained aid-post orderly,

one progressed through hospital orderlies, native medical assistants, and European medical assistants to the Fiji-trained assistant medical officer. All these grades of medical personnel actually were treating patients with the same diseases but with varying amounts of skill. In another country there was a tendency to promote an individual from a dresser to an assistant nurse, then to a hospital assistant or, in the newer nomenclature, a clinical assistant. This latter method of promotion precluded the presentation of the principles of preventive medicine and public health, as the students were clinically minded throughout their career.

It would appear reasonable to invoke a system whereby two, and only two, grades of medical personnel are actually working. These would be consultants and general practitioners, the latter corresponding to the present-day A.M.O.'s. Some limitation of practice would have to be imposed upon the A.M.O.'s to prevent their becoming, as in some urban areas of North America, a general practitioner who limits his practice to internal medicine. This would undoubtedly mean government intervention in medicine, but this is the only course that is likely to be followed in the developing countries. It is quite impracticable to look for a generalized system of private practice in these countries, as the responsibility of medical care must remain with the central government.

The upgrading of medical personnel, i.e., the A.M.O., is a practical solution to the medical care question. This is shown by the training of the *assistants médicaux* of the Belgian Congo who are being trained in France to assume the status, knowledge, and role of degree physicians. Since the introduction of the program in 1960, 134 of the Belgian Congo *assistants médicaux* have been trained in France and 6 in Switzerland. These students are diploma students of the Congolese schools and have been accepted by several medical schools in France for further instruction. Many of these students received their degrees in medicine, including diplomas in tropical medicine, at the end of 1963. Others will complete their courses within the next two years. So far, everything indicates that these students have benefitted from further instruction and are attaining the standards necessary to pass the examinations set for physicians in France. Further details of this program appear in Appendix O. It may be that one method of upgrading A.M.O.'s in the developing countries is to select individuals to be sent abroad to complete their training as doctors. This would not necessarily mean that all A.M.O.'s would receive the benefit of a scheme of this type. Training abroad,

however, must be considered if a group of specialists is to be developed within the program.

Unless there is some practical method of upgrading selected A.M.O.'s, it is certain that the present A.M.O. will become a physician in title but not in education. The evolution of the A.M.O. in some countries has been achieved by designating him to be the "medical officer" of a local service without further training. In actual fact, the qualifications, ability, and duties of this glorified A.M.O. are identical to those of his less euphemistically entitled colleagues in other countries. It is imperative therefore to deal with this situation honestly and realistically by promoting capable A.M.O.'s to positions of more responsibility after exposing them to further formal education. Without this, the hypocrisy of accepting the A.M.O. as a full physician will produce neither more adequate medical care nor international acceptance of his capabilities.

One element that enters into the reception of A.M.O.'s by foreign schools is that the A.M.O. must understand the language in which the education of the country is conducted. The teaching in all the programs visited, as already noted, was in English. In New Guinea, some teaching was conducted in pidgin English, although this was confined to the aid-post orderly training programs, where most of the trainees could not understand English. As these orderlies are not allowed to work outside the villages unless closely supervised, the use of pidgin English cannot be condemned in this particular instance. The obvious disadvantage of teaching in a local dialect or lingua franca is that there is no medical literature available. This lessens the possibility of further study and also hinders any progression of the trainee in his profession. It is worth noting that the *assistants médicaux* trained in France after serving in the Belgian Congo are required to pass an examination in French composition before they are enrolled as students in the French medical schools.

THE SPECIALIST A.M.O.

It is impossible to develop medical services without allowing for the specialization that will accompany the improvement of medical care. This was evident in Fiji, as previously stated. Whether training is received abroad or within the country, certain aspects of specialization in rural areas must be met by the A.M.O. in his daily work. This is particularly true in obstetrics.

The pattern of obstetrical care was uniform in the countries visited. The bulk of prenatal care, deliveries, and postnatal care was

done by the trained nurse-midwife. This is no innovation in medicine. In most European countries, the trained midwife is the mainstay of the obstetrical services. In the developing countries, where most of the obstetrical practice is conducted either in small rural hospitals or in homes, the midwife must play the main role in the care of the woman in pregnancy. As a member of the health team, she must be supervised not only by her midwife supervisor, but also, presumably, by the director of the health team, i.e., the A.M.O.

It is unrealistic to consider producing A.M.O.'s who are all competent obstetricians. It also is unrealistic to think of the general duty A.M.O. as being able to deal, for reasons already enumerated, with obstetrical emergencies. Perhaps the best way to meet this difficulty would be to have flying squads located at strategic points in the country. These flying squads would consist of a specialist, *e.g.*, an A.M.O. obstetrician, and a midwife who is trained in administering anesthetics. The squad must have transportation available at all times, possibly a small plane. The nature of the transportation would vary with the terrain in which the group is working. The logical place for these flying squads would seem to be as units within the obstetrical services of the district or regional hospitals. This type of service would mean that necessary emergency care is brought to the patient in the home or small rural hospital.

The alternative method is to use transportation from a central hospital to collect the patient and bring her to the hospital for treatment. This certainly would be necessary in some instances, as facilities of small rural hospitals do not meet the necessary requirements for such things as delivery by Caesarean section. The aim of prenatal care, however, is to eliminate the necessity of emergency Caesarean section, and therefore the prenatal services must be developed alongside any emergency scheme that may be considered. In any event it is unreasonable to look to the local A.M.O. for specialist advice in rural obstetrical emergencies. Apart from lack of experience, the burden of work placed upon the shoulders of a local A.M.O. precludes his use as a specialist of this type.

The present method of dealing with emergencies in obstetrics did not vary too much from country to country. In most instances, the nurse-midwife was able to deal with emergencies other than those requiring surgical intervention. Because of malnutrition, the likelihood of disproportion between the fetal head and the pelvis is comparatively commonplace. Other cultural factors may also enter

into the picture of abnormal obstetrical conditions. The Kikuyu women in Kenya, for instance, are notorious for the number of Caesarean sections necessary to deliver their babies. It has been suggested that this may be because they transport large loads of firewood on their backs suspended by a sling from their foreheads, thereby distorting the anatomical planes of the lower lumbar region. This, possibly accompanied by malnutrition, may change the pelvis sufficiently to produce disproportion. It was evident that the Kenya medical authorities had met this necessity for Caesarean sections very well. Their ability to do this was partly a result of the well-developed roads in the country which enabled the patients to be transported readily to hospitals. The picture would have been different in other countries were many Caesarean sections necessary.

The extension of the flying-squad method to other specialties seems possible and it would lessen the likelihood of keeping undiagnosed cases in rural hospitals. This undesirable method of medical care was seen in most of the countries because of lack of transportation.

PUBLIC HEALTH AND PREVENTIVE MEDICINE

It is trite to say once again that the developing countries must have adequate public health and preventive medical services. It was evident in the countries visited that the realization of the necessity of public health services is fully appreciated by the medical departments. It therefore follows that it has become an integral part of the teaching of the A.M.O.

Before proceeding, the terms "public health" and "preventive medicine" must be defined. Public health implies those services which are of benefit to the group or community, *e.g.*, water supply, sewage disposal. Preventive medicine signifies those personal services in which an individual relationship is entered into between the medical worker and the patient, i.e. immunization, prenatal care. The fusion of these terms into "social medicine" is fashionable at present in many countries, but the designation of public health and preventive medicine as two entities still is permissible in the developing countries.

On paper it appears that a considerable amount of public health work is being done in the developing countries. In practice it is somewhat difficult to see any concrete results of the A.M.O.'s attempts to produce a healthy environment. Although there are obviously many reasons for this, it is probable that a main factor is

the lack of appreciation for public health by the teachers of the A.M.O. This in turn is the result of the small amount of time allocated to public health in the curricula of medical schools in the Western world. Unfortunately, this pattern of emphasizing the clinical aspects of disease to the exclusion of public health measures has permeated the teaching in the A.M.O. schools. This renders the acceptance of public health methods by the A.M.O. to be tenuous from the beginning. So much has been written on this subject that there is little point in pursuing it further. It must be emphasized again, however, that unless teachers in clinical subjects are aware of the part public health plays in modern medical care, it is unlikely that the student will maintain an interest although he has received competent instruction elsewhere in the school.

This is true in Fiji where the formation of a Department of Preventive Medicine has been sponsored by the Nuffield Foundation and adequate instruction in public health is brought to the students. It is also true in Fiji that genuine attempts are being made to project the preventive aspects of medicine into clinical medicine. Even with this ideal curriculum certain circumstances mitigate against the A.M.O. who is putting his public health knowledge into practice. As an example, the trend toward specialization of the A.M.O. does not allow him to practice public health when he is confined to a hospital environment. Consequently, those who should be using their public health knowledge are usually of lesser scholastic ability. It is these individuals who are sent to rural areas. It is questionable whether many of them really accept the dogma of public health. Even when they do, it is almost impossible for them to practice it in the villages. The demand for clinical services, the lack of education of the people, the persistence of superstitions, and the inability to enforce existing legislation all serve to nullify the attempts of the A.M.O. to introduce public health to the rural areas.

The use of surveys in the Fiji school introduces health personnel to the necessity of environmental health measures in community practice. The A.M.O. is asked to perform an environmental health survey as his initial move in the field of public health when entering a village. He does this with the cognizance and acceptance of the local village or district chiefs. The survey is received well by the people. The factors disclosed by the survey are usually numerous and reveal many elements for improvement in the environment. At the same time it is completely unrealistic to look to the A.M.O. for a full-time assault upon the environment. The work therefore is

delegated to health inspectors. It has already been mentioned that the acceptance of non-Fijian, i.e., Indian, health inspectors in Fijian villages is non-existent. Thus it is the A.M.O. who must initiate environmental health control measures by himself, or at best, with the help of the public health nurse. The amount of time necessary for this program cannot be met, as both the A.M.O. and the nurse are too busy with clinical medicine and maternal and child health in their routine work. Even when new sanitary facilities are built these must be maintained, a notoriously difficult practice to enforce. It is not unusual, for instance, to see pit latrines that have become ideal fly breeding areas because of the lack of maintenance.

The picture in the other countries is more dismal than in Fiji where the villages are invariably kept in good repair. The attempt in one African country to produce a team consisting of an A.M.O., a nurse, and a sanitarian is based upon modern public health practice in the United States. Although some progress is undeniably being made, the lack of sanitation in the villages is quite noticeable. It would be reasonable to look for the best sanitary facilities in the villages where training centers are situated, these areas being used for demonstration projects in teaching students. In discussing this matter with local sanitarians it was evident they could do very little in producing the desired effects in the villages. There is no legislation that allows them to act. If there were, it is questionable whether they could accomplish anything without antagonizing the secular and religious authorities. The requirement that the A.M.O. spend two days a week in the field with his team of nurse and sanitarian is intended to insure that he indulges in a considerable amount of public health practice. In truth, the A.M.O. entering a village is besieged with requests for treatment which he cannot refuse. As a result his entire time is occupied with practicing clinical medicine.

As may be seen, the A.M.O. practicing public health is in an unhappy position. He is taught public health in school, but often this is not reinforced by the clinical teaching. He is sent to rural areas with instructions to practice public health for a considerable part of his time but cannot do this because of the volume of overt disease that must be treated. He is legally responsible for enforcing public health laws but cannot because of cultural barriers. He surveys his villages and yet realizes he cannot do anything about improving the sanitary conditions. He sees the dramatic results of clinical treatment and does not see any results from attempting to

improve the environment. He receives very little supervision from his superior medical officer, who is usually a physician trained in the Western world with the customary lack of understanding of public health. He is swamped with the administrative aspects of managing the dispensary or rural hospital for which he is responsible. He remains in splendid isolation in his rural area and does not receive any postgraduate instruction in either clinical medicine or public health. He may or may not serve an internship, but, if he does, he undergoes an experience that generally is clinically complete but lacks public health emphasis. He experiences difficulty on occasion in understanding the local cultural customs of his people and even sometimes their language. He has to contend with political and religious factions, many of which do not accept his attempts to impose modern public health methods upon centuries-old customs. It is small wonder that the A.M.O. becomes frustrated with the challenges presented to him in public health.

When the A.M.O. is disillusioned by the lack of acceptance of public health, he may do two things. First, he may be able to expand his interest in clinical medicine and persuade the medical officer in charge of his district that he is a likely candidate for further training in one of the specialties. In this event he moves to a central hospital and receives instruction in clinical medicine, thereby becoming a specialist A.M.O. Alternatively, he may decide that he has neither the ability nor the inclination to practice as a specialist, and therefore decides that he will remain in his rural area, practicing clinical medicine to the best of his ability and to the exclusion of public health. The majority of A.M.O.'s are forced into the second category. Thus the theory of public health taught in school, even when presented in an interesting and competent manner, readily disintegrates in practice.

The field of preventive medicine that is dealt with adequately by the A.M.O. is that of immunization. There have been some excellent immunization programs initiated in the countries visited. Some of these were precipitated by outbreaks of disease, *e.g.*, poliomyelitis in Fiji in 1958. Others, *e.g.*, tetanus, have resulted from the realization that tetanus, and especially tetanus neonatorum, is extremely prevalent in the country. In any event, immunization programs have been well-administered and generally have been extremely successful. The same may be said for attempts to eradicate diseases like yaws.

These immunization and eradication programs have entailed the

use of a team, the principal members being the A.M.O. and the nurse. In addition, the use of health educators has been prominent, particularly in the areas where well-trained health educators are available. There are several factors that may explain the success of these programs in preventive medicine.

The acceptance of the needle, which was exemplified in New Guinea by the yaws eradication campaign, leads the indigent people to envisage the needle as a brand of magic superior to their own. Consequently programs that follow the use of the needle are looked upon with favor. It also is comparatively easy for the A.M.O. locally in charge of these programs to work with the district officer who is responsible for the political government of the area. This individual has access to the best census data and is able to determine the number of people in the village to be included in the immunization program. As the person legally responsible for the district, the district officer can demand that all individuals in his district be immunized. Therefore there is no difficulty in bringing the members of the village to the clinics. Any person not coming to the clinics is brought in by the chief of the village on the district officer's instructions. It was surprising to learn that this method had worked very well in one country where many of the villages are extremely primitive. Gratifying as this is, it is evident that it is often a personal method of preventive medicine which benefits indirectly the entire community. It is true that by immunizing against such diseases as whooping cough, the transmission of the disease from individual to individual is eliminated. On the whole, however, the benefit of immunization is often conferred upon the individual and not upon the group, particularly where the percentage immunized is small.

It is unlikely under present circumstances that the A.M.O.'s effectiveness in bringing public health to the people will improve. It seems unfortunate that the pattern of medical services has developed, and is developing, within the narrow limits imposed by the West. The general duty A.M.O. should not be made responsible for heading the team of workers necessary to bring more public health to the people of rural areas. If the A.M.O. is to be used in public health, he should be a specialist A.M.O. just as in any other branch of medicine. It would seem reasonable to train specialist A.M.O.'s in public health who would be responsible for large areas of their countries if they could have well-trained sanitarians, or health inspectors, working for them.

There is no question that many of the lay groups in the

developing countries have a definite interest in improving their environment. A particularly striking example of this was noted in Fiji. During the time that the Council of Chiefs was meeting in Suva, a delegation of the leading women's club of Fiji was invited to the Fiji School of Medicine. The purpose of this invitation was to acquaint them with the demonstration project in modern methods of sewage and refuse disposal and with food hygiene which had been built by the school. The women visited the school on a Wednesday. They were so impressed that they wrote to the Council of Chiefs, demanding that it visit the school. The Council of Chiefs actually visited the school on the next Saturday and was introduced to the program by the school officials. Although the emancipation of women has not become a reality in some countries it is noticeable that the female is beginning to assert herself as a controlling factor in political government in many areas. This trend should be followed and used vigorously by public health authorities.

The A.M.O. is able to practice individual preventive medicine, as typified by the immunization programs seen in most areas. He is not able to practice public health to any extent, principally because of the vast volume of disease requiring his clinical knowledge and skill. Consequently the other so-called members of the health team are not supervised and directed by the A.M.O. Because of frustration, he tends to drift more and more into the practice of clinical medicine and away from public health. It would not seem unreasonable to look for the development of separate public health units in the developing countries. Naturally these must work under the direction of the same department of health as the clinical services. The bulk of the work necessary at the moment is in the field of environmental sanitation, i.e., water supplies, sewage disposal, refuse disposal, and food hygiene. These objectives can be met very easily by using relatively few A.M.O.'s trained in public health. When these group improvements have been accomplished it should be possible to think of encouraging individuals to seek advice on individual preventive measures other than immunization. It is utterly unrealistic to ask the general duty A.M.O. to combine individual preventive medicine and group public health in his routine activities.

It may seem paradoxical to encourage a schism of clinical and public health services in the developing countries while at the same time decrying this pattern in the Western world. In the developed countries, however, clinical and preventive services did not evolve simultaneously. The introduction of community disease control was

a product of the social conscience engendered by the appalling economic conditions of the nineteenth century. The "Great Sanitary Awakening" succeeded clinical medical practice by centuries. In the developing countries medical practice always has been an integral part of the community government structure introduced in these countries by the colonial powers. It is not unreasonable to envisage the formation of two parallel, but closely interrelated, branches of medicine, one curative and one preventive, both of which would be directed by one central and local administration. This, in effect, is the pattern of medical care in the U.S.S.R. It should be noted in this context that the Russian A.M.O., i.e., the feldsher, has played and is still playing a vital role in the Soviet medical services, both in medical care of the individual and the community.

The realization that the developing countries will look for outside help in developing their medical programs must be remembered. It is improbable that these countries will accept completely the current methods of medical practice in the Western world, particularly when they can see the glaring inconsistencies which exist in medical care in many of the countries of Europe and North America. It would be well to question again the imposition of Western methods of medicine upon the newly independent countries, particularly as they have the unparalleled opportunity of developing integrated medical services as part of their total government structure.

HEALTH EDUCATION

The words "health education" have been used in the Western world for many years and are looked upon by some to be the best method of producing a modern utopia. It is evident that health education has not achieved many of its main objectives. After many years of immunization in the United States, for instance, several diseases should have been eliminated. It is noticeable that tetanus, a completely preventable disease, is still responsible for some 250 deaths in the United States each year. It may be seen that where illiteracy prevails, as it does in most of the developing countries, health education is not going to produce dramatic results in the reduction of disease.

The more realistic members of the health services visited agreed with this statement. The alternative to health education is legal enforcement. As mentioned in the previous chapter, legal requirements for immunization have been instituted in some parts of the world with varying success. There is no point in introducing

legislation unless enforcement is absolute. In most parts of the developing countries this is impossible because of the lack of supervision available. The emphasis, therefore, in many places is upon the instruction of school children in matters of health education. This again is unrealistic as the children do not have their learning experiences reinforced at home. It was noticeable that in one country, where a combination of the United Nations and Western governments has been responsible for initiating the program in public health, health education measures were taught to students who then attempted to practice them in the field. One example of the futility of this should suffice. The hand-washing technique employed by public health nurses in the United States is part of the clinical practice of the community nurses. On a visit with one of these nurses, it was noticeable that she washed her hands three times during the examination of a pregnant woman. It was fortunate that in this particular village there was a plentiful supply of water from a nearby lake, although the water had to be transported by hand for a considerable distance. Nevertheless, water was readily available at all times of the year. Upon questioning, the community nurse stated that the principal reason for washing her hands was not to prevent the transmission of infection from patient to patient, but more to educate them in using hand-washing techniques. She said further she would use this technique wherever she was working, regardless of the availability of water in the particular area. It was apparent that she considered her idea of educating the people more valuable than preventing the resentment aroused, in areas with a poor water supply, by the waste of water.

It is imperative to understand that the lack of basic education negates many attempts at health education. There are so many cultural factors that enter into the acceptance of health practices that only experts in the anthropology and culture of a country should be allowed to advise upon this subject. For instance, the lack of understanding of pictures in most of Africa and the acceptance of three-dimensional models is comparatively well-known to visiting educators. There are many other aspects of health education that are learned only after the bitter experience of failing to bring new ideas to the people.

In general there was a divergence of opinion in the central health authorities about health education. Although realizing this was a necessary part of any health service, many individuals stated it was useless to employ methods of health education before the educa-

tional standards of the people allowed them to obtain some benefit from them. The use of women's community groups was being developed extensively in one country, and some improvement in environmental factors was being engineered through these organizations. It was usual to note that health education, *per se,* was not successful in producing results. Health education as a part of the work of the nurse-midwife, for instance, was more productive. Unquestionably the best way of educating the people is to show that particular benefits may be obtained by applying modern health practices. This was evident in most countries in the apparently ready acceptance of obstetrical care by the native population. Where no material benefits could be demonstrated, as in water supply or sewage disposal, acceptance was not forthcoming.

The emphasis upon health education therefore must be upon the material personal benefits produced and not upon those of the group or community. As in most other aspects of the A.M.O.'s work, he cannot be looked upon as the individual responsible for health education. In most countries it was noticeable that the A.M.O.'s had been told they could teach best by example. This they were doing, and presumably other methods of health education may be introduced slowly in the community.

THE A.M.O. IN FIELD PRACTICE

From the foregoing it is evident there are many factors that contribute to the successful use of A.M.O.'s as practicing medical auxiliaries. Assuming their training is adequate, which is by no means true in all the countries visited, the emerging A.M.O. must be considered a physician in the eyes of the people he serves. This attitude of the people should be encouraged as he is the only individual who is going to be available for medical care for many years to come. This recognition of his ability to practice medicine, within the limitations of his training, must be realized by all degree physicians. This applies particularly to those consultants who have been imported from abroad or trained in foreign medical schools. The ultimate role of the A.M.O. will vary with his acceptance by the consultant physicians of his country.

In some programs the A.M.O. has been allowed to evolve as an individual produced by a series of promotions, many of which differ in name but not in practice. The progression of practice from the aid-post orderly to the assistant medical officer has produced a confusing picture. The role of the central government must be that of

a powerful and beneficent democratic despot in health, as in all other matters, in the countries that are emerging into the era of modern technology. The abolition of certain categories of medical workers therefore must be considered.

The error of allowing too many categories to practice similar types of medicine has led, and is leading, to areas of overlapping within the medical services. It is therefore imperative to write accurate descriptions of the duties and positions of the various workers within the services. There must be a wide gap between the actual doctor, whether he be an A.M.O. or a degree physician, and the aid-post orderly or dresser. The latter individual will be a necessary part of the health services for some time and must be seen as ultimately becoming an assistant to the better-trained A.M.O.

It is possible in some countries that the establishment of a licensed physician may include all members of the profession other than the aid-post orderly or tribal dresser in type. This method of approach is a realistic attempt to meet the impasse that is rapidly being approached in Fiji. The Fijian A.M.O. has reached the required standard for a degree physician in many countries of the world although this is not necessarily true for all Fijian A.M.O.'s now practicing in Fiji. The modern graduate of the Fiji school is unquestionably a candidate for recognition as a full physician.

The pattern of Western medical care is something that cannot be applied in developing countries *in toto*. The vicious circle of education producing healthier people who in turn demand more education and then further health services cannot be ignored. At present the provision of complete medical care is an impossibility with the number of trained physicians available. This ultimate picture may be compared to that which persists in many of the Western countries at the moment where curative medicine generally is practiced to the exclusion of preventive medicine and medical care. The eventual role of the A.M.O. may be as a general practitioner who screens cases before they are seen by specialists, treating most of the patients seen without consultation. In actual practice this is what most of the A.M.O.'s are doing today with varying degrees of competency. There are indications that many of the A.M.O.'s have by training and experience attained the standards of practice of an average general practitioner in many Western countries. There are also many A.M.O.'s who, because of stagnation in rural areas and the lack of basic and medical education, are

dealing with the routine diseases of an area without expanding their knowledge.

The necessity for postgraduate education of the A.M.O. is something that cannot be denied. At present the only way most of the A.M.O.'s manage to receive any further instruction is to become registrars in central hospitals where they are taught by the consultants. The use of refresher courses in general medicine has not been instituted so far. The A.M.O. seminars that have been begun in Fiji are an attempt to meet some of the post-graduate needs of the A.M.O. These, however, are very limited and the main method of post-graduate instruction in Fiji is by radio.

The type of medical meeting that is common to the United States would not be of much use to the A.M.O. His particular need is more in the method of formal lecture, demonstration, and clinical instruction. This corresponds more to the clinical refresher courses that are available in some parts of the world. That this method of instruction is practical has been demonstrated by the *assistants médicaux* from the Belgian Congo in French medical schools. Although these individuals have not yet assumed their duties in the Congo, there is every reason to believe that they will act competently as full physicians in their native countries if they are accepted by their colleagues. It should be emphasized that where the native practitioner is away for any length of time he must receive some type of local instruction when he returns to his country. Without this, he may forget that he cannot apply the methods of the country in which he has been taught to his own conditions.

The other method of bringing modern medical instruction to the developing countries is to send visiting faculty to these areas. This of course has obvious limitations—the principal being that by the time the visiting lecturer begins to understand the customs of the country, he must return to his own medical school. It may be that the method used in one African country, in which several members of the faculty of a foreign medical school spend their summer vacation teaching, is most likely to be successful. The disadvantage of this method of postgraduate education is that when many A.M.O.'s come to the teaching sessions the services of the country are depleted considerably. The consideration of postgraduate education should be included in any formation or alteration of a program that includes the use of the A.M.O.

The rural A.M.O. cannot act efficiently unless he is completely

and adequately supervised. The pattern of supervision by a qualified degree physician must be disregarded and A.M.O.'s promoted to the rank of supervisor where their abilities permit this. The advantages of this type of supervision are obvious in that the A.M.O. is conversant with the country, the people, and the work of the A.M.O. as it pertains to his district. Without good supervision the A.M.O. can readily revert to the position of a practitioner of native magic. With the enhancement of prestige that comes with the attainment of his position as an A.M.O. he can wield considerable power in the villages for which he is responsible. There is, at present, an almost complete lack of supervision of A.M.O.'s because of the inability to procure the services of expatriates or native physicians to do the work and also because of lack of transportation. As the economy of the countries develops, roads and transportation will be available for better supervision. In this instance it should be the A.M.O. supervisor who is placed in the position of authority.

The lack of effective public health work being done by A.M.O.'s must be met realistically. The A.M.O. must be allowed to practice clinical medicine to the exclusion of the responsibility of public health duties. A less educated individual, under competent professional supervision, can be used to work as a public health team member. This has been done in various parts of the world in the eradication of malaria. These particular individuals should not be trained solely in the methods of control of one disease but should receive training that will enable them to switch their point of assault to any disease.

This branch of medical service should certainly use A.M.O.'s, but these A.M.O.'s should be specialists trained in public health and preventive medicine. They should have with them the auxiliary personnel of public health nurses, sanitarians, health educators, etc. In addition, they should have enforcement authority that is supported by the local governing group. The initial emphasis of public health in the programs of the specialist A.M.O.'s should be upon environmental health in conjunction with other government departments. In the meantime the routine work of immunization can be continued by the clinical A.M.O. when working in the villages of his district. The combination of clinical medicine and public health under one A.M.O. is completely unrealistic and is unlikely to produce any worthwhile improvement in the environment.

Most specialties in modern medicine require a considerable amount of technical training. It is an accepted fact in the Western

countries that, in order to practice medicine well, one must have a considerable amount of education in the liberal arts or humanities. In the developing countries this is an impossibility and should not be attempted at this stage. The basic education necessary must be such that the A.M.O. can understand the scientific approach to medicine. Once he is trained, in opposition to educated, he may be looked upon as performing the technical duties of a doctor without necessarily using any education he may have had in other than scientific subjects.

Again, the application of modern methods of medical care as practiced or suggested in Western countries cannot be applied to the developing countries. In the main the position of these countries is that they are without any basic medical care. The emphasis therefore must be upon curative medicine with a separate organization attempting to improve environmental health. The acceptance of medicine is accomplished readily by demonstrating that treatment cures disease. Treatment, however, must be applied to the individual and not to the group. There are exceptions to this statement, although generally the public will accept medical care more readily when an injection will dramatically cure a disease like yaws than when the drainage of an area ultimately eradicates malaria.

It is evident that teaching methods of Western public health control have been tried without success in some of the countries visited. It was noticeable that there were attempts being made to teach A.M.O.'s the elements of certain diseases without teaching them the principles upon which all medicine may be based. This was very noticeable in the teaching of epidemiology and communicable disease control. Obviously the teaching of principles to A.M.O.'s is something that must be accomplished, the various disease entities being used as examples of the principles taught. The visiting consultant also may be too much aware of his exalted position and try to teach according to his own standard rather than the lower standards of the A.M.O. This is true not only in schools for A.M.O.'s but also in the field projects that are superintended by physicians, nurses, and engineers from the developed countries.

The place of the A.M.O. seems permanently established in the countries visited. He is likely to remain a prominent member of the health team for many years to come. The ultimate role of the A.M.O. will vary with the country's political and industrial structure, but it is likely that he will obtain the rank of a professional physician in time. The development of medical care in the countries

other than those in the Western world should be watched with interest as it is likely that new methods of medical care may be inaugurated. It may be that, in time, the so-called developing countries will show the rest of the world that complete medical care can be made available to their total population, a phenomenon that is not seen in many countries at present. They can achieve this by "creation not imitation." There are indications that some of the countries in Africa realize this and are working toward this goal.

The role of the A.M.O. as a practitioner may be summarized as follows:

1. A.M.O.'s act as general medical practitioners. They are salaried civil servants, with or without medical registration. They receive the benefits of civil servants. They are not allowed to indulge in private practice nor accept fees outside the government service.
2. The range of practice of the A.M.O. is unrestricted legally, although some limitation is imposed indirectly.
3. A.M.O. professional organizations have been formed in several countries.
4. There is a wide variation in the legal enforcement requirements allowed the A.M.O.'s.
5. A considerable part of the A.M.O.'s time is occupied by clerical duties.
6. Adequate facilities and equipment are available for the type of practice for which the A.M.O. is trained.
7. Opportunities for postgraduate study and case consultations with specialists generally are few.
8. There is a lack of clinical and administrative supervision of A.M.O.'s.
9. There is a lack of uniformity in the obstetrical competency of A.M.O.'s.
10. The A.M.O. is not used for teaching student A.M.O.'s.
11. The A.M.O. works harmoniously with private practitioners and other members of the health professions, *e.g.*, midwives, sanitarians, and health educators.
12. There are many categories of medical auxiliaries, all doing the same work as the A.M.O. with varying degrees of skill.
13. A.M.O.'s act as specialists, particularly those recently graduated. The A.M.O. who is a rural practitioner is usually of lesser ability.
14. The A.M.O. is hampered by lack of transportation.

15. The A.M.O. is practicing reasonable personal preventive medicine but poor public health and health education.

16. The A.M.O. is not trying to establish himself as a degree physician. He would like to obtain further training leading to a medical degree. This should be made available to selected A.M.O.'s.

17. The A.M.O. practices acceptable clinical medicine within his limitations.

18. The A.M.O. is an acceptable and necessary part of medical services in the developing countries of the world.

8

CONCLUSIONS

The data in this report suggest several conclusions. The majority of the conclusions are based on the material in the report; however, other factors play a role. Suggestions from individuals who helped develop schools for training A.M.O.'s; faculty of the schools visited; recommendations in the literature on these programs; and the professional opinions of the authors have been influential.

The general conclusions are:

1. The programs for training A.M.O.'s should continue. Until a country reaches a level of medical education in which enough physicians are graduated to meet the country's health needs, the use of the A.M.O. must continue, and where applicable, be expanded. The initiation of A.M.O. training programs is desirable in countries with demonstrated deficiencies in medical services.

2. The improvement of primary and secondary education should be an immediate goal of all emerging nations. Since in many countries this goal is receiving attention already, its importance as a fundamental to strengthening higher education must continuously be foremost.

3. As the primary and secondary education programs improve, the preliminary courses given the A.M.O. students in the medical schools should be dropped. The medical school should concern itself with only the preclinical and clinical subjects.

4. Standardized achievement tests used for screening applicants should continue. Where they are not used they should be instituted. Standardized tests provide some assurance of the quality of applicants. Other screening devices must also be part of the admissions procedures.

5. Schools' objectives should clearly be spelled out. These objectives must be realistic, understandable, measurable, and stated in terms of behavior changes expected in the students. With better-defined objectives, teaching methods and examination procedures can be improved and made more effective.

6. "Team teaching" as a concept should be used more extensively,

especially in preclinical subjects. "Team teaching" involves the utilization of the best abilities of each teacher regardless of the subject he is assigned to teach. Through this approach faculty resources could be better tapped.

7. While some schools have integrated the teaching of the preclinical subjects, more extensive use of this approach should be made. Teaching by body systems rather than by distinct subjects may make teaching and learning more effective. New textbooks using the integrated approach are being published and should be reviewed to check their appropriateness for training A.M.O.'s.

8. Individual learning as a concept needs exploration. The use of programmed texts, synchronized slides and tape recordings, teaching machines, recordings, and many other learning devices must be critically examined. More use of movies, charts, manikins, three-dimensional models, and other audio-visual aids should be encouraged.

9. Curriculum experiments going on throughout the world should be evaluated for suitability in teaching A.M.O.'s. The concepts in "new" mathematics and the University of Colorado Biological Science Curriculum Studies are but two of the recent developments that appear to have appropriateness for training A.M.O.'s.

10. There is a need for more student participation in classroom activities. If the Socratic approach continues to be used in clinical work, students must be made aware of this approach sooner. The student must be challenged in the classroom. Since this approach often is contrary to customs and mores, its use must be encouraged as early as possible in a student's education. Without a doubt, in the preliminary subjects students must be challenged more often than they are at present.

11. Rules and regulations governing examinations should be published. They should be available to students and faculty. Because of the turnover in faculty the need for consistency in examination procedures appears crucial.

12. The entire question of examination techniques needs review. The almost singular use of the essay type of question to measure direct recall suggests that other types of examination techniques might be more appropriate.

13. Observation records to document student clinical ability need to be developed. Such instruments would assist the students to identify their strengths and weaknesses as well as to give clinical

faculty a more objective measure of student clinical performance.

14. Courses of study should continue to be outlined. Again, because of large faculty turnover, course outlines provide needed continuity. They should not, however, be too detailed. The individual instructor should have opportunity to develop his own course of study.

15. Library resources need enlargement. With more encouragement of individual learning, expanded library resources are essential.

16. Whenever possible new faculty should be encouraged to read on pedagogy. *Teaching and Learning in Medical Schools* would be an ideal text and might be required reading for new faculty.

17. Closer relations between preclinical and clinical faculty are needed. Then too, preclinical faculty should have closer ties with the students who are engaged in clinical studies.

18. A faculty member, primarily with responsibility in teaching at the medical school proper, should be appointed as a liaison faculty member to the hospital. Such an individual would be alert to student problems and assist the principal in identifying individual student problems before they assumed serious proportions. This arrangement is especially needed when the main teaching hospital is separated geographically from the medical school.

19. As new schools are built, they should be located as close to the main teaching hospital as possible.

20. In a country that has a university the medical schools should be affiliated with the university. Granting faculty academic appointments might improve the quality of applicants seeking positions as teachers of the preclinical subjects.

21. Faculty need more voice in academic matters of the school. The construction of examinations is but one area in which faculty need to be heard. As the number of faculty increases they should be given more opportunity to do research.

22. Studies providing comparative financial data on the cost of per student training are needed desperately.

23. The legal status of A.M.O.'s should be defined within the structure of their country's government. Some form of registration is desirable, possibly in conjunction with degree physicians.

24. Legal limitations should be placed upon the range of medical practice delegated to A.M.O.'s. Usually indirect methods of legislation such as restriction of facilities, equipment, and drugs will have to be employed. The aim of training should be to produce an awareness in A.M.O.'s of their limitations.

25. A.M.O.'s should occupy a well-defined place in the pattern of medical services. It is undesirable to have several categories of medical workers who practice the same type of medicine with varying degrees of skill.

26. Specialist A.M.O.'s should be accepted as desirable members of the profession, in both clinical medicine and public health. Suitable A.M.O.'s should be selected and trained for specialist positions.

27. Adequate clinical and administrative supervision of A.M.O.'s should be emphasized. This should insure efficiency and prevent reversion to primitive medical practices. Selected A.M.O.'s should act as supervisors.

28. Adequate salaries, facilities, benefits, and promotions should be available to A.M.O.'s. Patients should not be charged for medical services. Practice outside government services should be discouraged.

29. The facilities available to A.M.O.'s in their dispensaries should include only the minimum necessary for general practice. A few "holding beds" may sometimes be necessary.

30. Transportation services by ground, sea, and air should be adequate for all uses of A.M.O.'s and their patients.

31. Clerical and other non-medical personnel should be employed to allow A.M.O.'s to use their training fully. Nurse-midwives should be responsible for routine obstetrical services.

32. Attendance at formal postgraduate courses should be required of A.M.O.'s. A.M.O.'s trained abroad should have refresher courses upon return to their country.

33. General duty A.M.O.'s should not practice both clinical medicine and public health. Personal preventive medicine, accompanied by an active use of public health services, should be part of their clinical practice. Clinical practice and public health services should be under the same central and local supervision.

34. Enforcement of health regulations should not be the responsibility of A.M.O.'s practicing clinical medicine.

35. A.M.O.'s should be located in areas with which they are culturally acquainted.

36. A.M.O.'s should assume administrative responsibility for the health work within their districts.

37. Methods of health education by A.M.O.'s should be patterned upon the educational standards of the country.

38. The use of A.M.O.'s in methods of medical care differing

from those in Western countries should be encouraged. A.M.O.'s should work closely with other government departments.

39. A.M.O.'s should be encouraged to form professional organizations.

40. Selected A.M.O.'s should be sent for further training leading to a medical degree.

41. The place of A.M.O.'s in the emerging medical elite of their countries should be defined. This may require legislation.

42. The use of A.M.O.'s should be accepted as the basis of medical care programs in the countries in which they are employed.

APPENDIX A. AUXILIARY HEALTH PERSONNEL STUDY

1. **History of School**
   - A. Its development
   - B. Organization—administrative
   - C. Physical plant
   - D. Projected growth

2. **Educational Requirements (criteria)**
   - A. Number of years of preparatory education
   - B. Kinds of subjects required in preparatory education (language—science—math, etc.)
   - C. Minimal acceptable grades in required and non-required subjects
   - D. Standardized tests used for admission
     - (1) I.Q.
     - (2) Achievement
     - (3) Personality
     - (4) University matriculation
     - (5) Others
     - (6) Who interprets tests
   - E. Recommendations
     - (1) From teachers
     - (2) Others
     - (3) Rating scales used
   - F. Who decides on admission
     - (1) Principal
     - (2) Faculty committee
     - (3) Other
   - G. Limitations on applicants
     - (1) Geographic
     - (2) Sex
     - (3) Age
     - (4) Marital
     - (5) Ethnic
     - (6) Religious
     - (7) Other

3. **Supply and Demand of Applicants**
   - A. How is number of desired graduates determined (demand)?
   - B. Is this achieved?
   - C. How is number of entering students determined (quota)?
   - D. Is this achieved?
   - E. If not, why not?

F. The number of applicants per entering class
G. The number of rejections per entering class
   (1) Major causes of rejection
   (2) Opportunity to apply to other health fields

4. Recruitment of Applicants

A. Is there a recruitment policy?
B. If no, why not? If yes, what is it?
C. Do you consider the recruitment program adequate? What would you do if no limitations were present?

5. Course of Study

A. School objectives
B. Subjects
   (1) Required
   (2) Elected
C. Number of hours in each
   (1) Didactic
   (2) Laboratory
   (3) Clinic
D. How are required courses determined? Also number of hours?
E. What changes in courses has taken place in recent years?
F. Mechanism for instituting change

6. Methods and Materials

A. Types of teaching methods used
B. Reasons for using them
C. Rating of them in each class
D. Types of teaching materials used
E. Reasons for using them
F. Rating of them in each class
G. Availability of materials
H. Library resources
   (1) Number of volumes
   (2) Kinds of volumes
   (3) Measuring student use of resources
   (4) Serials, etc.
I. Use of preceptors

7. Kinds of Appraisal Techniques

A. Paper and pencil tests—essay and objective
B. Orals—recitations
C. Grading system
D. Weights of grades assigned

E. Failure criteria
F. Allowing to repeat

8. **Credentials of Faculty**
   A. Who are the faculty?
   B. Where do faculty come from?
   C. How selected?
   D. Background—education—experience—etc.
   E. Faculty teaching load—research load—service (clinic) responsibilities
   F. Faculty privileges
   G. Faculty committees
      (1) Any
      (2) How selected
      (3) Voice in school operation
      (4) Curriculum responsibilities
   H. Governmental restrictions
   I. Promotion
      (1) Opportunities
      (2) Rules

9. **Finances**
   A. Tuition costs
   B. Room and board
      (1) Facilities
      (2) Costs
   C. Governmental subsidies
   D. Other support
      (1) Foundations
      (2) Private health agencies

10. **Post Graduate and Refresher Courses**
   A. Courses offered
   B. How are courses determined
   C. Enrollment
   D. Field courses

APPENDIX B. SCHOOL OF MEDICINE APPLICATION TO ENTER

Name_____ Date of Birth_____

Postal Address_____

Please indicate which course you desire to enter: Medical/Dental/ Other _____

Schools attended and dates _____

_____

*Class places in the last 3 years at school (give number in each class)

_____

_____

*Examinations passed (full details including subjects) _____

_____

_____

List your main leisure interests (sports, hobbies, reading, etc.) _____

_____

_____

If you have left school give an account of your career to date _____

_____

_____

Names and addresses of three people of standing who would be prepared to vouch for your character and ability

1. _____
2. _____
3. _____

Attach a short essay on the following subject _____

*If possible, ask your last headmaster to certify these two answers.

Date _____ Signature of Applicant _____

For Office Use Only

Received _____ Category _____

References written _____ Replies Received 1. _____ 2. _____ 3. _____

For Interview: Written_____ Interviewed_____ Decision_____

Notified_____ Comments_____

_____

_____

_____

APPENDIX C. DEPARTMENT OF EDUCATION FORM OF APPLICATION FOR EDUCATION OR TRAINING

Name: _____ EXAMINATION RESULT
(IN BLOCK LETTERS)

Home District: _____ Tribe _____

Age: _____

Religion: _____ (If Christian, state mission)

School: _____

My address after leaving school at which a letter will reach me without delay is:

Address: _____

Nearest railway station or bus terminus for issue of warrant: _____

I am this year completing (Standard-Form)_____at the above school and I wish to be considered for further education or training. My choice is as follows:

1. _____
2. _____
3. _____
4. _____
5. _____

Candidates for Teacher Training should indicate *above* their choice of Centre.

List of Main Choices for Further Education or Training

College—(Standard candidates only)
Technical College—(Standard candidates only)
Engineering Course—(Standard candidates only)
Survey Course—(Standard)
Meteorological Course—(Standard candidates)
Grade I Teacher Training—(Standard candidates)
Medical—(Standard candidates)
(a) Medical Assistants (men and women)
(b) Dental Assistants
(c) Laboratory Assistants
(d) Pharmaceutical Assistants
(e) Radiographic Assistants
(f) Hospital Steward Assistants

(g) Assistant Health Inspectors
(h) Malaria Assistants
Railway Training Schools—(Standard candidates)
Post Office Training Schools—(Standard candidates)
Commercial Training—(men and women)—
(Standard candidates)

APPENDIX D. SCHOOL OF MEDICINE PARTIAL SYLLABI FROM SELECTED PRELIMINARY COURSES

Physics

HEAT

1. Measurement of temperature
2. Expansion of solids and liquids
3. Expansion of gases
4. Calorimetry
5. Change of state, solid to liquid
6. Change of state, liquid to vapour
7. Relationship between heat and work
8. Transmission of heat

LIGHT

9. Rectilinear propagation of light, photometry
10. Reflection at plane surfaces
11. Reflection at spherical surfaces
12. Refraction at plane surfaces
13. Refraction at spherical surfaces, thin lenses
14. The eye and optical instruments
15. Dispersion of light, spectra and colour
16. The wave properties of light, velocity of light
17. Interference, diffraction, and polarization of light.

Biology

INTRODUCING BIOLOGY

1. The nature of life
2. Protoplasm composition, nature and importance
3. The cell as a biological unit
4. Cell division
5. Reduction division
6. Evolution
7. Binomial nomenclature

BOTANY (Concurrent with Zoology finish about mid 2nd term)

The structure and specialization of plant cells
The anatomy of the various parts of a herbaceous dicotyledon
The nature and importance of the fungi
Carbon and nitrogen cycles

The physiology of the plant including:
(1) Photosynthesis
(2) Respiration
(3) Translocation
(4) Mineral nutrition
(5) Plant hormones

ZOOLOGY

The invertibrates
The Protozoa—including the structure and physiology of *amoeba, euglena, copromonas, trypanosomes, paramecium, monocystis, plasmodium*
The Coelenterata—*hydra* and *obelia*
The limitations of diploblastic animals

Chemistry

AN INTRODUCTION TO CHEMISTRY

The historical development of chemistry. Methods of science. The nature of chemistry.

MATTER: THE MATERIAL FROM WHICH EVERYTHING KNOWN IS MADE

Definition of matter; its classification; properties of elements, compounds. Mixtures. The periodic chart; periods and groups. Relationships between matter and energy; measuring matter and energy.

STRUCTURAL UNIT OF MATTER: THE ATOM

Definition of the atom. Dalton's atomic theory. Contributions of Gay-Lussac, Avogadro, and Cannizzaro toward establishing the atom's nature. Atomic weight and reactive capacity. Particles within the atom. Revision of Dalton's theory. Electron configurations and orbitals.

OTHER STRUCTURAL UNITS OF MATTER: THE MOLECULE, THE ION. BONDING

Bonding. Electronegativity and electron transfer. Orbital overlap in electron sharing. Writing Lewis structures. Polarity. Hydrogen bonds. Reactions: making new bonds. Activation energy. Reaction speed.

FORMULAS AND CHEMICAL EQUATIONS

Writing formulas and naming compounds. The meaning of a formula. Chemical equations: reactants, products, quantitative relationships. Patterns for writing reactions. Detecting chemical changes.

APPENDIX E. SCHOOL OF MEDICINE COURSE OF LECTURE AND PRACTICAL CLASSES IN PHYSIOLOGY AND BIOCHEMISTRY

First Term

Week I

LECTURE I	Introductory—Definition of subjects, experimental method, meaning of normal values
LECTURE II	Water and solutions, osmosis—Revision
LECTURE III	Electrolytes, acids, bases and buffers—Revision
PRACTICAL	Estimation of water content of foods, osmosis, indicators, titration

Week II

LECTURE I	Brief general survey of cellular physiology
LECTURE II	Transfer across cell membranes—The Donnan membrane equilibrium
LECTURE III	Carbohydrates
PRACTICAL	Effects of isotonic hypo- and hypertonic fluids on the cell carbohydrates

Week III

LECTURE I	The environment of the cell—Body fluids
LECTURE II	Body fluids continued
LECTURE III	Fats
PRACTICAL	Preparation and examination of blood films; fats

Week IV

LECTURE I	Blood—The red cell and haemoglobin; formation and fats in the body
LECTURE II	Regulation or erythropoesis
LECTURE III	Proteins I
PRACTICAL	Estimation haemoglobin, P.C.V., E.S.R.; proteins I

Week V

LECTURE I	Anaemia
LECTURE II	Blood groups
LECTURE III	Proteins II
PRACTICAL	Red cell counts, M.C.H.C., etc.; visit to pathology laboratory for demonstration electro-phoresis

Week VI

LECTURE I	Plasma proteins and coagulation of blood
LECTURE II	Defences of the body I—The white cells
LECTURE III	Nucleic acids and nucleoproteins
PRACTICAL	Bleeding and clotting times, white cell counts—Revision

Week VII

LECTURE I	Defences of the body II—The globulins
LECTURE II	Lymph, the Lymphatic system; Oedema
LECTURE III	Enzymes
PRACTICAL	Full blood report on individual student's own blood

Week VIII

LECTURE I	The Heart—Properties of cardiac muscle; brief survey of functional anatomy of circulation
LECTURE II	Origin and spread of impulse; accompanying electrical changes
LECTURE III	Biological oxidation I
PRACTICAL	The beat of the frog's heart, Stanius ligatures, the E.C.G.

Week IX

LECTURE I	The cardiac cycle, pressure changes, and the heart sounds
LECTURE II	Cardiac output measurement, variation with venous return
LECTURE III	Biological oxidation II; introduction to metabolism
PRACTICAL	Clinical examination of the heart; X-ray screening to demonstrate normal human cardiac action

Week X

LECTURE I	Innervation of the heart; the cardiac centres
LECTURE II	Regulation of the heart-nervous reflex control
LECTURE III	Regulation of heart's action; other factors
PRACTICAL	The arterial pulse, measurement of blood pressure

Week XI

LECTURE I	Blood pressure arterial, venous, and capillary
LECTURE II	Control of the peripheral circulation—Nervous factors
LECTURE III	Factors affecting venous return and arterial pressure
PRACTICAL	Plethysmography responses of peripheral circulation

Week XII

LECTURE I	Chemical control of circulation
LECTURE II	Response to exercise, haemorrhage, etc.
LECTURE III	Circulation through particular organs
PRACTICAL	Demonstration on cat of various points in physiology of circulation

Week XIII

LECTURE I	Revision
LECTURE II	Revision
LECTURE III	Revision
PRACTICAL	Revision

Second Term

Week I

LECTURE I	Review of examination papers
LECTURE II	Hemoglobin and O_2 transport
LECTURE III	Transport of CO_2 regulation of (H) in the blood
PRACTICAL	Estimation of O_2 capacity of venous blood by Haldane method

Week II

LECTURE I	Development, functional anatomy, and movements of lungs
LECTURE II	Divisions of lung volume, composition of respired air
LECTURE III	Gaseous exchanges between blood and alveolar air
PRACTICAL	Clinical examination of the normal lung and X-ray screening of the chest; Spirometry I

Week III

LECTURE I	Regulation of breathing—The respiratory centre
LECTURE II	Chemical and reflex control of respiration
LECTURE III	Hypoxia; the effects of exercise on respiration
PRACTICAL	Spirometry II, recording of respiratory movements; effects of hyperventilation, rebreathing, etc.

Week IV

LECTURE I	Cyanosis; artificial respiration
LECTURE II	Oral and gastric digestion
LECTURE III	Intestinal digestion I
PRACTICAL	Respiratory movements, etc.; cont. artificial respiration

Week V

LECTURE I	Intestinal digestion II
LECTURE II	Metabolism—General, R.Q. and the B.M.R.
LECTURE III	Protein metabolism I
PRACTICAL	Saliva; gastric test meal

Week VI

LECTURE I	Protein metabolism II
LECTURE II	Fat metabolism
LECTURE III	Carbohydrates I metabolism
PRACTICAL	Estimation of B.M.R.

Week VII

LECTURE I	Carbohydrates II metabolism
LECTURE II	Citric acid cycle
LECTURE III	Diabetes and ketosis
PRACTICAL	Free period for students' own project

Week VIII

LECTURE I	Nutrition—Caloric and specific requirements
LECTURE II	Vitamins A, E, K
LECTURE III	C & P metabolism, vitamin D, and the parathyroids
PRACTICAL	Nutrition survey I

Week IX

LECTURE I	Vitamin B group; vitamin C
LECTURE II	Alcohol, hunger, appetite, and thirst, water balance
LECTURE III	Kidney—General introduction
PRACTICAL	Nutrition survey II

Week X

LECTURE I	Functions of the glomerulus
LECTURE II	Functions of the proximal tubule
LECTURE III	Functions of the distal tubule
PRACTICAL	Normal constituents of urine

Week XI

LECTURE I	Regulation of renal blood flow and secretion; micturition
LECTURE II	Acid-base balance and the kidney, renal function tests
LECTURE III	Body fluid composition and the kidneys
PRACTICAL	Renal function tests

Week XII

LECTURE I	The adrenal medulla
LECTURE II	The adrenal cortex
LECTURE III	The thyroid
PRACTICAL	Abnormal constituents of urine

Week XIII

LECTURE I	The pituitary
LECTURE II	Revision
LECTURE III	Revision
PRACTICAL	Revision

Third Term

Week I

LECTURE I	Divisions of nervous system; functional components; cranial and spinal nerves
LECTURE II	Receptors, types and mode of action; methods of testing sensation
LECTURE III	Neurones—Types; resting potential
PRACTICAL	Testing of sensation (introductory); preparation of the nerve-muscle preparation

Week II

LECTURE I	Neurones—The action potential and conduction of nerve impulse
LECTURE II	Degeneration and re-generation in nerves
LECTURE III	The neuromuscular junction and the synapse
PRACTICAL	Speed of conduction in nerves; neuromuscular junction

Week III

LECTURE I	Skeletal muscle—Properties
LECTURE II	Skeletal muscle—Biochemistry
LECTURE III	Comparison of skeletal, cardiac, and smooth muscle
PRACTICAL	Muscle twitch, etc.

Week IV

LECTURE I	The reflex arc—Flexion and withdrawal reflexes
LECTURE II	Stretch reflexes and tendon jerks
LECTURE III	Conditioned reflexes
PRACTICAL	Testing for reflexes; design experiment to measure speed of reflex

Week V

LECTURE I	Afferent paths I
LECTURE II	Afferent paths II
LECTURE III	Afferent paths III
PRACTICAL	Examination sensory system

Week VI

LECTURE I	Efferent paths Extra-pyramidal system
LECTURE II	Efferent paths Extra-pyramidal system
LECTURE III	Co-ordination—Cerebellum
PRACTICAL	Examination motor and cerebellar function

Week VII

LECTURE I	The reticular system
LECTURE II	Posture and locomotion
LECTURE III	Voluntary action
PRACTICAL	Free period for students' own project

Week VIII

LECTURE I	Consciousness and sleep
LECTURE II	Vision I
LECTURE III	Vision II
PRACTICAL	Vision and hearing

Week IX

LECTURE I	Hearing
LECTURE II	Speech
LECTURE III	Regulation temperature
PRACTICAL	Temperature

Week X

LECTURE I	Autonomic nervous system I
LECTURE II	A.N.S. II
LECTURE III	A.N.S. III
PRACTICAL	Revision

APPENDIX F. SCHOOL OF MEDICINE OUTLINE FOR OPERATIVE SURGERY

INTRODUCTORY DEMONSTRATION:

Knife holding, value of blunt dissection
Knot tying—reef, granny, nylon; double from major ligature
Stitching-curved and straight needles; round vs. cutting; simple, deep, vertical and horizontal mattress, continuous simple and interlocking, everting; subcuticular

ARTERIES

1. Ligature radial artery—forearm (2)
2. Ligature radial artery—above wrist (2)
3. Ligature ulnar artery—upper forearm (2)
4. Ligature ulnar artery—above wrist (2)

Talk on practical reasons necessitating ligature of major arteries; pre-amputation, aneurysm, etc. rare in practice, but good anatomical exercises

5. Ligature brachial artery—middle arm also combining—exposure median nerve (2)
6. Ligature axillary artery—third part (2)
7. Exposure third part subclavian artery also combining—exposure phrenic nerve (2)
8. Ligature common carotid artery—middle neck (2)
9. Exposure ext. and int. carotid arteries (2)
10. Ligature lingual artery—submandibular (1)
11. Excision submandibular (1)
12. Ligature popliteal artery (2)
13. Ligature femoral artery—in femoral triangle (2)
14. Ligature femoral artery—in subsartorial canal (2)
15. Exposure ext. iliac artery (1)

TENDONS

Talk on needs for tenotomy, tendon transplantations, etc.

16. Tenotomy hamstrings (4)
17. Tendon lengthening—tendon Achilles (2)

NERVE EXPOSURES

Talk on indications—injuries by fracture, penetrating wounds; causalgia; disease; *e.g.* leprosy

18. Exposure spinal accessory nerve in posterior triangle (2)

19. Transverse division of all structures ant. wrist, identification and suture nerves and tendons (2)
20. Exposure ulnar nerve at elbow and transplantation (2)
21. Exposure radial nerve—middle arm (2)
22. Exposure sciatic nerve—lower border glut. max. (2)
23. Exposure lateral popliteal nerve—and fibular neck (2)

AMPUTATIONS

General discussion types, guillotine; flaps—positions, constituents, use and dangers, stoma length, length of stump-planning *re* ideal length, position of scar, etc., in relation to artificial limb

24. Disarticulation terminal phalanx of finger (6)
25. Amputation through middle phalanx (4)
26. Metacarpo-phalangeal amputation three types (6)
27. Extensor tendon suture of hand (6)
28. Radical amputation breast—DEMONS
29. Disarticulation wrist (1)
30. Amputation forearm—site of election (2)
31. Amputation of arm (1)
32. Disarticulation shoulder (1)
33. Disarticulation terminal phalanx toe (great) (1)
34. Excision nail bed—great toes (1)
35. Amputation of toes (6)

Talk on toe and foot amputations, fixed principles

36. Syme's amputation (2)
37. Amputation leg—site of election (2)

Talk on amputations length and thigh at sites of election; adaption to circumstances according to availability of artifical limbs

38. Excision knee cartilage—DEMONS
39. Disarticulation knee (1)
40. Amputation of thigh—site of election (1)
41. Aspiration and drainage knee joint (1)
42. Aspiration hip joint; ant. drainage joint (2) (1)
43. Posterior drainage hip joint (1)
44. Obtaining cancellous and chip bone for grafting from ilium (1)
45. Disarticulation hip (1)

NECK AND FACE

Talk on tracheotomy—emergency, in major throat operation, cut throat, tetanus and paralysis

46. Tracheotomy (1)
47. Exposure thyroid gland; thyroidectomy (1)
48. Laryngo-fissure (1)
49. Block dissection of neck—DEMONS
50. Antrum puncture and washout (2)

51. Wedge excision lower lip (1)
52. Enucleation of the eye (1)
53. Evisceration of eye (1)
54. Obliteration of frontal sinus (2)
55. Injection of Gasserian ganglion—2 ways (2)

INGUINAL AND GENITAL

Talk on various repairs for inguinal hernia; anatomical difference between direct and indirect, significance; approaches to femoral hernia; points of hydrocele operations, tapping

56. Inguinal hernia exposure, proceedings (2)
57. Femoral hernia exposure—inguinal root; repair of both (1)
58. Vasectomy (2)
59. Excision of hydrocele and orchidectomy (2)
60. Circumcision
61. Amputation of penis (1)

POSTERIA ABDOMINAL WALL

62. Exposure of kidney—lumbar root; perinephric drainage (2)
63. Exposure of renal pelvis, upper ureter (2)
64. Nephrotomy; nephrectomy (2)
65. Lumbar sympathectomy—DEMONS

ABDOMINAL

Talk on approaches for prostatectomy; emergency suprapubic drainages

66. Suprapubic cystostomy (1)

Talk on abdominal incisions, advantages and disadvantages; skin tension lines; approaches for a commoner operation; peritoneal drainage.

67. Lt. paramedian laparotomy; removal (crude, of most of small intestine and mesentery) (1)
68. Gut resection and anastomosis—on removed small intestine (4)
69. Repair lacerated gut (demonstration gut suture method) (4)
70. Right grid incision; appendectomy, caecostomy (1)
71. Midline epigastric incision—transverse colostomy
72. Middle epigastric incision—gastrostomy (1)
73. Wright Locher's incision; exposure of gall bladder (1)
74. Cholescystectomy—DEMONS (1)
75. Rammstedt—pyloroplasty—DEMONS (1)
76. Left transverse incision plus paramedian extension (1)
77. Splenectomy

Talk on various approaches to the stomach, gall bladder, spleen; muscle-splitting and muscle-dividing incisions.

HEAD

Talk on intracranial operations in general

78. Exploratory trephine skull (2)
79. Exposure of middle meningeal artery, combined with subtemporal decompression (1)
80. Craniotomy flap (1)
81. Mastoidectomy—conservative (2)
82. Mastoidectomy—radical (2)

THORACIC

83. Rib section (for empyema) (4)
84. Thoracotomy (1)
85. Liver aspiration—various sites

APPENDIX G. EXPERIMENTS

Physiology. Water Diuresis in Man

The object of the experiment is to study the response of the kidney to an increased load of fluid in the body.

The plan of the experiment. The rate of flow, chloride concentration and specific gravity (S.G.) of urine are measured for about one hour before and two hours after a standard load, 1 litre, of fluid by the alimentary route. Two types of fluid are drunk, one strongly hypotonic to body fluids, viz. distilled water, and the other approximately isotonic, viz. 1% NaCl solution. The effect of moderate exercise on the response to water loading is studied in several subjects. Exercise is performed after most of the fluid is absorbed but before diuresis is established.

PROCEDURE

1. This section of the class will work in pairs.
2. The member of each pair who is to act as subject should ask a demonstrator during the preceding week about any food or fluid which may be taken before the experiment.
3. About one hour before the experiment the subject empties the bladder, he records the time but does not collect the urine.
4. Immediately *before* drinking the fluid provided, the subject empties the bladder, again recording the time. Measure volume, S.G., and chloride concentration of the urine specimen.
5. Drink the fluid provided as quickly as possible without serious discomfort. Zero time for the experiment is taken as half way through the drinking period.
6. Thereafter, the subject empties the bladder at 20-minute intervals, or as close thereto as possible, for two hours. Between times he remains seated. The exact time of collection of each urine specimen is recorded and the volume, S.G., and chloride concentration measured.
7. *N.B.* The subjects who exercise will do so for 15 minutes during the second period after drinking water (i.e., between 20 and 40 minutes after zero time). They should adjust their exercise so that the exercise involves considerable effort but does not cause profuse sweating.

WRITING UP THE EXPERIMENT

1. Tabulate the results posted on the notice board, which have been selected by the demonstrator from those obtained by the various groups.

2. Display in graphs the changes in S.G. and concentration of chloride in the urine and the changes in rate of output of fluid and chloride during the experiments.
3. Calculate the proportion of the administered load of fluid and chlorides which was excreted during the experimental period of two hours.
4. State briefly, in not more than a foolscap page, your interpretation of the results.

Estimation of Chloride Concentration in Urine

PRINCIPLE

When mercuric nitrate is added to a solution containing soluble chlorides, mercuric chloride is formed. Although not precipitated, this is not ionized. The end-point of the reaction can be determined by using a reagent (diphenylcarbazone) which gives a strong colour only with free mercuric ions and thus indicates the first excess of the well-ionized mercuric nitrate.

PROCEDURE (SCHALE'S METHODS)

1. To one ml. of the urine sample in a small flask add four drops of 0.1% solution of diphenylcarbazone in 95% alcohol. (This indicator has been freshly prepared and is stored in a dark glass bottle).
2. Titrate with the standard nitrate solution until a faint, permanent bluish-violet colour is obtained. Use daylight, if possible, and a piece of white paper as a background.
3. Calculate the chloride concentration as mg. NaCl/100 ml urine. The mercuric nitrate solution has been standardized against pure sodium chloride and its precise equivalence is given on the bottle (usually 1 ml. nitrate equals 1.2–1.3 mg. NaCl).

Note: Sometimes a lavender colour appears when only a few drops of mercuric nitrate solution have been added, especially if the urine is alkaline or the concentration of chloride very low. Usually, the colour disappears after a few more drops of mecuric nitrate have been added and titration to a permanent bluish violet colour is sufficiently accurate for the present purposes. When the chloride concentration is very low the urine should be titrated with the more dilute of the mercuric nitrate solutions provided.

Biochemistry. Determination of Plasma and Blood Volume by the Dye-stuff Method

1. The subject is weighed and a record of his height is made for use later in the experiment.

2. Ten ml. of blood are drawn from right antecubital vein, under sterile conditions. The barrel of the syringe is detached from the needle without withdrawing the needle from the vein, and the contents are transferred to a centrifuge tube containing one drop of a heparin solution (Liquemin-Roche). The centrifuge tube is agitated gently to ensure mixing of blood and heparin. This is sample A.
3. Without withdrawing the needle from the vein, another sterile syringe containing exactly 5 ml. of an Evan's Blue (T.1824) solution is connected to it, and the dye-stuff is injected into the vein. After a few seconds the syringe is refilled with blood from the vein. This blood is then reinjected into the vein. This process of withdrawing and reinjecting blood is repeated once again. (Note that this part of the procedure is important as it affords the only method of washing the dye from the syringe into the circulation. The whole process should not occupy more than 1½ to 2 minutes.) The syringe and needle are then withdrawn.
4. Four minutes after the start of the injection (par. 3) 10 ml. of blood are withdrawn from the left antecubital vein and treated in the same way as sample A. This is sample B.
5. From whichever of the centrifuge tubes appears to contain the larger amount of blood, withdraw about 1 ml. by means of a clean, dry teat pipette with a fine tip, and fill a Wintrobe's haematocrit tube (up to the 100 mm. level). Any blood left in the pipette is returned to the centrifuge tube from which it was taken.
6. Centrifuge samples A and B and the haematocrit tube at 3000 r.p.m. for 30 minutes.
7. The plasma and cell proportions in the subject's blood are estimated from the reading of the haematocrit tube.
8. Using a clean, dry teat pipette, transfer the plasma from sample A to a clean, dry test tube. The same procedure is performed with the plasma from sample B. Success depends on observing the following rules:
   a. Squeeze the teat before putting the pipette down into the plasma.
   b. Insert the pipette well down into the plasma, until the pipette is 1.5 to 2 mm. above the cell-plasma interface.
   c. Release the pressure on the teat slowly and evenly.
   d. If the cells are stirred up do not attempt to collect more plasma. Return the sample to the centrifuge and spin again for two to three minutes. Then continue the separation.
9. Using a calibrated 2 ml. pipette, transfer an exact 2 ml. of plasma A to a colorimeter tube—tube P.
10. Using the same pipette, transfer 2 ml. of the same plasma to a second colorimeter tube—tube Q.

11. Clean and dry the pipette used in par. 9 and 10, and use it to transfer 2 ml. of plasma B to a colorimeter tube—tube R.
12. Again clean and dry the pipette, and use it to add 2 ml. of tap water to the plasma in tube P. This plasma we shall refer to as plasma AW. It consists of undyed plasma diluted with an equal volume of water.
13. Use the same pipette to add 2 ml. of tap water to the plasma in tube R. This we shall refer to as plasma BW. It consists of dyed plasma diluted with an equal volume of water.
14. Clean and dry the 2 ml. pipette.
15. Commencing with the remainder of the Evan's Blue solution which was used for the injection, prepare a diluted solution containing 5 parts of the original solution in 3000. The diluent should be tap water. A convenient method of doing this is as follows:
    a. Transfer 5 ml. of the dye-stuff to a 1-litre volumetric flask and make up to volume with tap water.
    b. With a 25-ml. pipette transfer 25 ml. of this solution to a beaker. Wash the pipette and then use it to add 50 ml. of tap water to the 25 ml. of dye. This second dilution contains 5 parts of the original dye solution in 3000.
16. Using the same pipette as in par. 9–13, add 2 ml. of the dilute dye solution just prepared to the plasma in tube Q. We shall call this plasma AC. It consists of undyed plasma diluted with an equal volume of dilute dye solution which itself contains 5 parts of 3000 of the original dye.
17. Tube P, containing plasma AW, is now placed in the photoelectric colorimeter. The diaphragm that controls the intensity of the light source is adjusted so as to give a scale reading of zero This means that sufficient light is passing to cause the photoelectric cell to produce a full-scale deflexion of the meter.
18. Tube R, containing plasma BW, is placed into the colorimeter, and a note is made of the scale reading. Let the reading be X%. This indicates how much of the light transmitted by sample AW is absorbed by the dye contained in this sample. Tube R is then withdrawn.
19. Tube P is replaced in the colorimeter to ensure that no change in the zero setting has occurred (due to random fluctuation in the source lamp brightness). If any change has occurred the zero should be reset, and par. 18 and 19 should then be repeated.
20. If the result of par. 19 is satisfactory, tube Q is placed into the colorimeter, and a note is made of the scale reading. Let the reading be Y%. This indicates how much of the light transmitted by sample AW is absorbed by the dye in the control sample AC.
21. The test of par. 19 is repeated.

CALCULATION

1. The concentration of the original solution of dye in sample AC is 5 parts in 6000 of mixed water and plasma. This absorbs Y% of light.
2. The dye in sample BW, concentration unknown, absorbs X% of light.
3. $\frac{\text{Concentration in BW}}{\text{Concentration in AC}} = \frac{X}{Y}$
4. Concentration in BW $= \frac{5X}{Y}$ parts in 6000.
5. BW consists of equal volumes of plasma B and tap water.
6. Concentration in B $= \frac{5X}{Y}$ parts in 3000.
7. The volume of the injection was 5 ml.
8. This must have been diluted by $\frac{Y}{X} \cdot 3000$ ml. (More accurately by $(\frac{Y}{X} \cdot 3000 - 5$ ml.) of plasma to give the dilution calculated in par. 6. This is the plasma volume of the subject.
9. Let the haematocrit reading be H% cells. Then the proportion of plasma is (100–H)%.
10. The total blood volume of the subject is:

$$\frac{\text{plasma volume X 100}}{100-H}$$

APPENDIX H. SYLLABUS FOR A.M.O. COURSE

Medicine

1. Clinical Examination
   Chest—3 sessions
   Abdomen—1 session
   Heart—3 sessions (includes listening to a record of heart sounds and murmurs)
   C.N.S.—1 session
2. Coma
3. Worms and their treatment
4. Jaundice
5. Fits and faints
6. Chest X-rays
7. Treatment of T.B.
8. Oedema and ascites
9. Skins—2 sessions
10. Splenomegaly
11. Common mental disorders
12. Laboratory demonstration—chiefly blood and stool examinations—2 sessions
13. Common infectious diseases—this is also being covered in the A.M.O.'s public health lectures.
14. Venereal diseases
15. P.U.O.

All students attend the Saturday morning lectures given alternately through the year by the physician and surgeon. These lectures are also attended by nurses and dressers and their subject matter is chosen with these in mind as well.

THE SUBJECTS ARE:

1. Chests:	Pneumonia—classification, specific and non-specific
2. Chests:	Collapse of lung, bronchiectasis
3. Chests:	Lung abscess, empyema, pneumothorax Emphysema
4. Chests:	Pulmonary tuberculosis (excluding treatment)
5. Hearts:	Rheumatic heart disease and bacterial endocarditis
6. Hearts:	EMF, syphilis, hypertension, cor pulmonale, and TB pericarditis
7. Hearts:	Heart failure
8. Nutrition:	Vitamin deficiencies, pellagra, beriberi, scurvy

9. Paediatrics: Kwashiorkor, undernutrition
10. Paediatrics: Neonatal disease—birth trauma and jaundice, premature infants
11. Tropical: Malaria
12. Tropical: Treatment of malaria
13. Tropical: Schistosomiasis
14. Tropical: Kala-azar
15. Tropical: Leprosy
16. Blood: Anaemia I, classification (1) those due to lack of essential substances
17. Blood: Anaemia II, (2) haemolytic (3) aplastic and (4) anaemias of unknown cause
18. Blood: Leukaemia, Hodgkin's disease, and reticuloses
19. Kidneys: Function, uraemia
20. Kidneys: Nephritis and pyelonephritis
21. Endocrines: Diabetes, goitre, and thyrotoxicosis
22. G-I: Chronic abdominal pain, peptic ulcer
23. G-I: Dysentry, Amoebic and bacillary
24. Liver: Cirrhosis, portal hypertension, liver failure
25. Neurology: Infections of the CNS, meningitis, poliomyelitis, encephalitis
26. Neurology: Tumours, strokes

APPENDIX I. A.M.O. MEDICAL COURSE

General

Eliciting history from adults and children. Full physical examination. Ward side room examination of urine. Succinct presentation of relevant features, diagnosis, differential diagnosis and treatment.

Analysis and Differential Diagnosis of Symptoms and Physical Signs

GENERAL. Characters of a pain and of a lump. Lassitude. Weakness. Loss of weight. Fever. Generalized rashes. Bleeding tendency. Polyarthritis. Lymphatic enlargement. Dehydration. Skin pallor. Anaemia. Jaundice.

C.V.S. Palpitations and arrhythmias. Oedema. Breathlessness. Hypertension. Shock. Neck vein distension. Tachycardia. Assessment of systolic and diastolic murmurs.

R.S. Cough. Haemoptysis. Central and lateral chest pain. Cyanosis. Clubbing. Rales. Consolidation. Dullness on percussion. Inspection of sputum. Stridor. Pleural effusion.

A.S. Anorexia. Vomiting. Haematemesis and melaena. Dysphagia. Abdominal distension. Epigastric, R. hypochondrial, iliac fossa pain. Constipation. Diarrhoea. Inspection of mouth and tongue. Enlargement of liver/spleen. Proctoscopy. Rectal exam. Inspection of stool. Ascites.

C.N.S. Headache. Attacks of transient loss of consciousness. Coma. Delirium. Dementia. Weakness of limbs. Involuntary movements. Ataxia. Neck stiffness. Meningitis. Fontanelle examination. Paraplegia. Hemiplegia. Lower and upper motor lesions. Squint. Bell's palsy. The pupils.

G.U.S. Haematuria. Frequency. Retention. Polyuria and other urinary symptoms.

Significance of Investigation and X-rays

Value of Chest X-ray, value of Mantoux test, sputum examinations. Urine: Albumen, sugar, urobilinogen, bilirubin, Microscopy. Serum Proteins Hb. W.B.C. and differential E.S.R. Kahn. Widal. Stool. Microscopy. Occult blood. Cerebrospinal fluid. Cells, protein, sugar, organisms.

Ward Procedures

Paracentesis. Chest aspiration venepuncture.
Injections. Marrow aspiration. Spleen puncture. Gland puncture. Thin slide preparation.

Therapeutics

Route of administration. Indications. Doses. Side-effects. Duration of action. Contra indications and disadvantages.

C.N.S.	Analgesics Minor	*Aspirin.* Tabs codeine Co. Phenacitin. Phenyl butazone.
	Analgesics Major	*Morphia.* Pethidine.
	Anti convulsants	Phenobarb. Phenytoin. Paraldehy.
	Hypnotics and Sedatives	Chloral. Medium acting barbiturates. Largactil.
	Antibiotics	Narrow spectrum. Penicillin. Streptomycin. Broad spectrum. Chloramphenicol, the tetracyclines.
	Chemotherapeutic Agents	Sulphonamides, Anti Tb. P.A.S. I.N.A.H. Tb. 1 Anti Schistosomes. Sodium antimony. Tartarate. Organic trivalent arsenicals (uriotostam). Organic pentavalent arsenicals (pentostam).
	Anti Malarials	Mepacrine; Quinine pyrimethamine (Daraprin); Chloroquine proquanil (Paludrine)
	Anti Amoebics	Emetine; Emetine bismuth iodide

C.V.S. Drugs used in heart disease—Digitalis (and diuretics, mersalyl, chlorthiazide).

A.S. Purgatives. Magnesium sulphate. Senna, cascara, liquid paraffin, and castor oil.

R.S. Anti-asthmatics, adrenaline and isoprenaline.
Ephedrine.
Aminophylline.

Vitamins: Nicotinic acid. Folic acid (you should know about A.B_{12} aneurine, C and D, but not the dosage).

Vaccines and antisera for diseases mentioned below.

Miscellaneous—Saline solution, potassium chloride solution. Glucose, oxygen, dietary treatment, iron (anti-coagulants and hypotensives). Soluble insulin. P.Z.I. Chlorpromazine, corticosteroids.

Diseases (Aetiology. Clinical features. Management.)

Infections

VIRAL: Common cold. Influenza, measles, rubella, herpes simplex, Varicella, herpes zoster. Smallpox, mumps, rabies, (prophylaxis only). Anterior poliomyelitis. Lymphocyte meningitis and encephalitis. Glandular fever. Typhus. Lymphogranuloma inguinale. Infectious hepatitis.

BACTERIAL: Pneumococcal infections. Streptococcal infections. Rheumatic fever. Staphylococcal infections. Gonococcal infections. Meningococcal infections. Diphtheria (diagnosis only). Salmonella infections (typhoid and food poisoning). Plague. Dysentery. Brucellosis. Tuberculosis. Tetanus. Anthrax.

FUNGAL: Cryptococcosis (primary and post-primary). Tinea Capitis.

SPIROCHAETAL: Syphilis. Congenital, primary, secondary, tertiary, and neuro.

PROTOZOAN: Amoebiasis, malaria, leishmaniasis. Trypanosomiasis.

HELMINTHIC: Schistosomiasis. Tapeworms. Ascaris. Threadworms. Ankylostomiasis. Filaria bancrofti. Hydatid.

ARTHROPODS: Scabies. Arthropod vectors of disease, glossina, mosquitoes, sand flies, ticks.

Allergic Diseases

Urticaria. Asthma. Hayfever.

Poisonings

Methyl alcohol. Snake venom. Organo phosphate insecticides. Bacterial food poisoning. Carbon monoxide.

Deficiency Diseases

Starvation. Kwashiorkor. Pellagra. Scurvy.

Diseases of Metabolism

Diabetes mellitus. Gout. Amyloid. Salt and water deficiency. Potassium deficiency. Acidosis (alkalosis and tetany.) Obesity.

Diseases—Ductless Glands

Goitre. Thyrotoxicosis. Acromegaly.

Diseases—Digestive System

Tonsillitis. Carcinoma oesophagus. Hypertrophic pyloric stenosis. Acute gastritis. Peptic ulcer. Carcinoma stomach (and see under other headings).

Diseases—Liver

Cirrhosis. Liver coma. Carcinoma (and see above).

Respiratory System Diseases

Laryngitis. Bronchitis. Bronchiectasis. Foreign body. The pneumonias. Fibrosis lung. Abscess lung. Pneumoconiosis. Diaphragm—sub-diaphragmatic abscess.

Diseases—Kidneys

Acute nephritis. Sub-acute nephritis. Pyelitis and pyelonephritis. Chronic renal failure. Acute renal failure.

Spleen Diseases

(See above and) Hodgkin's disease and lymphoscarcoma.

Diseases—Blood

Anaemia. Leukaemia. Haemorrhagic disease.

Diseases—C.V.S.

The forms of heart failure. Rheumatic heart disease. Syphilitic heart disease. Pericardial disease. Venous arterial and cardiac thrombosis and causes of embolism. Bacterial endocarditis. Mitral stenosis. Aortic incompetence. Mitral incompetence. Coronary occlusion, angina, and infarction.

Diseases of Central Nervous System

(Amyotrophic lateral sclerosis and syringomyelia). Syphilis. G.P.I. and tabes. Cord compression and transverse myelitis. Peripheral neuritis. Parkinson's disease. Sub-arachnoid haemorrhage. Causes of raised intra-cranial pressure.

Psychological Diseases

Hysteria, anxiety, depression, addictions—alcoholism, mania and psychoses. E.C.T. Psychological diseases. Mimicking organic illness.

Skin Diseases

Eczema and exfoliative dermatitis. Psoriasis. Skin changes in general disease.

You are expected to be able to do a post mortem examination.

APPENDIX J. A.M.O. SURGERY OUTLINE

The Course of Lectures Will Cover the Following Subjects:

Abdomen
Thoracic surgery, traumatic and other diseases
Hernia, all types, complications
Intestinal obstruction
Electrolyte chemistry and management
Kidney, ureters, bladder
Uraemia
Genital system, prostate and strictures
Diseases of testis
Burns
Head injuries
Other diseases of head and neck
Thyroid, parathyroid, glands and their diseases
Hare lip and cleft palate
Vascular surgery, gangrene and its treatment
Orthopaedic surgery, traumatic and otherwise
New growths of bone
Sequelae of poliomyelitis
Breast
Uterus and adnexa
E.N.T. emergencies
Ophthalmic emergencies

APPENDIX K. REVISED CURRICULUM

First Academic Year

	FIRST TERM	SECOND TERM
1. Introduction to Public Health (Including Personal Hygiene) (96 Hours)	2 (cr. hour)	2
2. Biology (96 Hours)	3 lab	3 lab
3. Mathematics, special (96 Hours)	2	2
4. Physics, special (96 Hours)	2 lab	2 lab
5. Chemistry, special (96 Hours)	3 lab	3 lab
6. National Language	2	2
7. English (Composition and Reports)	3	3
8. Survey of National studies	2	2
Lecture Hours Per Week	19	19

Second Academic Year

	FIRST TERM	SECOND TERM
9. Anatomy and Physiology (192 Hours)*	4 – 2	4 – 2
10. General Pathology (48 Hours)*	0	3
11. Pharmacology (48 Hours)	3	0
12. Physical Diagnosis (32 Hours)	0	2
13. Microbiology (64 Hours)	2 lab	0
14. Laboratory Technology (96 Hours)	2 lab	2 lab
15. Environmental Sanitation	2	2
16. Fundamental Nursing Care (32 Hours)	2	0
17. Sociology	2	2
Lecture Hours Per Week	16	16

In addition the following practical works are given to the students:

1. Environmental Sanitation
2. Dispensing
3. Nursing

Third Academic Year

	FIRST TERM	SECOND TERM
18. Health Education Methodology (96 Hours)	2	0
19. Communicable Diseases (128 Hours)	4	4

* These two subjects should be taught by one teacher and be co-ordinated.

	FIRST TERM	SECOND TERM
20. Internal Medicine (96 Hours)	3	3
21. M.C.H. and Paediatrics (96 Hours)	3	3
22. Obstetrics (64 Hours)	0	4
23. Surgery and First Aid (96 Hours)	3	3
Lecture Hours Per Week	15	17

In addition the following practical works are given to the students:

1. Village Field Experiences
2. M.C.H. Clinic Experiences
3. Polyclinic Experiences
4. School Health Experiences
5. Obstetrics Experiences
6. Environmental Sanitation
7. Health Education Methodology

Fourth Academic Year (one semester)

	HOURS
24. Public Health Administration (48 Hours)	3
25. Epidemiology and Statistics (32 Hours)	2
26. Eye Diseases (16 Hours)	1
27. Mental Health (16 Hours)	1
28. Nutrition (16 Hours)	1
29. Skin Diseases, Leprosy, and Venereal Diseases (16 Hours)	1
Lecture Hours Per Week	9

In addition the following practical works are given to the students:

1. M. C. H. Clinic Experience
2. Polyclinic Experience
3. Hospital Ward Experience

APPENDIX L. EXAMPLES OF EXAMINATION QUESTIONS USED

Medicine

1. State briefly how you would treat the following:
   (a) Flatulence
   (b) Retention of urine
   (c) Constipation
   (d) Epistaxis
   (e) Epileptic fit
   (f) Convulsion in a child
2. What may be the effects of the diet consisting only of maize meal in a child aged two years? What supplement should be added and why?
3. How would you diagnose the patient suffering from kwashiorkor? At what age is this disease most common and why? On discharge from the hospital what advice would you give a mother to prevent the recurrence of this disease?
4. What are the important points of taking the history from the relatives of the patient being admitted to a hospital in the case of
   (a) a child of one year suffering from a cough and a high temperature
   (b) an unconscious patient
5. Describe the following in typhoid fever:
   (a) Symptoms
   (b) Signs
   (c) Complications
   (d) Nursing treatment
   What drugs might the doctor order?
6. What conditions may be present with (a) acute or (b) chronic enlargement of the lymph glands, and how may they be recognised?
7. Describe the history, onset, clinical signs of a case of pneumococcal pneumonia. What is the differential diagnosis?
8. Discuss the actions of the various hormones produced by the suprarenal gland.
9. Discuss the causes of anaemia.
10. Describe the aetiology, the clinical findings and the treatment of infective hepatitis.
    What precautions should be taken to prevent its spread?
11. What are the factors which *cause* occlusion of coronary vessels?
    What are the results of a reduced blood supply to the cardiac muscle?
    Outline the *treatment* of *cardiac infarct.*

Surgery

1. Describe the underlying principles in giving intravenous fluid therapy for the following conditions, and state what fluids you would give and how you would estimate the necessary amounts in each case:
   (a) dehydration from persistent vomiting, due to paralytic ileus;
   (b) after a major gastro-oesophageal operation, the patient not being allowed fluids by mouth;
   (c) shock from severe injury, without haemorrhage;
   (d) shock from severe injury, with much loss of blood.
2. (a) What are the signs and symptoms of acute intestinal obstruction?
   (b) Name the common causes of this condition.
   (A list of them only is required.)
   (c) What treatment would you give the patient before operation?
3. (a) What are the most common causes of coma (unconsciousness)?
   (b) How would you examine a patient brought to you in hospital after being found in coma inside his hut?
4. Describe the symptoms and signs of acute otitis media. What is the treatment? What are the possible complications?
5. Describe in detail the instructions you would give to a junior nurse concerning the nursing care of a patient who is having a blood transfusion. What complications may arise? How would you deal with them pending the arrival of the doctor?
6. Describe the treatment in the first 24 hours of a case of *severe* burns.
7. Describe the operation of tracheotomy and mention the important points in the post-operative management of such cases.
8. Describe the signs and symptoms of small bowel obstruction. Name *one* surgical condition which may cause this and describe *briefly* the management of such a case.
9. Describe the signs and symptoms of acute appendicitis.
10. How would you reduce a recent anterior dislocation of the shoulder?
11. What local treatment would you give for a full thickness burn of:
    (a) the groin
    (b) the face
    (c) the hand and fingers?
12. Why is atropine and morphine given before an anesthetic? What are the doses of these two drugs in an adult male? What other precautions do you take before sending a patient to the theatre for an anesthetic?
13. What are the signs and symptoms of inflammation? Describe the favorable and unfavorable results which may follow an infected wound of the finger.

Public Health

1. In what ways can health education be attempted by an assistant medical officer in charge of a rural area?
2. During a school inspection you find many children suffering from simple goitre and bad dental caries.
   (a) What dietary advice would you give the teachers?
   (b) Describe methods the teachers may use for improving the school lunches at the school.
3. Why is an adequate supply of water necessary? What standards would you apply when assessing the adequacy of a water supply?
4. Ten cases of meningococcal meningitis have been admitted (from one location) to hospital in the past seven days. What steps could be taken to reduce further cases to a minimum?
5. The production of cash crops is encouraged more and more. What effects, good or bad, can this have on a family unit?
6. What do you understand by the term "infant mortality rate"? Give typical figures for this rate for (a) an underdeveloped country, (b) a moderately developed country, (c) a country with well-developed health services. What are the *four* major causes of infant mortality. What steps should be, or are being, taken to reduce any *two* of these causes?
7. Describe methods of disposal of faeces in rural areas. Comment on their suitability for varying conditions.
8. *Mention* a few of the commoner diseases that can affect man from contaminated water supplies and describe the treatment of one of them in detail.
9. Describe the aims and objects of a medical inspection visit to a school.
10. Name four common worm infestations. How do people get these and what precautions should be taken to prevent them?
11. What are the causes of diarrhoea and how is it spread? What precautions should be taken to prevent it?
12. Describe in detail preventive measures to be undertaken during an outbreak of smallpox. How would you distinguish smallpox from chicken pox?
13. Why is the sanitary disposal of domestic rubbish necessary? Describe three methods suitable for rural use.

Tropical Medicine

1. Draw the life cycles of *plasmodium falciparum* and *plasmodium vivax*. How do they differ? What effects does the difference in the life cycles produce in relation to the clinical symptoms, the treatment and the epidemiological behaviour of these infections?

2. Describe the pathology of the various forms of infection with *entamoeba histolytica*. Give the treatment of each.
3. Describe the clinical differences between lepromatous and tuberculoid leprosy. Explain why their treatment is managed in different ways.
4. Describe briefly the life cycle of *Wucheria bancrofti*, the pathology of human filariasis and its clinical manifestations.
5. Give a list of the important bacterial and helminthic diseases transmitted by contamination with faeces. Describe the transmission of each disease and how this can be prevented.

Specialties

OBSTETRICS—GYNECOLOGY

1. Answer six of the following:
   (a) What is the vertex?
   (b) What are the three stages of labour?
   (c) What are the uses of ergometrine in obstetrics?
   (d) What are the principles of antenatal care?
   (e) What are the early signs and symptoms of pregnancy?
   (f) What is the suboccipito-bregmatic diameter?
   (g) What are the main bony points in the female pelvis?
   (h) What is pre-eclamptic toxaemia?
2. What is the treatment of a case of severe pre-eclamptic toxaemia presenting during the 35th week of pregnancy?

FORENSIC MEDICINE

1. Describe in detail your examination in a case of suspected rape.
2. What is criminal abortion?
   You suspect that a patient in your care shows signs of abortion which may not be natural. Describe your responsibilities as a medical practitioner.

MATERIA MEDICA & THERAPEUTICS

1. Write down the four principal actions of the digitalis alkaloids in the order of their importance in the treatment of the failing heart.
2. Suggest a safe suitable sedative for the following cases:
   (a) A fit young man the night before operation
   (b) A five-year-old child in pain from severe burns
   (c) A case of left ventricular failure
3. Suggest some satisfactory drugs for the treatment of the following cases. Dosage is *not* required.
   (a) A case of ureteric colic
   (b) An agitated patient awaiting operation
   (c) A case of multiple hornet stings

(d) A fractured femur about to be moved

4. By what method may drugs be introduced into the body? What are the rules for
   (a) giving the medicines by mouth
   (b) giving dangerous drugs?

PATHOLOGY

1. Describe the essential pathological lesions in the following:
   (a) Tuberculosis
   (b) Acute rheumatism (rheumatic fever)
   (c) Acute purulent inflammation

PHYSICS

1. Explain what is meant by the centre of gravity of a body.
   ABCD is a square plate of uniform thickness and area of 4 sq. in. E is the mid-point of AD, and F is the mid-point of CD. The triangle EDF is cut off. Find the position of the centre of gravity of the portion ABCFE.
2. State the laws of friction.
   A body, of mass 200 gm., rests on a rough horizontal table and is connected by a horizontal string, which passes over a light frictionless pulley, with another body of mass 50 gm. hanging freely. Find the acceleration of the system and tension in the string (Coefficient of kinetic friction between the 200 gm. mass and the table equals 0.15).

CHEMISTRY

1. Describe briefly one method for the determination of the molecular weight of a substance volatile without decomposition.
   0.2 gm. of a substance when vapourised displaced 62 cc. of air measured over water at 16° c and 771 mm. pressure. Calculate the molecular weight of the substance.
   (Tension of aqeous vapour at 16° c is 13.5 mm., 1 cc. of hydrogen at N.T.P. weighs 0.00009 gm.)
2. Write short notes on:
   (a) Autocatalysis
   (b) Sublimation
   (c) Isomorphism
   (d) Enzyme as catalyst
   (e) Absolute zero
   (f) Reduced pressure distillation

Biology

1. Write a comparative account of respiration, nutrition, and excretion in the frog and the earthworm.

2. Write notes on:
   (a) Locomotion and nutrition in euglena
   (b) Conjugation in paramecium
   (c) Sexual cycle of plasmodium vivax
   (d) Neurone theory
3. Describe the structure of yeast. Describe the process of alcoholic fermentation brought about by yeast in brewing beer.

Mathematics

1. Find a fourth proportional 22 : 55 :: 18 : x.
2. A rectangle is l inches long and b inches broad. Write expressions for (a) its area (b) its perimeter (c) its diagonal.

English

1. Write sentences to illustrate any 5 of the following:
   (a) An adverb clause of place
   (b) A noun clause, which is the object of a transitive verb
   (c) A compound sentence, containing two clauses in adversative co-ordination
   (d) An interrogative adverb
   (e) A complex sentence, containing two adjective clauses
   (f) The comparative forms of "well" and "badly"
   (g) A no-action verb, followed by a complement
   N.B. Underline the special part of each sentence. Write in brackets after each sentence what you have illustrated.
2. Recast sentences A to C to give a better construction. Complete sentences D to F by adding the words or phrases in brackets.
   (a) We need an extra-ordinary man of talent for such a post.
   (b) He wrote articles shortly after his return for the newspapers on his travels.
   (c) The car cost 500 pounds in the garage damaged in the road accident.
   (d) We hope Tom will come. (only, alone, if at all)
   (e) You should listen when your father speaks. (for your benefit, earnestly, always)
   (f) The twins obstructed, but the three friends aided. (always, often, each other, one another)

APPENDIX M. REGULATIONS MADE BY THE FIJIAN AFFAIRS BOARD UNDER THE PROVISIONS OF THE FIJIAN AFFAIRS ORDINANCE (CAP. 83)

No. 2 of 1948

A Regulation to Define Certain Terms and Expressions Used in the Fijian Affairs Regulations.

"Buli"—means the official in charge of a Tikina appointed under the Fijian Affairs Ordinance (Cap. 83) and includes Acting Buli.

"Government Medical Officer"—means a Medical Officer or an Assistant Medical Practitioner.

"Province or Tikina"—means a Province or a Tikina of the Colony as defined under the Fijian Affairs Ordinance (Cap. 83).

"Roko" or "Roko Tui"—means the Fijian administrative head of a Province appointed under section 12 of the Fijian Affairs Ordinance (Cap. 83) and includes an Acting Roko or Roko Tui.

No. 14 of 1948

A Regulation to Provide for the Registration of Births and Deaths.

9. It shall be the duty of the Buli upon receiving information of the death in a village or elsewhere of a child under the age of one year, or of a person over the age of one year who has not been attended by a Government Medical Officer during his last illness, to inform forthwith the nearest Fijian Magistrate. The Magistrate shall thereupon hold an inquiry into the cause of the death and forward a report with his finding to the nearest District Officer.

10.—(1) It shall be the duty of a Government Medical Officer who has attended any person during his last illness prior to death to sign and give to any person required by this Regulation to supply notice of death a certificate stating to the best of his knowledge and belief the cause of death; and the person so required shall deliver the certificate to the Buli of the Tikina in which the death occurred and the Buli shall forward the same to the Provincial Scribe who shall enter in the Register of Deaths the cause of death as set out in the certificate and the name of the certifying Government Medical Officer.

(2) If any person to whom a medical certificate is given by a Government Medical Officer in pursuance of this section fails to deliver the certificate to the Buli of the Tikina in which the

death occurred, or to the nearest Buli, he shall be liable on conviction to a penalty not exceeding five pounds and in default to imprisonment for any period not exceeding one month.

No. 16 of 1948

A Regulation Relating to Dwelling-houses, the Sanitation of Villages and Infectious Diseases.

1. This Regulation may be referred to as the Fijian Public Health Regulation, 1948.

Part I. Dwelling-houses

2. No house shall be built on any site that is swampy until the site has been filled in and drained or levelled to standards required by a Government Medical Officer or, when such technical advice is not available, to the satisfaction of the Roko or Buli.

9.—(1) Every village shall be provided with a sufficient number of suitable latrines to standards required by a Government Medical Officer or, when such technical advice is not available, to the satisfaction of the Roko or Buli.

(2) Every dwelling-house situated outside a village on native lands shall be provided with a suitable latrine to standards required by a Government Medical Officer or, when such technical advice is not available, to the satisfaction of the Roko or Buli.

(3) Any person who fails to carry out any order given under this section shall be liable on conviction to a fine not exceeding two pounds and in default to imprisonment for any period not exceeding fourteen days.

Part II. Sanitation

13.—(1) Pigs shall not be kept within any village nor allowed to wander therein but shall be confined within properly built fences not less than twelve feet square erected in a place to be approved by the Buli, where possible not less than two hundred yards from a village.

It shall be lawful to destroy any pig found within any village or cultivated land. Notification of such destruction shall be given to the owner or person in charge. Whichever of them is responsible for such animal straying in the village or cultivated land shall also be liable to prosecution under section 23 hereof.

(2) No cattle or horses or goats shall be grazed or allowed to wander within any village.

14. There shall be no banana clumps or food crops within any village.

15. All undergrowth and scrub shall be cleared for a distance of at least fifty yards round every village.
16. Any cemetery which in the opinion of a Government Medical Officer is over-crowded or in an insanitary condition or in an unsatisfactory position may be closed by order of the Roko.
17. Any well or water supply which in the opinion of a Government Medical Officer is injurious to health may be closed by order of the Roko.
18. No dead animal or refuse matter, solid or liquid shall be placed on any road or part of a village, or in any place whereby the water supply of any village may be contaminated. All dead animals shall be buried or burnt.
19. No dead animal or refuse or putrid food or fish shall be thrown into any latrine.
20. In every village or settlement on native lands in which the water supply is from any well or tank, the supply shall be protected and covered so as to prevent the deposit of refuse, dead leaves or other harmful matter.
21. In every village or settlement on native lands such depressions shall be filled in and such drains for carrying off surface water from any part of such village or settlement shall be dug as the Roko or Buli may think fit.
22. Water tanks, gutters, or small receptacles holding standing water shall be treated or disposed of by the inhabitants of a village or settlement on native lands in such manner as the Buli may direct to prevent the breeding of mosquitoes.
23. The Buli shall see that the provisions of this part of this regulation are carried out. Any person who fails to carry out any order given by the Buli, and any person who fails to carry out any of the provisions of this part of this Regulation or does any of the acts forbidden herein, shall be liable on conviction to a fine not exceeding five pounds and in default to imprisonment for any period not exceeding one month, or to both imprisonment and fine.

Part III. Infectious Diseases

24. In this part of this Regulation "infectious disease" means any disease enumerated in the Schedule to this Regulation and any other disease which the Governor may see fit by Proclamation to declare temporarily or permanently to be an infectious disease within the meaning of this part of this Regulation.
25. All infectious diseases shall be at once notified to the Turaga ni Koro or the nearest Buli who shall forthwith inform the Roko and the Government Medical Officer, in the case of a sick child by the parent or guardian, and in the case of a sick adult by the householder in whose house the illness occurs. Where the householder himself

is sick it shall be the duty of his wife or his next of kin living in the village to make the report.

26. A Government Medical Officer or a Buli shall have power to order the isolation or removal to hospital of persons suffering from any infectious disease, and no person so isolated or removed to hospital shall leave or be taken from the place where he has been isolated or leave the hospital or be taken therefrom, unless so ordered by the Government Medical Officer.
27. Any person who has been in contact with a person suffering from any infectious disease, or who is known to have rendered himself liable in any other way to infection by any infectious disease, shall, when so ordered by the Government Medical Officer, remain for any period in his village or in such other place as such officer may direct.
28. The Government Medical Officer or the Buli may order the removal, disinfection, or destruction of houses or anything therein that has been exposed to infection.
29. The notification provided for in section 25 herein of any person suffering from infectious disease on any vessel, boat, or cutter shall be made by the person in charge thereof.
30. The Roko, Buli, or Government Medical Officer may at any time enter and inspect any house in which he has reason to believe that there is a case of infectious disease.
31. No person being the parent or having the care of a child who is or has been suffering from infectious disease shall permit the child to attend school, unless such child has been certified by a Government Medical Officer to be free from infection.
32. When any person dies from any infectious disease in any hospital or place of isolation for the sick, the body shall not be removed from the hospital or place of isolation aforesaid without the authority of the Government Medical Officer, except for the purpose of immediate burial in the nearest burial-ground.
33. There shall be no delay in the burial of bodies after death from infectious disease. Any Roko, Buli, or Government Medical Officer shall have power to order the immediate burial of bodies of persons who have died from infectious disease, and to direct where such bodies shall be buried. Any person responsible for the burial of any such body who refuses or neglects to comply with any such order as aforesaid shall be guilty of a breach of these Regulations.
34. The Government Medical Officer may order any locality or Tikina to be quarantined or isolated when in his opinion the spread of any infectious disease can thereby be checked, and any persons entering or leaving such locality or Tikina against such order shall be guilty of a breach of these Regulations.
35. Any person who knowingly commits a breach of any of the provisions of this part of this Regulation shall be liable on conviction to a

fine not exceeding fifty pounds and in default to imprisonment for any period not exceeding six months, or to imprisonment for any period not exceeding six months.

Part IV. Miscellaneous

36. Prosecutions for breaches of the provisions of this Regulation may be instituted by the Roko or Buli or Government Medical Officer.
37. In the event of any by-law or order approved under the provisions of the Councils Regulation, 1948, being inconsistent with the terms of this Regulation then in any such case the terms of this Regulation shall prevail.

The Schedule

(Section 24)
Infectious Diseases

CLASS A—Immediate Notification

1. Cholera
2. Plague
3. Smallpox
4. Typhus
5. Yellow fever
6. Epidemic of any infectious disease

CLASS B—Weekly Notification

7. Acute anterior poliomyelitis (infantile paralysis)
8. Cerebro-spinal meningitis
9. Chicken pox (varicella)
10. Dysentery—
    (a) Amoebic
    (b) Bacillary
11. Influenza
12. Measles (morbilli)
13. Measles (German)
14. Typhoid fever—
    (a) Enteric
    (b) Paratyphoid fevers
15. Whooping cough (pertussis)
16. Anthrax
17. Beriberi
18. Dengue fever
19. Diphtheria
20. Encephalitis lethargica
21. Erysipelas

22. Infantile diarrhoea
23. Infective hepatitis (malignant jaundice)
24. Leprosy
25. Leptospirosis (Weil's disease)
26. Malaria
27. Puerperal fever
28. Scarlet fever
29. Silicosis
30. Tetanus
31. Trachoma
32. Tuberculosis—
    (a) Pulmonary
    (b) Other than pulmonary
33. Undulant fever
34. Venereal diseases—
    (a) Climatic bubo
    (b) Gonorrhoea
    (c) Ophthalmia neonatorum and gonorrhoeal ophthalmia
    (d) Soft chancre
    (e) Syphilis
    (f) Venereal granuloma
    (g) Venereal warts

APPENDIX N. THE A.M.O. AND SOCIAL MEDICINE *

Aid Posts

The permanent representatives of scientific medicine in the Wingei area are two aid-post orderlies, but our investigations show that the following comments apply generally to most of the aid posts in the Maprik area. The orderlies are of low educational standard, but have had two years' special training in Wewak. They are of value in the treatment of minor diseases due to *wala*, such as most attacks of malaria or septic skin conditions, but, as a matter of Government policy, they are natives of the area and inevitably they believe in the local sorcery as firmly as anyone else. Once sorcery has been diagnosed, they do not consider their medicines likely to be of benefit. The word pneumonia was thought by one of them to be the English word for *poisin*—that is, sorcery.

The aid-post orderly is paid 89 pounds to 113 pounds per year and is not provided with rations. Therefore he needs to have land for his garden within the area of his own village or of the village which agrees to house him. Also he must fulfill all the usual social obligations in the village. (We have even found an orderly working to repair the road with the rest of the people of his village on a Monday, which is the appointed day of the week for the Government's tasks.) If he is conscientious and properly supervised, he can do a great deal of medical good for his fellow villagers, and also for those nearby villages which are traditionally friendly. However, about half of the surrounding villages will be hereditary enemies of the orderly's own village. Observation shows that his therapeutic effects in enemy villages are practically nil at present.

The aid post orderly is the only local official with Governmental powers outside his own village. The people of the enemy villages naturally have no confidence in the orderly's good intentions towards them. They accuse him, sometimes perhaps with some justification, of misusing his position and overstepping his authority to make medical inspections, to send people to hospital or to order the digging of latrines as means of harassing them for political reasons. This explains the apparent paradox that there is often a considerable demand from villages without aid posts to have them, even though it is quite obvious that the "big men" have little faith in the power of an orderly's medicines to affect any but minor illnesses. They may want him for political more than for medical reasons, as they can use him to annoy the unfriendly villages near by.

* F. D. Schofield and A. D. Parkinson, "Social Medicine in New Guinea: Beliefs and Practices Affecting Health Among the Abelam and Wam Peoples of the Sepik District," *The Medical Journal of Australia*, i, 1–8 and 29–33, 1963.

Aid posts are often sited on unused ground, because this ground is naturally the most willingly given up by the villagers. But the ground is unused often just because it lies close to the border between traditionally enemy territories. If his post is set up in such a site, the orderly is likely to have almost no patients from one sector of his intended circle of influence.

The aid posts in the Wingei area have been there for only six years, so no orderlies are yet old enough to be "big men," but in time they will be. Then, if the present circumstances persist, it is likely that accusations of sorcery will be levelled against the orderlies by people of unfriendly villages. At the present time a patient from such a village who is seriously ill, say with pneumonia or dysentery, never takes advantage of the holding facilities at the aid post which are intended to allow drugs such as penicillin and sulphonamides to be administered to him at the correct intervals. This reluctance is due to the fear that the patient's food scraps at the aid post may fall into the hands of his enemies, thus laying him open to the power of further sorcery. Conversely, it is unrealistic to expect even a conscientious orderly to walk, maybe for some miles, into unfriendly territory two or three times a day in order to treat a patient who, he thinks, may be suffering from sorcery brought about by people who are likely to belong to the orderly's own village or allies. What happens in such cases is that the patient receives one injection or a few pills at the aid post and then goes home either to die or to recover without any further treatment being given.

The law relating to neglect is sometimes invoked by Government officers against a man whose wife or child they find to have been injured or seriously ill for some days without having been taken to the aid post. In such cases the man may genuinely, though wrongly, believe that the patient runs more risk by going to the aid post than by staying at home. Patients with obvious chronic disease are usually sent to hospital once at least because, if they were not, they would be discovered by the doctor or the Native Affairs Officers on their periodic visits and either the head of the family or the orderly might get into trouble.

Old people are not thought worth being treated by the aid-post orderlies, and neither of the orderlies in the Wingei area has ever entered a menstrual house in his adult life, either to treat or to remove to hospital a woman ill in childbirth or an infant with neonatal disease. If they did so, not only would they shock their fellow villagers, but they believe their next yam crop would surely fail, as the contamination from a menstrual hut inevitably has this effect unless a troublesome and unreliable ritual of decontamination is undertaken. Hospital orderlies in contrast, even if Abelam themselves, will help women in the menstrual huts when ordered to do so. This is because they and their families are fed by the Government and a yam failure to them would be merely a social mishap, not an economic disaster.

Improvements in Aid Posts

Obviously the next step, though difficult to achieve, should be the provision of aid-post orderlies or similar workers who do not believe in the local sorcery, who think old people worth treating, and who are not afraid of contamination if they help women in childbirth or new-born babies. To bring this about, it would be a great help if these orderlies were not dependent upon just one of the villages for land to grow their food. Village councils could buy the land with money provided by all the villages that agreed to use the aid post. The labour and materials needed for the construction and upkeep of the aid post and the orderly's own house could be provided communally in the same way. As most of the men and many women now speak pidgin, the new orderlies could start their work through this medium.

The disadvantage of orderlies who were outsiders from other language groups would be the expense of the land, but they would have two big advantages. They could not be used by the "big men" for parochial political purposes and, because their own original ideas on disease aetiology would be locally irrelevant, they would probably find the techniques of scientific preventive and curative medicine the easiest to follow in practice. Thus, for the first time, the people might see practical examples in their own environment of a more effective approach to matters concerning health. The local systems of belief are still intact, even among men who have been to school and now work for the Administration. There seems no likelihood of formal education producing a change in these beliefs in this generation, but we consider it is not necessary to wait for such changes before great improvements in the people's health could be effected.

APPENDIX O. THE FRENCH PROGRAM FOR UPGRADING CONGOLESE ASSISTANTS MÉDICAUX (MEDICAL ASSISTANTS), OCT., 1963

This information was supplied by Dr. Jean Galiacy,* who directs the program for the World Health Organization (WHO).

Number

There are 140 Assistants Médicaux from the Congo and Burundi attending courses in France and Switzerland as grantees of the World Health Organization. Their places of training are as below:

Place of Training	Class of	Arrived in	Number
IN FRANCE:			
Lyon	1960	October, 1960	13
	1961	October, 1961	12
	1962	October, 1962	7
Paris	1960	October, 1960	1
Montpellier	1960	October, 1960	13
	1961	October, 1961	8
Bordeaux	1960	October, 1960	13
	1961	October, 1961	12
	1962	October, 1962	5
Nantes	1960	October, 1960	11
	1961	October, 1961	10
	1962	October, 1962	6
	(Of whom 5 from Burundi)		
Rennes	1960	October, 1960	10
	1961	October, 1961	6
	1962	October, 1962	7
	(Of whom 4 from Burundi)		
IN SWITZERLAND:			
Lusanne	1961	October, 1961	6

* Médecin General Galiacy
41 bis Rue du Chateau
Boulogne-Sur-Seine
Paris
France

Instruction

These Assistants Médicaux are graduates of the Congolese schools. Theoretically they have had four years of medical study and two years of medical practice under the supervision of physicians. Most of them had practiced for eight or ten years after graduation before coming to Europe. They range in age from 28 to 44.

They are admitted to the fourth year of medical study in France and do not have to meet the requirements required for the baccalaureate degree or the first three years of medical school. They do, however, have to pass a test in "general culture" consisting of examinations in French composition, psychology, history, and geography. These tests are based upon the baccalaureate examination. Instruction in non-medical subjects continues into the sixth year in medical school. They proceed to study with their French counterparts, and have to abide by the regulations for medical students. In addition to completing examinations at the end of the fourth, and fifth, years they have to pass tests in clinical medicine, surgery, and obstetrics, and defend a doctoral thesis. They are required to attend special courses in emergency surgery, and also in tropical medicine.

Preparation

On arrival in Europe, the Assistants Médicaux are referred to a counselor in France who decides the location of the school to which they will be sent. At the school, they are assigned to a professor as a local counselor.

Results

Fifty-nine Assistants Médicaux have finished their courses of study, and ten have passed their thesis. The others will complete their years of study by the end of 1963. Two students have been asked to repeat the fourth year in medical school and are at this time in the fifth year, graduating in 1964. One of these did not pass his examination at the end of the fourth year and will probably be returned to the Congo. At the time of writing, he is the only student who has been unable to complete or continue his study.

Families

Assistants Médicaux were accompanied by their families, most of them consisting of a wife and four to five children. These families were all domiciled and affiliated with the "Securité Sociale Française." Part of the WHO grant has been used to cover moving expenses, clothing, heating, furniture, recreation, etc. Special courses in French, household economics, hygiene, sewing, etc., are being given to the wives of the Assistants

Médicaux. The children, more than six hundred in number, are enrolled in French or Swiss schools and are now pursuing the usual course of studies. Some of the children will remain in Europe to prepare themselves for the baccalaureate examination at 19 years of age. Physical examinations of the dependents of the Assistants Médicaux have been performed, and illnesses detected are being treated. The Assistants Médicaux and their families are included in the social welfare programs of the countries of their residence. All Assistants Médicaux will return to the Congo where they will practice as physicians in the health services of that country.

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