A STUDY OF THE FEASIBILITY OF USING A DOCTOR'S ASSISTANT IN RURAL AREAS

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1966

Submitted to the Faculty of the College
of Business Administration
of Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTERS OF BUSINESS ADMINISTRATION
May, 1970

Name: Matthias B. Schaefer Date of Degree: May 24, 1970

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

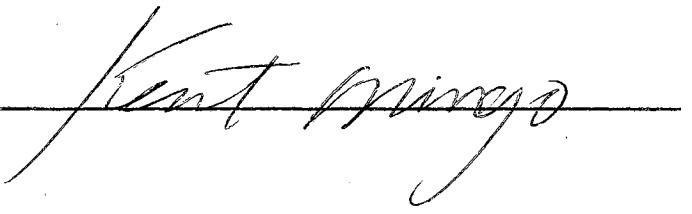
Title of Study: A STUDY OF THE FEASIBILITY OF USING A DOCTOR'S ASSISTANT IN RURAL AREAS

Pages in Study: 88 Candidate for Masters Degree in Business Administration

Major Field: Business Administration

Scope and Method of Study: In this study, a program for the use of a doctor's assistant in rural areas was outlined. It was proposed that this assistant position would be filled by a man who had received training and had worked as an independent duty medical technician in the Armed Forces. Information about this individual's specific medical capabilities was obtained through the use of a questionnaire completed by training personnel at Sheppard Air Force Base. Another questionnaire was used to compare the opinions of doctors and independent duty technicians on the corpsman's ability to perform 48 medical tasks at varying degrees of independence. The capabilities of the medical technician, plus the expected population usage were used to determine the size and type of facilities and equipment necessary to provide medical service to a community. The cost of this equipment and the related services were compared to the expected patient workload at a specific fee to determine the feasibility of the program.

Findings and Conclusions: The results of the survey from Sheppard Air Force Base supported the assumption that the independent duty technician was able to diagnose and treat a number of the more common medical disorders with a minimum of supervision. The doctors and corpsmen surveyed in the sample were found to have similar perceptions about the degree of independence with which the independent duty technician could perform the tasks listed. Analysis of the anticipated costs and expected revenues of the program showed that, initially, it would not be financially feasible. The problem arose from the high risk involved for the supervising doctor and the payment necessary to offset this risk.

ADVISER'S APPROVAL 

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Report Approved:

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PREFACE

This study investigated the economic feasibility of using a physician's assistant in doctorless rural areas. The information presented here describes a particular program which proposes separate facilities for a doctor's assistant. Such an arrangement would enable the assistant to provide limited medical service to a doctorless community in the area of a supervising doctor's practice. The high acceptance of the doctor's assistant in the rural areas surveyed has indicated the potential utility of this study.

Many persons contributed significantly to this study. Drs. John Shearer and Kent A. Mingo, of the College of Business at OSU, provided background information and guidance for the author through the more difficult early stages of the paper. Dr. Thomas Points, (MD, Ph.D) of the University of Oklahoma Medical School, provided the author with advice on the feasibility of many of the matters associated with medical practices. The study of acceptability around which this research was designed was conducted by Fred Fry and Doug Allen, MBA candidates at Oklahoma State University.

The author would be amiss if he did not thank those who helped to design the questionnaires and those who provided information for parts of this study by completing them. Dr. Ronald Sanders (MD), of Stillwater, made a valuable

contribution by devoting a great deal of his time perfecting the questionnaires. Colonel John Veit (MD), director of the medical installation at Sheppard Air Force Base, also contributed greatly by providing information, via the questionnaire, concerning the training and capabilities of the independent duty medical technician. Dr. Robert Hoffman (MD), of Oklahoma City, also provided valuable assistance by administering a questionnaire to a number of his colleagues.

Finally, I would like to thank my wife, Marla, who spent many long hours typing and helping me prepare the paper for its final printing.

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CHAPTER I

INTRODUCTION

The purpose of this study was to determine whether or not an independent duty medical technician, upon retirement from the Armed Forces, could operate a medical care facility in rural Oklahoma. This medical care technician (MCT) would function separate from, but under the supervision of, a medical doctor. The actual focus of the project is to determine whether or not such health manpower innovation could be financially self-supporting.

The research conducted was designed to answer the following questions:

1. What medical training has an independent duty medical technician received?
2. What medical tasks could he be expected to perform and with what degree of independence?
3. What would be the approximate cost of the facilities and equipment needed to perform the above tasks?
4. How large a population is needed to support an individual medical care technician?

For the purpose of this study the corpsman, referred

to as the Medical Care Technician (MCT), will be assumed to be located 20-30 miles from the doctor. The MCT will be able to ask the doctor's advice or request his direct assistance for any or all cases by telephone. For emergency cases the patient may be transferred from the scene of the accident or illness to the doctor's clinic or the nearest hospital by an ambulance operated as part of the MCT's services.

Background

Why propose such a program when it is almost certain that the local population would prefer the services of a doctor to those of an assistant? At the same time, why should a doctor be expected to spend his time training and supervising someone who would be taking part of his business? These questions can be best answered by analyzing the need for a program such as the one proposed. This study stems from the anticipated rapid increase in the demand for medical services which is expected to grossly outstrip the increase in the supply of medical doctors, as well as the uneven distribution of the doctors presently practicing in the United States.

Although there have been some questions raised as to whether or not a doctor shortage is now or will be a problem in the United States, the problem does not arise rom a shortage of doctors alone, but the career choices of these

doctors.[1] The present emphasis in most medical schools is on specialty fields, leaving a marked shortage of MD's in the general practice or family practice area.

According to Dr. Thomas Points of the University of Oklahoma Medical School, 80 percent of the medical needs of the public today could be filled by the skills of general practitioners. At the same time, 80 percent of the medical school graduates go into some type of specialty field. It is not the purpose of this paper to suggest changes in the present medical education system, but rather to suggest a possible means of enabling those doctors in general or family medicine to treat a greater number of patients through the use of an assistant. The MTC can help relieve this physician shortage by working in the role of the assistant in the early detection and prevention of disease.

In the past, the first places to suffer the impact of the doctor shortage have been the poorer rural areas, where low population concentration and low income made it unfeasible for a MD to set up a practice. The problem is even more acute in Oklahoma where, in 1967, there was one doctor for every 51 persons, and only one-third of these doctors were general practitioners, thus one family doctor for every

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[1]W. Lee Hansen, "An Appraisal of Physician Manpower Projections," A paper, University of Wisconsin, September, 1969.

3,074 persons.[2, 3] These figures are more meaningful when they are compared to the national average of one family doctor for every 1,050 persons.[4] The program developed in this paper was proposed because it was felt that lower overhead may allow the MCT to provide medical services to low income, sparsely populated areas and still economically break even. Most important, the MCT would provide medical services where they have not been readily available for some time, thereby improving the health standard in these areas.

Those familiar with the health manpower areas are aware of other proposals similar to this one. As is the case with the Duke and MEDEX programs, the personnel to fill the position of a Medical Care Technician would be recruited from the Medical Service Corps of the Armed Forces.[5, 6] The difference in the programs arises from the amount of military training that the man has received. As was emphasized on all questionnaires used in this study, the corpsman will be a senior specialist who has received training as an

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[2]C. N. Theodore, J. N. Haug, Selected Characteristics of the Physician Population, Special Statistical Series, American Medical Association (Department of Survey Research), Chicago, Illinois, 1968, p. 168.

[3]Ibid., pp. 169-171.

[4]"People Etc.," The Tulsa World (Sunday, December 14, 1969), Your World, p. 2.

[5]"Physician's Assistant Program 1969-1970," Bulletin of Duke University, V. XLI (June, 1969).

[6]Richard A. Smith, "MEDEX," Washington State Medical Association Bulletin (November 6, 1969).

independent duty medical technician and has from 8 to 20 years of experience with the military in hospitals and at remote clinics.

Emphasis is placed on the fact that the individual is an independent-duty medical technician, not a field aid man. This distinction is very important because the program is designed to provide high quality medical aid to the rural communities involved, with minimal delay for additional education for the MCT. For this reason the corpsmen selected for the program would receive little formal medical training. This can be contrasted to the Duke and MEDEX programs in which the former requires two years of medical schooling and the latter from 12 to 15 months.

Although it is not assumed that the MCT is as proficient as a physician when it comes to providing medical care, it is true that a number of the tasks performed by a doctor do not require a high degree of training, and that these tasks could be performed by a physician's assistant, allowing the doctor additional time for the more specialized work. Through their concentrated training program the Armed Forces have created technicians who, with a limited amount of training in geriatrics and pediatrics and a familiarization with the procedures used in civilian practices, could perform many of the physicians' tasks and maintain a high level of quality demanded in the field of medicine.

Oklahoma law lends itself particularly well to the use of doctors' assistants, and for this reason makes

implementation of the program proposed here legally feasible. The Medical Practice Act of Oklahoma contains the following statement:

> But nothing in this article shall be so construed as to prohibit the service in case of emergency, or the domestic administration of family remedies; or services rendered by a physician's trained assistant, a registered nurse or a licensed practical nurse if such services can be rendered under the direct supervision and control of a licensed physician, ...[7]

The MCT would be acting in the role of a physician's assistant by providing medical care, and/or referral to the doctor's patients in his area. The doctor will be able to supervise and control this assistant by direct telephone contact or through the use of a two-way radio. The MCT could use these same communications facilities to consult on a diagnosis about which he is uncertain, or to ask the doctor's advice on the treatment of a specific illness.

Organization

The body of this paper is divided into three main parts. The first gives a comprehensive view of the training which an independent duty medical technician receives in the military and how this training qualifies an individual to fill the role of the Medical Care Technician and function as a doctor's assistant. Emphasis is placed on the independent duty training to point out the corpsman's ability to

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[7]Medical Practice Act of Oklahoma, 59 O.S. 1961, pp. 481-518, Paragraph 2, Section 14.

function in isolated areas without the need to contact a medical doctor for advice or assistance. This part of the paper also contains a comparison of the tasks performed by the MCT, as perceived by the doctor and functioning military independent duty technicians.

The second part of the paper contains an estimate of the customer usage based on the percent of the population which may be expected to make use of the facilities provided by the MCT and the number of visits per year for each patient expected to participate. This section also includes a list of the equipment and a description of the facilities necessary to provide the quality of services required of medical personnel, as well as the additional equipment needed to provide the special services necessary for the successful operation of this type of program.

The third part shows the expenses involved in providing the necessary equipment and facilities, plus additional administrative expenses, and the economic fee structure to be used in the program. From this information a break-even analysis will be developed, and this information will in turn be used to determine the minimum size population necessary to generate the break-even income for the MCT. Finally, this portion of the paper will contain a section, with suggestions as to the additional uses of the MCT and alternate sources of equipment, in the event that the program was economically unfeasible.

Although this study is based on information related to

the implementation of an MCT program in rural Oklahoma, it can, with few modifications, be applied to communities of rural America or even in urban areas where a doctor's services are in short supply.

Limitations

Due to the nature of the study this paper is not developed in the usual style of a master's thesis. Most of the information needed in the development of this work could not be obtained in complete form for use here. For this reason, a number of assumptions were made to enable the author to arrive at solutions to the problems which so frequently arose. These assumptions were made with the concurrence of the author's advisors, and others who are deeply involved in the organization and implementation of the program. The assumptions were not made to allow the author to draw erroneous conclusions about the feasibility of the program. A limited amount of the information used in this study was gathered by the use of questionnaires. No attempt was made to draw a random sample of the respondents due to the limited access to the population to be tested. Again, the author attempted to remain objective in the analysis and presentation of results, and although a random and larger sample would have produced more representative outcome, it is felt that the results presented in this paper are accurate and representative of the actual situation.

CHAPTER II

REVIEW OF LITERATURE

Most of the literature reviewed in preparation for the writing of this paper dealt with different aspects of general medical practice. It was felt that the information which might be provided by research of this nature would be helpful in implementing a program which would allow the introduction of a doctor's assistant such as the Medical Care Technician (MCT) into the field of medicine, especially in rural, doctorless areas.

There has been little research done to determine if this type of physician's assistant would be allowed to perform in the capacity suggested in this study. Coyle and Hansen surveyed Wisconsin doctors by the size of the population in the area of their practice, their professional activity, the type of practice and the years since their graduation to determine the type of tasks these doctors would allow an assistant to perform.[1] The results suggested that the physicians would allow the assistant to function in two capacities. They would let him work either

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[1]R. D. Coyle, M. F. Hansen, "The Doctor's Assistant, A Survey of Physicians' Expectations," Journal of the American Medical Association, V. CCIX, No. 4 (July, 1969), pp. 529-533.

as a surgical technician or as a helper working with the patients generally seen by a family physician. Neither of these two levels of performance permitted the assistant the degree of independence or the amount of responsibility allowed the MCT in the proposed program.

The problem of a shortage of health facilities can be easily identified in rural Oklahoma communities. Two recent articles in Oklahoma newspapers relate situations where proper medical care is not readily available to rural families due to a shortage of doctor's.[2, 3] The situation is described more specifically by the following statement:

> Focusing upon the rural areas, in Oklahoma there are 23 counties with a combined population of approximately 195,000 encompassing 19,775 square miles, each with less than 5 active physicians. In this area there are a total of 57 active physicians (one to 3425 people). This amounts to one physician per 347 square miles. The consequences of conditions such as this are that many people do not receive adequate medical services.[4]

A report dated July 10, 1969, on the Health of the Nation's Health Care System, defined the problem on a national

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[2]David Graham, "Small Towns in Oklahoma Just Can't Keep Doctors," The Daily Oklahoman (Monday, August 18, 1969), p. 21.

[3]Pat Crow, "Latimar County Has a Problem; 7,900 People, 4 Doctors," The Tulsa Daily World (Wednesday, July 23, 1969), Section B, p. 1.

[4]T. C. Points, J. C. Shearer, K. A. Mingo, "The Use of Former Military 'Independent-Duty Medical Technicians' in Doctorless Rural and Urban Areas," A Paper, Oklahoma State University (January 9, 1970), p. 3.

level.[5] This report by Secretary of Health, Education and Welfare Robert Finch, and Assistant Secretary Designate of Health and Scientific Affairs Robert Egenberg, places the blame for increasing medical costs on increased demand on the already overburdened medical facilities. The MCT could be of service in the medical profession today because, by working in remote rural areas, he could provide the "prevention and early care of illness which must be the first line of attack on our health problems."[6] By so doing, he could ease the workload of the local doctor and supporting hospital and improve the economic efficiency of the primary health care system.

In an interview in January, 1969, Dwight Wilbur, 1968 President of the American Medical Association, proposed the following solution to the doctor shortage:

> ... we'll have to set up a structure in which physicians in cities and medical centers will supervise the work of specially trained assistants stationed in rural areas.[7]

One good source of such personnel, according to Dr. Wilbur, would be from the thousands of medics released from the Armed Services each year. Supervision would be conducted by telephone and occasional direct visits by the doctor in

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[5]R. H. Finch, F. O. Egenberg, "A Report on the Health of the Nation's Health Care System," A Paper, Department of Health, Education and Welfare (July 10, 1969).

[6]Ibid., p. 2.

[7]"Dwight Wilbur's Rx for Doctorless Areas; A Special Report," Medical Economics, V. XLVI, No. 4 (January 6, 1969), pp. 21-31.

charge of the assistant.

A report on Allied Health Personnel by the National Academy of Sciences on the use of military medical training programs as a model for use in non-military health care programs, not only found that:

> The educational and training techniques used for military corpsmen (medics), as well as the ways in which their skills are used, are worthy of consideration for the allied health professions in civilian life.[8]

The report adds that if this same person is willing to stay in the health services field, he can "...be developed as a (health) manpower resource on his return to civilian life."[9] When the quality of medical service in the military was compared to similar situations in civilian life, the committee said:

> ... in general, most institutional and out-patient care by the military is as skillful as that furnished in non-military medical institutions and clinics with full-time closed staffs.[10]

These articles show the need for more paramedical personnel, point out how they might be used, explore the military medical service corps as a possible source, and present a comparison of the product of the military medical educational system with his civilian counterpart.

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[8] Allied Health Personnel, National Academy of Sciences, Washington, D. C. (1969), p. i.

[9] Ibid., p. 9.

[10] Ibid., p. 3.

CHAPTER III

CORPSMAN'S TRAINING AND ADAPTABILITY TO CIVILIAN MEDICAL PRACTICE

Introduction

The question could be asked in relation to the medical feasibility of a program of the nature of the one proposed in this study: "What medical training has the independent duty medical technician received?" Perhaps two questions which are more important are: "How does this training qualify the corpsman to perform in the role of a Medical Care Technician?" and "How does the quality of his medical education compare with that of non-military personnel?"

It is not the desire of this program to flood the health service field with low quality medical care. It is known, however, that some of the independent duty medical technicians, with a wide range of experience in health care can, with a minimum of additional training, provide medical care in isolated rural areas. This point is based on the military training program which these men must complete in the course of their progress through military medical careers, not on the legal and educational requirements of the civilian medical educational system.

The purpose of this chapter is to describe the general

and specialized training received by a man pursuing a career as an independent duty medical technician in the Air Force throughout the period of his normal education and work experience in the service, and then suggest how this training makes him eligible to function in the role of the MCT. The final section of this chapter contains a comparison of the doctor's and corpsman's perception of the tasks that the Medical Care Technician should perform in the role described for him.

The training the independent duty technician receives, coupled with his wide range of experience, makes him well qualified for the job of Medical Care Technician. Part of his formal training is compared to the training of his civilian counterpart in the following statement:

> ... the armed services medical departments have demonstrated that, by the use of relatively short, intensive, and carefully structured educational and training programs, they can graduate a corpsman with sufficient basic knowledge and skills to be placed, under supervision, in a situation involving the direct delivery of patient care. With continuing, supervised, on-the-job instruction programs, they can produce in a few more months a corpsman with adequate skills to perform many basic nursing and other procedures. The special service schools develop skills and abilities commensurate with his civilian counterpart performing similar types of tasks.[1]

A simple outline of the training received by a corpsman does not alone mean a great deal. Many argue that an independent duty man deals primarily with healthy young men and thus is not truly qualified to work with the older

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[1] Allied Health Personnel, p. 6.

population of the rural areas. The actual range of the corpsman's experience is much broader, as is witnessed by the following:

> The armed forces furnish complete health care to some 3.5 million service personnel on active duty. They also furnish health care to retired personnel, dependents of active and retired personnel, dependents of active and retired servicemen, their widows, and other declared eligible by Congressional or other competent authority. In the aggregate, the military medical departments have a major degree of responsibility for the health care of about 10 million persons.[2]

General Training

The USAF Medical Service has an extensive training program which reaches into every phase of airman activity through the following training courses:

*Basic military training
Required of all airmen.

Basic medical training
Training in subjects needed by all medical personnel.

Apprentice specialist training courses.
Training in formal classes at medical training centers in a medical career field specialty prior to assignment to a medical facility.

Specialist, supervisor and technician level on-the-job training.
Individual training, at the airman's duty station, which prepares him for the 5 or 7-level military classification structure. The emphasis is upon applying skills already learned, and upon improving job proficiency.

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[2]Ibid., p. 4.

*Not a direct contribution to the airman's medical career.

Supervisor and technician training courses.
Training in formal courses in preparing for senior medical airman duties.

*Collateral training.
Training by the unit training section at medical facilities. This training encompasses military training required for all airmen.

*Unit training.
The primary mission of all Air Force Medical facilities is to furnish medical support to Air Force Units in time of war. In unit training the medical facility is trained to function as a team in accomplishing its wartime mission.[3]

Before a corpsman is eligible for training as an independent duty medical technician he must complete intensive training in other areas of medical care. In the Basic Medical Service Course the airman learns emergency care, treatment of trauma and hemorrhage and similar first aid procedures required to save lives under adverse conditions. This course is three to four weeks in length and deals primarily with basic medical procedures. The next step in the pursuit of a medical career leads the airman into formal training as an apprentice specialist. There are a great number of different fields in which an airman may choose to specialize, but the one which leads to training as an independent duty technician is the basic medical service course. After completion of this course the airman is assigned to work first as an apprentice medical service specialist and

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[3]Medical Airman's Manual, AFM 160-34 (1 April 1961), p. 18-1.

later as a medical service specialist. It is at this point in his career that the airman receives the extensive on-the-job training described earlier. This period of training lasts from 48 to 53 weeks and covers a wide range of duties in the medical field.

After completing this portion of his training, the airman may receive training in the Advanced Medical Service course which would qualify him to function in the role of a Medical Care Technician. It is through the Advanced Medical Service Course that the airman is taught basic and advanced nursing procedures. An outline of the Blocks of Instruction, with their major units of curriculum and time allotted for each section is contained in Appendix A. This training consists of 390 hours divided approximately in half between class work (lecture) and performance. The performance portion ranges from actual treatment, to cases and problem solving, depending on the design of the instructional unit.

The USAF Medical Service School plan of instruction for the medical care technician contains the following course description:

> ... training in high levels of technical nursing and supervisory skills concerned with the direct care and treatment of patients in Air Force Medical Treatment Facilities. A secondary objective is to provide Phase I training for the Medical Service Technician (Vocational Nurse) Course.[4]

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[4] Plan of Instruction (Technical Training), Medical Service Technician, Sheppard Technical Training Center (21 April 1969), p. i.

Upon completion of his training as a medical care technician, the airman will have spent a minimum of six years in the Air Force, most of which will have been spent either training or working in the field of medicine. Before he is finally eligible to receive training for and work as an independent duty technician, the airman must spend two years working as a medical service technician, to improve his skills and better prepare himself for the additional responsibility that independent duty involves.

Specific Capabilities

The following is a brief description of the duties and responsibilities of an independent duty technician functioning as the sole source of medical aid at a remote site.

> The medical airman assigned to remote sites is the sole source of immediate medical attention for the site personnel. He can get competent medical attention for the site personnel. He can get competent medical assistance from military officers at medical facilities and from civilian doctors and facilities in the area. He is provided with the tools and support he needs to do his job. He is supervised by personnel in the support unit and the air division. He is given access to methods of evacuation from the sites and is instructed in all special procedures.[5]

The organization, duties and responsibilities of the independent duty airman are very similar to those that would be assigned to the Medical Care Technician. The main difference is that the MCT would be in closer contact with

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[5]AFM 160-34, p. 17-7.

his supervising doctor through telephone and radio communication.

As a result of his military medical training, the MCT could be expected to perform a number of tasks under the doctor's supervision, such as:

> ... specially defined physical examinations, the treatment of minor illnessess and injuries, application of casts and traction following fractures, collection of blood for transfusion and/or analysis, intravenous treatment with blood and blood derivatives, the administration and supervision of drug treatments, and immunizing procedures. Most important of all in terms of adapting the medical program of the Armed Forces to civilian medical are is the participation of the medical corpsmen in the care of civilian dependents of the Armed Forces.[6]

In addition the MCT could be reasonably expected to perform the tasks as outlined by the categories in Appendix B. This information was obtained by the use of a questionnaire (Appendix C) which was filled out by the officers in charge of the independent duty airman's school at Sheppard Air Force Base and their senior enlisted instructors, through the cooperation of John P. A. Veit, Colonel, USAF Medical Corps, commander of the installation. In addition to the personnel mentioned above, five students who had completed the independent duty technician's course were each asked to complete a questionnaire. This information is an important prerequisite in determining the type of facilities and the type and amount of equipment needed to set the MCT up to function separately from his supervising doctor. This

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[6] National Academy of Sciences, p. 8.

data will be considered to be an accurate representation of the capabilities of the independent duty technician.

Equally as important, as the treatment capability of the MCT, is his ability to perform and interpret certain laboratory tests, operate an X-ray machine and read the X-rays. If the MCT is to provide complete medical care he must have at his disposal, and be able to successfully operate, equipment which could make such care possible. The information as to the independent duty airman's capabilities in these areas was obtained from Sheppard Air Force Base. This information is presented in Appendix D.

From this description of the laboratory procedures and through the cooperation of Dr. Thomas Points of the University of Oklahoma Medical School, an estimate of the cost of the necessary laboratory equipment was made. At the same time using the list of laboratory procedures from Sheppard Air Force Base, an estimate was made of the volume of laboratory work that could be expected at the isolated facility. From this, an estimate was made as to the amount of income which could be generated by the use of such laboratory facilities.

It also was decided that an X-ray machine would be an important part of the service that the MCT should provide. The rural areas have a high incidence of accidents which result in fractured or broken bones, as well as other injuries which might require X-ray work. Even though the information from the Air Force indicated that the MCT would not

be qualified to read complicated X-rays, he would be able to forward the X-ray to his supervising doctor and immobilize the suspected facture while he awaited the doctor's analysis. If the facilities such as these were not available, the MCT's services to the community would be incomplete because any injury which might require an X-ray would automatically force evacuation to the doctor's office or a hospital.

The information contained in Appendices B and C define the specific capabilities of the independent duty technician. The combination of the information in this and the preceding section show that the training and experience of the independent duty medical technician qualify him to fill the civilian role of the Medical Care Technician with little additional formal training. The most important qualification is this man's experience as a sole medical resource in an isolated area, a situation similar to the one which an MCT would be expected to face in a civilian context.

Use of the MCT in Rural Medical Care

There may be some question as to the rationale behind assigning a doctor's assistant to work in a rural area when health problems may be more severe in ghettos and crowded urban areas. There also may be some question as to the wisdom of setting the MCT up in facilities separate from a doctor, especially when this doctor is acting in the capacity of the MCT's supervisor and is responsible for his actions.

Why emphasize rural doctorless areas? A brief explanation of the need for improved health conditions in rural areas is contained in the introduction and review of literature of this paper. No attempt will be made here to compare health conditions or the need for health services in crowded urban areas with those in rural areas. The rural locations were selected because it was felt that less opportunity existed for medical care in these areas due to the distance the patient had to travel for a doctor's services. In addition, a number of factors make the probability of usage and acceptance of the MCT higher in rural areas, which is an important consideration for the pilot program. This assertion concerning the feelings of the population about the use of a doctor's assistant which is used in this report is taken from a survey conducted by two researchers at Oklahoma State University who sought to identify medical and demographic variables which affect acceptability of MCTs.[7]

The functioning of the MCT in facilities separate from those of his supervising doctor also presents a unique problem. The physician's assistants produced by the Duke program were not assigned an independent role due to the legal implications in the states where these men would work. An excerpt of the Medical Laws of Oklahoma relating to the use of a doctor's assistant is contained in the introduction of

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[7]F. Fry, D. Allen, "A Study of the Acceptability of a Former Military Corpsman as a Medical Resource in Rural Communities," Masters of Business Administration thesis, Oklahoma State University, 1969.

this paper. This law can be interpreted in such a way as to allow varying degrees of independence for the doctor's assistant. The interpretation contained in this paper is quite liberal but the medical isolation of the rural areas points out the need for separate facilities. One of the most important duties of the doctor's assistant will be the early detection and prevention of disease. By living and working in the rural community the MCT can provide this service through a more comprehensive medical care program. Even though the MCT would not be working with the doctor in his office, it could be expected that he would eventually ease the doctor's workload, thus allowing the doctor more time for special tasks or for professional development.

Level of Task Performance

As part of the current study, a survey was conducted to determine if there was any similarity in the perception of task performance between the doctor and the independent duty technician. Due to limitations of time and financial resources, no attempt was made to draw a random sample of the doctors and corpsmen requested to answer the questionnaire. Instead, a limited number from each group was selected to fill out the questionnaire, contained in Appendix E. The questionnaire was designed to determine the amount of delegation of duty and responsibility generally felt possible by the doctors and to determine if the independent duty technicians willingness to accept responsibility was similar.

The doctors who completed the questionnaire were young MD's who had served in the Medical Corps of the Armed Services. No attempt was made to differentiate these doctors by branch of service (Army, Navy, or Air Force) nor was any attempt made to determine whether or not they had worked directly with the independent duty medical technician. The information on the cover sheet of the questionnaire emphasized the fact that the man being rated was an independent duty technician and not a field aid man. An attempt also was made to explain the high degree of competence and the broad range of experience of this individual so as to give the doctors an idea of the type of person that they would be rating.

The corpsmen asked to complete the questionnaire were independent duty medical technicians stationed at Tinker AFB in Oklahoma City, Oklahoma.

The scores used to assess a value to each questionnaire were derived by assigning the values of 1, 2, 3, or 4 to the columns A, B, C, and D, respectively (see Appendix E). The total of the question values would then be the questionnaire score. Thus, the scores could range from 48 for completely independent action by the MCT to 192 for those persons who would allow no independent action.

The null hypothesis for the test was:

H_0 = There is no difference between the perceptions of doctors and independent duty medical technicians as to the degree of

independence of performance of certain tasks by a doctor's assistant.

The questionnaire scores were evaluated through the use of the Mann-Whitney U-test.

The results indicated that the doctors and independent duty technicians had similar feelings about the degree of independence with which the MCT could perform the medical tasks listed on the questionnaire. Full analysis of scores and the results of the test are contained in Appendix F.

The problem of how a local civilian population, those who would be able to receive medical care from the MCT, would respond to such a program is dealt with at length by Fry and Allen, who surveyed the population of a number of doctorless Oklahoma towns. A summary of the results of their research is contained in the next chapter.

This information is combined with specific data on the expected volume of visits and with information about the specific capabilities of the independent duty medical technician contained in this chapter. It provides a basis for determining the type of facilities, and type and amount of equipment needed by the MCT to provide adequate medical care to the community he serves.

CHAPTER IV

USAGE AND ORGANIZATION OF THE MEDICAL CARE FACILITIES

Introduction

Assuming the MCT is qualified to administer medical care in facilities separate from his supervising doctor, some estimate of the sizes and types of facilities is needed to insure that he is able to provide high quality medical services. The size and type of facilities required depend on the frequency of use by the local population, as much as it does on the capabilities of the MCT. For this reason, it is necessary to arrive at a figure for population usage of medical facilities in rural areas, in terms of an estimated percent of usage and the number of visits per year.

The first part of this requirement is filled by information derived from the Fry and Allen study mentioned earlier while the second portion is provided by information from a national survey on the volume of physicians' visits in different areas of the United States. These two figures act as a basis for an assumption concerning the volume of visits to the MCT.

This information should provide insight as to the amount and type of equipment needed to provide medical care

to a community and the manner in which the facilities may have to be organized to insure that the MCT is able to function properly.

Potential Clientele

The study by Fry and Allen is the basis for many of the assumptions made in this section. For this reason a summary of the results of research will be presented here.[1] The study was conducted in eight rural Oklahoma communities each with a population of about 500. A random selection of five percent of the community's residents were asked to participate in the study. An exception to the randomness was made through a special attempt to reach local community leaders, such as mayors, school principals, etc., to determine if a position of this nature had any effect on the individual's acceptance of the MCT.

The interviewers briefly explained the capabilities of the MCT as well as his working relationship with the doctor and then asked whether or not the person would go to the MCT for treatment of a number of specific symptoms. Each question was answered for three separate situations, each representing a different level of independence of the MCT from the doctor's supervision.

The results of the study which are particularly

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[1] F. Fry, D. Allen, "A Study of the Acceptability of a Former Military Corpsman as a Medical Resource in Rural Communities," Masters of Business Administration thesis, Oklahoma State University, 1969, pp. 40-41.

important in this report are:

1. Estimated percentage usage was 35 percent in a community that had a practicing osteopath, compared to 79 percent for a town which was 30 miles from the nearest competent medical resource, showing the affect of distance from a doctor on acceptance.
2. The estimated percentage usage when the MCT worked in the office with his supervising doctor was 60%, indicating a preference to see the doctor when possible.
3. The acceptance of the MCT by sex of the patient is reflected by the estimated percentage usage of 75% for males and 74% for females in the isolated rural areas surveyed.
4. The variables of age, education, and income had little effect on the acceptance of the MCT.

The average estimated percentage usage for all communities surveyed was about 70%. This is the figure that will be used as the estimated percentage usage for the rest of this report.

Volume of Visits

Next, the number of visits per person per year was determined. Since there is only sparse information

available dealing directly with visits to a physician's assistant, the figures relating to the physician himself will be used.

The information presented here is taken from a survey of the volume of physicians' visits by the National Center of Health Statistics.[2] Two definitions are given at this time to provide a clearer understanding of what is meant by a physician's visit:

> A physician is a doctor of medicine or an osteopathic physician. A visit is defined as a consultation with a physician, either in person or by telephone, for examination, diagnosis, treatment or advice. Service provided directly by a physician or by a nurse or other person acting under a physician's supervision is considered a physician visit.[3]

The information provided by this survey is broken down into areas similar to those tested by the hypothesis of the Fry and Allen study of estimated percentage population usage, age, sex, income, and education. Since all of these areas were shown to have had little effect on the acceptance of the MCT in the particular area under consideration, it will be assumed that any variation in the volume of visits caused by these factors are of minor importance. The figures quoted are based on residence and for the purposes of this study, represent an average of physicians' visits of

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[2] Volume of Physician Visits, United States - July 1966-June 1967," National Center for Health Statistics Series 10, Number 49, U. S. Department of Health, Education and Welfare, Public Health Service, Washington, D. C., November 1968.

[3] Ibid., pp. 2-4.

the farm and non-farm population outside of the standard metropolitan statistical area.

The number of visits were 4.1 and 3.3 visits per person per year for non-farm and farm residents, respectively. The average of these figures is 3.7 visits per person per year. Additional information shows an increase in visits with an increase in age, and although the majority of the residents of the communities surveyed were over 40 years old, the Fry and Allen study indicated that as age increased, the use of the services provided by the MCT were likely to decrease. However, since the test of the actual effect of age on estimated percentage usage showed no significant difference in usage, the figure of 3.7 visits per person per year will be considered accurate for the purposes of this study.

One assumption which must be made at this time is that visits to the MCT, working in the role described earlier, would be the same as the visits to a physician working in that rural area. That is, the people living in the community where the MCT is located will each require medical care 3.7 times per year and 70% of these visits would be made to the MCT, or, as explained later, 70% of the population will visit the MCT 3.7 times per year.

The information summarized in this section serves as the basis for a number of important assumptions concerning the use of the services provided by the MCT. The 70 percent usage figure given earlier will, for the sake of simplicity, be assumed to mean that 70 percent of the population of the

area will use the services offered by the MCT each year. It also will be assumed that this 70 percent of the population will average 3.7 visits per person per year.

When the figures for the estimated percentage of usage and the number of visits per year are combined, it is possible to arrive at a figure of 2.6 visits to the MCT per unit of population per year. As part of the Fry and Allen survey of rural communities summarized in the preceding section, each person interviewed was asked how many times he has visited a doctor or medical facility in the last year. The average for the 200 respondents was eight visits.[4] It was felt that this figure may have been inflated by the interviewee in the hope that the high demand in his community would result in a health care program being established. For this reason, it is assumed that 100 people in the average rural Oklahoma community will make 260 visits to the MCT in the first year of his service. Any significant increase or decrease in that figure after the first year obviously depends upon the amount of confidence that the local population has developed in the MCT's medical ability.

Services and Facilities Needed to Provide Medical Care

The extent of the independent duty technician's

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[1]F. Fry, D. Allen, pp. 40-41.

training and experience, as well as the estimated number of visits per year, serve as a basis for determining the size of the facilities and the type of equipment needed to provide medical services to the full extent of his capabilities. Although the services which would be provided are not as extensive as those provided by a medical doctor, it is felt that the facilities and equipment should be very similar to those of a general practitioner practicing under similar circumstances. The possible exception to this might be the amount of laboratory equipment and the size of the X-ray machine used by the doctor. The doctor may be more qualified to analyze the results of lab tests and be better able to read X-rays; therefore, he may need more extensive laboratory and X-ray equipment in his practice. The laboratory and X-ray equipment used by the MCT, on the other hand, is subject to the constraints of his training and skills as presented in Appendix D. It is difficult to identify specific laboratory and X-ray procedures to be performed by the MCT as part of his medical service to the rural community. However, it is obvious from the information in Appendix D that there is a definite role to be played.

A list of furniture and equipment (less lab and X-ray items) needed for independent practice was taken from a publication which outlines some of the requirements for

office organization of a family practice.[5]

This information, complete with two sets of cost data for office furniture is contained in Appendix G. Analysis of cost data is presented in the next chapter. The items are only those felt to be necessary under the hypothesized circumstances. Additions to or subtractions from the lists may be possible as circumstances permit.

The size and organization of the office also depends on expected usage of the MCT. After reviewing literature on medical practice, however, space should be allowed for:

1. Reception room
2. Examination and treatment room
3. Consultation room
4. Business office
5. Toilet facilities
6. Storage and utility area
7. Laboratory
8. X-ray facilities.

It may be possible to combine a number of activities in a single room, but for the most part, ample space should be allowed for all anticipated activities. The reception room should be large enough to accommodate from six to ten patients. The examination, treatment and consultation rooms could be easily combined and contained in the MCT's office

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[5] Organization and Management of Family Practice, Committee on Medical Economics, American Academy of General Practice, Volker Boulevard at Brookside, Kansas City, Missouri (1968).

with a screen provided for visual separation or division of the room. The laboratory and X-ray facilities should be in separate rooms, away from the MCT's office. The final arrangement depends upon the facilities available as well as on the feelings of the supervising doctor about requirements for the particular area.

The only full-time assistant that the MCT needs in the operation of his facilities is a secretary who would perform certain office functions such as typing, answering the phone, arranging appointments, etc. This secretary, whose presence is important if the MCT is to see female patients, should be hired from the local community. She would not be trained, nor expected, to perform any medical tasks: This is to prevent undesirable situations of an "assistant's assistant" which would place additional burden of liability on the supervising doctor.

The MCT will have an ambulance (described in Appendix H) at his disposal to enable him to provide more complete medical service to the community. The ambulance will be used to evacuate the more critical patients from the scene of an accident or place of illness to the nearest hospital or clinic, or to the supervising doctor's office. In order to enable the MCT to render assistance to the patient during the journey, it will be necessary for the local community to have a qualified ambulance driver available at all times. This service may be provided on the same basis as the volunteer fire department or a similar community organization.

It is assumed that the community, working with the doctor and MCT, could work out any problems with regard to Oklahoma law governing the training of ambulance drivers.

The purpose of this chapter has been to arrive at an approximate patient workload which, when combined with the information about the MCT's medical capabilities described in Chapter III, served as a basis for the estimation of the size and type of facilities and equipment needed to provide full medical care to a rural community. The cost of these items and the manner in which they will be depreciated is presented in the next chapter.

CHAPTER V

ECONOMIC CONSIDERATIONS

Introduction

This chapter contains a discussion of the cost of establishing the facilities and initiating the services of the MCT, applying a fee structure to the patient work load and comparing the costs and income to arrive at a break-even point. Both the cost and income figures are only estimates of what might be expected under actual demonstration conditions. In evaluating costs, when some doubt existed as to which cost figure to use when several were available, the highest cost was selected to allow for any contingency which might arise. For this reason, the cost figures are slightly higher than those that should be encountered when such a program is actually implemented.

The break-even information and the manner in which it is presented represent an attempt to answer the questions concerning the cost of the program and the population size required for the support of the MCT. It also will point out any major financial obstacles which might arise with regard to the economic feasibility of the program.

Finally, some alternate uses of the MCT are suggested as a means of generating additional income, and other sources

of equipment and facilities are identified in an attempt to reduce costs.

Cost Structure

A list of the furniture and equipment needed in general practice is contained in Appendix G. Two separate price lists are given for the items in the Appendix, the first shows the costs estimates for setting up an office for family practice, these prices are quoted from a manual designed to assist doctors interested in establishing such a practice.[1] The second list is made up of costs of the same items taken from other sources. The second list of this appendix was compiled in an attempt to show that the same furniture could be purchased at a lower cost. The items are of good quality and, in the author's opinion will be of service to the MCT for a minimum of 10 years. Therefore, it will be assumed that the items can be procured for the total cost of $2,870. These items will be depreciated on a straight line basis over a period of 10 years.

The laboratory equipment needed by the MCT to provide full service to his patients costs an estimated $900. The approximate cost of this equipment and the X-ray machine and facilities described below was provided by Dr. Points, of the O. U. Medical School, on the basis of the information

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[1] Organization and Management of Family Practice, Comittee on Medical Economics, American Academy of General Practice, Volker Boulevard at Brookside, Kansas City, Missouri (1968), pp. 36-38.

contained in Appendix D. The cost of the X-ray facilities was set at $3,000. Both the laboratory equipment and the X-ray machine will be depreciated on a straight line basis over a period of 15 years.

Salaries and risk premiums involved in the operation of the health care facilities represent a sizable portion of the yearly expenses. Based on the information available on the starting salary of the graduates of the Duke Program ($8,000 to $12,000 per year) and the salary and benefits that an independent duty technician receives in the military, it was felt that a yearly salary of $10,000 would be necessary to attract the quality of independent duty technician desired to fill the role of the MCT. The fixed salary might be lower if an agreement could be reached between the MCT and his supervisor as to the use of some type of incentive plan.

The secretary's salary was based on an estimate of the average wage in the areas where the medical care facilities would be established, and the type of work that she would be doing. For the purposes of this study, it will be assumed that competent secretarial help can be secured for $300 per month.

Perhaps the most ambiguous fee which must be paid is that of the compensation to the supervising doctor for his additional effort and added responsibility. The figure of $5,000 per year was arrived at after conferring with Dr. Points, of the University of Oklahoma Medical School, and

Dr. Kent Mingo and Dr. John Shearer, of the Oklahoma State University College of Business. It was felt that this amount would be sufficient compensation for the doctor's time and trouble. This fee is in effect a risk compensation fee and does not encompass the total possible remuneration that a supervising physician could receive from working in conjunction with an MCT.

The total of the salaries and compensation fee present an interesting problem as far as the expense of the proposed program is concerned. The $18,600 of anticipated salaries represents a sizable cost for an operation of this size and may present a formidable obstacle to the financial, success of the program.

The cost of a fully equipped ambulance described in Appendix H is $6,099. Due to the type of vehicle necessary to provide service needed by the community and its surrounding area the decision was made to build an ambulance using a four-wheel drive Chevrolet carry-all as a base vehicle. Information as to the additional equipment needed to convert the vehicle to an ambulance and the approximate costs of these items was obtained from Tony Smith, of Stillwater, Oklahoma, who had performed a similar conversion on a carry-all to be used in his ambulance service. It is assumed that the ambulance will have a five year life. It will be depreciated on a straight line basis with a salvage value of $1,000. The cost of operation of the ambulance will be covered in miscellaneous expense mentioned below.

A number of minor expenses such as rent, utilities, taxes, insurance (excluding malpractice insurance), medical and office supplies, maintenance and other expenses should also be considered in the operation of the services. No exact figures are available for those expenses but it is estimated that they would total about $4,000 per year.

No set figure can be given for the increase in the supervising doctor's malpractice insurance. It is known that one doctor supervising a graduate of the Duke program has not had his malpractice insurance rates raised. However, this particular doctor's assistant is working in very close contact with the physician. Due to geographical separation of doctor and assistant, it will be assumed that the insurance companies will treat the supervising doctor as though he was working in partnership, as is the case with the midwife program in Colorado. In this particular case, a doctor in charge of a midwife assistant would pay twice the premium normally required. It is hoped that the amount allowed for the supervising doctor's risk premium would also cover the additional malpractice insurance.

Summary of Expenses

Item	Total Cost	Expected Life	Salvage Value	Cost Yearly	Total
Furn. & Equip.	$2,870	10 yrs.	$ 870	$ 200	
Ambulance	6,099	5 yrs.	1,100	500	
Lab. Equip.	900	15 yrs.	0	60	
X-ray Equip.	3,000	15 yrs.	300	180	
Total Depreciation Expense					$ 940
Salaries				$13,600	
Risk Premium				5,000	
					$18,600
Miscellaneous Expense					4,000
TOTAL YEARLY EXPENSES					$23,340

Fee Structure

The fee charged for the MCT's services is an important factor in the proposed program. If the fee is less than that charged by the physician, it may leave the impression with the patient that the medical service is of lower quality than that provided by the doctor. On the other hand, if the fee is the same and the patient has to be referred to the MD after being examined by the MCT, he might have to pay a double fee, and more than likely would go to the doctor for the initial examination.

In an attempt to resolve these problems, Dr. Points, Dr. Shearer, and Dr. Mingo devised a fee structure for the MCT. The purpose of the plan is to allow the patient a choice between paying a set fee for examination by the MCT or a slightly higher fee for examination by the doctor. If the patient chose to see the MCT and is subsequently referred to the doctor his total fee would be slightly higher (by 10 to 20 percent) than if he would have gone directly to the doctor. However, if by examination and consultation the MCT and the doctor decided that the patient would not require further treatment fee for the office call would be approximately 40 percent less than if the patient would have gone directly to the doctor. The purpose of this proposal is to allow the patient to save money by seeing the MCT. The problem of the feeling attached by clients by different levels of quality of service resulting from the differences in the fees still exists but hopefully could be eliminated

by the supervising doctor's open approval of the services provided by the MCT.

In an attempt to establish an exact figure for these two fees, information on the median office visit fees for general practitioners in the southern portion of the United States was obtained.[2] The fee of $5 for the first office visit is from a 1965 nationwide survey, and will be considered the average fee charged by doctors in the areas under consideration. Based on this figure, the fee for a visit to the MCT was set at $3.50 and the charge by the doctor for a patient referred by the MCT would be $2.00. When these figures are applied to the fee structure proposed above, the patient might be expected to pay from $3.50 to $5.50 for examination and treatment depending on whether or not he is referred to the doctor after the initial examination.

The question might be asked, "How can the $2 fee be justified as far as the doctor is concerned?" The assumption is made here that the MCT will be able to do the preliminary history and narrow the possible cause of the illness or perhaps positively identify it and forward this information with the patient, thus saving the doctor considerable time in the final diagnosis and treatment.

In order to insure control and maintain the clear understanding by the patients that the MCT is the doctor's

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[2]"Fees Charged vs. Time Spent on Office Services," Medical Economics, V. XLI, Part 1 (January 10, 1966), p. 92.

assistant, it is felt that the actual billing for the services rendered should be handled through the supervising doctor's office. This will also provide the doctor with a means of control in that he will have information as to the exact number of patients seen by the MCT and the services for which the patient was charged. This billing technique also eliminates any duplication of efforts in the case of patient referral. Finally, it leaves the clear understanding that the MCT works for the doctor and depends on him and his office for certain services essential in the operation of his facilities. Billing through the doctor's office may also minimize collection problems or avoid conflicts resulting from changes in billing procedures.

An alternate fee structure is proposed by the author in the last section of this chapter. Under this sytem, the billing procedure will remain unchanged, but the fee charged by the MCT will be different, hopefully eliminating some of the problems of the above system.

Break-Even Analysis

Lack of information concerning the expense created by each patient visit precludes the possibility of applying the conventional break-even analysis to the cost structure which has been developed. For this reason, all expenses will be considered fixed expenses on a yearly basis. Income will be determined on the basis of population and from this information the population size necessary to cover the expense

of operation of the facility will be estimated.

This approach is designed to determine the amount of income generated per 100 people. It should be helpful in selecting a community for the pilot program and later for determining the economic feasibility of the project in other areas. Using the information formulated earlier, one can find the income generated per 100 people who could be expected to make use of the facilities provided by the MCT 70% of the time with an average of 3.7 visits per year at $3.50 per visit, or (100 x .70 x 3.7 x $3.50). This gives a figure of $910 per 100 persons per year.

Additional income may be earned through the use of the laboratory and X-ray equipment, although no exact figure could be found as to the exact amount of this income it will be assumed that it will amount to 10% of the amount earned through office visits, or $90 per 100 people per year. When these two figures are combined the total yearly income generation potential per 100 units of population is approximately $1,000.

When this information is coupled with the yearly cost of operation approximation of $23,340, the break-even point in terms of population is 23,340 divided by 10 or 2,334 people living in or near the community where the MCT's facilities would be located. Since a city of this size would more than likely be able to attract and support a medical doctor, and the size of the towns considered in this study had an average population of 500, the program as it is

proposed would not be financially self-sustaining and, therefore, economically unfeasible.

Suggestions for Improving the Feasibility of the Program

The broad range of training received by the independent duty medical technician and the alternate sources of the facilities and much of the equipment needed to provide medical care permit a number of alterations to be made in the proposed program. These changes, many of which amount to no more than assigning additional duties or changing the present duties, will bring the program closer to a break-even situation.

The first possibility is the reduction of many of the costs involved in the establishment and operation of the facilities. Although there seems to be few alternatives to lowering the major expense, that of the salaries and the risk premium, much can be done to lower or eliminate the cost of equipment. In a number of the rural towns which are presently without a doctor, complete sets of medical equipment are available. This equipment was donated to the community by the local doctor upon his death. Other communities have complete clinics which are either closed or are open only part of the week because doctors are not available to staff them full time. With little additional expense in either situation, the MCT could use these facilities to see patients and administer health care.

Another expense which may be partially or fully absorbed by the local community is that of the purchase and operation of the ambulance. The possibility also exists that ambulance service is already provided to the community. If this is the case, the service may be more feasible since the MCT could act as the attendant, comforting and caring for the patient being evacuated. The responsibility for providing the ambulance driver would still fall on the local community and may be provided as described earlier.

Purchasing used furniture and equipment would be another means of reducing the initial capital expenditure. This could mean a significant cost reduction provided that this equipment or furniture is in good condition and could be used for a number of years.

The final proposal for cost reduction may not be feasible in the early stages of the program but may become more so as the program is accepted, and the MCT is allowed to take on additional duties applying his skills to a wider range of activities. The additional duties may not directly generate income but could be of great enough benefit to the community or supervising doctor to justify absorbing the difference between the income and expense of the total services. It may also be possible to reduce the amount paid to the supervising doctor in the form of risk premium once a good working relationship has been established with the MCT. This reduction may also be highly dependent on the risk experience of insurance companies that provide malpractice

insurance for the doctor.

The next proposal for improving the economic feasibility of the proposed program is the alternate fee structure mentioned earlier. The original fee structure proposed different fees for the MCT and the doctor with separate payment to each if the patient is referred to the doctor after examination by the MCT. This plan may place the stigma of low quality medicine on the services provided by the MCT and may cause confusion as to the actual role of this assistant. Under this plan, the MCT would charge the same fee as the doctor; in this case, $5.00 per visit and if the patient was referred to the doctor no additional charge would be made. It is the author's belief that this might encourage the local population to make use of the services provided by the MCT. This payment pattern assumes that the disutility of traveling from sixty to eighty miles to see a physician is greater than the quality imagery of the MD's services.

Payment to the doctor for seeing the referred patient could be handled in two ways. The first would be similar to the earlier plan in that all fees would be paid to the doctor and the MCT would be paid on a salary basis. Under the second plan, the risk premium to the doctor could be increased by some fixed amount. For purposes of simplifying net result, the latter solution will be used to show the change in the feasibility of the program.

It will be assumed that an increase in the risk/premium of $3,400 will adequately cover the supervising doctor's

compensation under the new fee structure. This raises the total cost of salaries to $22,000 and the total yearly cost of the entire service to $26,900. Assuming no changes in demand for the MCT's services, the income generated under the new fee structure is 100 x .70 x 3.7 x 5 or $1,295, plus the 10 percent used earlier which gives an income of about $1,400 per 100 people. This lowers the population requirement by one-fifth from 2,330 to 1,925. Although the program is still not economically feasible a significant reduction can be realized.

Any combination of the cost reduction, income increasing proposals presented here may be used to make the program more feasible.

CHAPTER VI

SUMMARY AND CONCLUSION

The doctor shortage in the United States is particularly acute in isolated rural areas. The focus of this paper was not to determine the cause of this shortage, but to explore possible solutions to it by using a physician's assistant. The proposal is that this assistant, called a Medical Care Technician (MCT) work under a doctor's supervision, but in a clinical setting, located in an outlying rural community. This geographic separation would be necessary if the MCT is to provide the early detection and prevention of disease as part of his basic medical care. The supervision would be provided by the responsible doctor through frequent telephone contact and occasional visits to the clinic operated by the Medical Care Technician. The Medical Practice Act of Oklahoma can be interpreted to allow such an arrangement between a physician and his assistant, and for this reason, doctorless rural Oklahoma areas were considered for the purposes of analysis.

The military independent duty medical technician is trained to work in a role similar to the one proposed for the MCT. Based on his training and experience, it was assumed that the independent duty technician, as typified

by Air Force independent duty medical technicians, could assume the role of the physician's assistant in rural doctorless areas of Oklahoma with a minimum of additional training.

Recognition of the independent duty technician's capabilities by doctors who are familiar with his role in the military and the acceptance by the population of such rural doctorless areas of Oklahoma that would be served by such a doctor's assistant are indications of the potential success of the MCT program. Specific information concerning the estimated percentage usage of the MCT in such rural communities and the number of visits anticipated per person each year indicated that it would be feasible to assume that the average patient in a doctorless rural community would visit the MCT 2.6 times per year.

When this estimated number of visits was combined with a fee structure, the income generated could easily be expressed in terms of population size.

The rural communities under consideration for the MCT program had a population of about 500. Based on the information about the expected percentage usage of this rural population, and the information concerning the capabilities of the independent duty technician, it was assumed that the MCT should have at his disposal facilities and equipment similar to those needed by a family doctor practicing under a like set of circumstances. In addition to the standard equipment requirement and in recognition of the MCT's

limited medical capabilities, it was assumed that the MCT would also need to have an ambulance at his disposal to evacuate serious cases to areas where more intensive care could be administered.

The variable operating costs and the cost of the furniture and equipment, depreciated on a straight line basis, are not formidable obstacles in the financial operation of the program. The economic stumbling block appears to be the salaries allowed for the MCT and his secretary and the risk premium paid the supervising doctor. The risk premium was assumed to be necessary to compensate for the additional responsibility and attention required of the doctor to insure successful operation of the program. It is this author's conclusion, based on the information presented in this paper, that the program as it is proposed is not financially feasible, and if it is initiated in this form a substantial subsidy will be required. A number of changes could be made to lower the break-even point. These include additional duties for the MCT, such as presenting health classes in the local schools, acting as an operating room assistant for his supervising doctor one day a week, or cost reduction plans such as purchasing used equipment. The income from the present work load could also be increased if a different fee structure were used.

Limitations

The research conducted for this study represents only

the most basic field research. The global approach used in presenting the topic has exposed several areas which merit further study. The survey presented in Chapter III compares the attitudes of doctors and corpsmen concerning the performance of certain medical tasks by an assistant. A similar survey of doctors who have differing degrees of experience or no experience working with military corpsmen might expose problems with respect to doctors' acceptance of the medical tasks to be performed by an assistant.

A more detailed economic analysis also could be performed on the expected costs and revenues of the MCT program.

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APPENDIX A

MEDICAL SERVICE TECHNICIAN

COURSE CONTENT

Block I - Introduction to Nursing Service

1.	Nursing Services	12 hrs.
2.	USAF Responsibilities and Relationships	3 hrs.
3.	Ethics and Interpersonal Relationships	5 hrs.
4.	Hospital Safety Practices	4 hrs.
5.	Publications and Material	3 hrs.

Block II - Personal, Family, and Community Health

1.	Personal, Family, and Community Health Principles	12 hrs.
2.	Causes, Prevention, and Signs of Illness	8 hrs.
3.	Nutrition	7 hrs.

Block III - Scientific Principles of Nursing

1.	Needs of People	10 hrs.
2.	Nursing Approaches	17 hrs.
3.	Records and Charting	4 hrs.
4.	Team Nursing, Plan of Care, and Goals of Team Nursing	4 hrs.
5.	Aseptic Techniques	5 hrs.
6.	Administration of Medications	31 hrs.
7.	Oxygen Therapy and Resucitation	6 hrs.
8.	Nursing Care of Chronically and Seriously Ill Patients	4 hrs.

Block IV - Care of Mental Health Patients

1.	Principles of Psychiatric Nursing	7 hrs.
2.	Patterns of Mental Health Care	8 hrs.
3.	Meeting and Nursing Needs of Mental Health Patients	12 hrs.

Block V - Care of Mothers, Obstetrics; Care of Newborn

1.	Prepartum Care	6 hrs.
2.	Labor and Delivery	6 hrs.
3.	Postpartum Care	6 hrs.
4.	Principles of Care of Newborn and Premature Infants	9 hrs.

Block VI - Care of Medical Patients, Care of Children; Pediatrics

1.	Nursing Care of Patients with Cardiovascular, Lymphatic, and Blood Disorders	12 hrs.

Block IV - (Continued)

2.	Nursing Care of Patients with Gastrointestinal and Metabolic Disorders	5 hrs.
3.	Nursing Care of Patients with Neurological Disorders	3 hrs.
4.	Nursing Care of Patients with Pulmonary Disorders	4 hrs.
5.	Nursing Care of Patients with Infectious and Parasitic Disorders	3 hrs.
6.	Nursing Care of Geriatric Medical Patients	4 hrs.
7.	Aeromedical Evacuation	2 hrs.
8.	Nursing Care of Patients with Dermatological Disorders	3 hrs.
9.	Care of Children	16 hrs.

Block VII - Care of Surgical Patients

1.	Principles of Care of Surgical Patients	10 hrs.
2.	Nursing Care of Patients with Chest Surgery	5 hrs.
3.	Nursing Care of Patients with Abdominal Surgery	5 hrs.
4.	Nursing Care of Patients with Orthopedic Disorders	10 hrs.
5.	Nursing Care of Patients with Surgical Infections	2 hrs.
6.	Nursing Care of Burned Patients	3 hrs.
7.	Nursing Care of Chronically and Seriously Ill Surgical Patients	6 hrs.
8.	Aeromedical Evacuation	2 hrs.
9.	Nursing Care of Patients with Urological and Neurological Disorders	4 hrs.
10.	Nursing Care of Patients with Maxillofacial and EENT Injuries	7 hrs.

Block VIII - Outpatient Clinic Nursing

1.	Principles of Outpatient Clinic Nursing	18 hrs.
2.	Emergency Care of Patients	10 hrs.

Block IX - Practical Nursing Management Techniques

1.	Disaster Nursing	6 hrs.
2.	Principles of Management	3 hrs.
3.	Personnel Management	12 hrs.
4.	Management of Patient Care	3 hrs.
5.	Team Leadership	3 hrs.

Each Block of instruction is followed by a period of Measurement and Critique. Total for this course of study is 40 hrs.

APPENDIX B

SUMMARY OF CORPSMAN'S TRAINING AND CAPABILITIES

Due to the small size of the sample (four instructors and five students) and the lack of randomness of selection of respondents, it was felt that a test for the significance of questionnaire scores would not provide meaningful results. However, by examining the questionnaire results, it is possible to visualize a trend toward one or, at the most, a combination of two of the levels of treatment deemed possible first by the personnel in charge of instruction and by the students themselves.

These actions will be described in classes by type of disorder or treatment required, not by specific disorder or treatment. If the reader so desires, he may draw his own conclusions as to the action taken for a specific disorder from the information in Appendix C. The block checked by the respondent will be marked with either an "i" or an "s" (instructor or student). The actions will be summarized by subsection in the order presented on the questionnaire.

Identification and Management of Patient Disorders

Dental Disorders - The action indicated for this type of disorder was generally treat with consultation and treat and refer. In two instances, lacerations and application of post-extraction hemorrhage packs, treat and release was considered acceptable action.

Respiratory Disorders - Complete independent action by the MCT for disorders of this nature is considered

undesirable. Emergency treatment and referral with minimal delay was the recommended action for the majority of disorders in the respiratory system. The only exceptions were asthma, pneumonia, and bronchitis, which could be treated after consulting the doctor.

Eye, ear, nose and throat disorders - The majority of patients with disorders in this category could be treated and released by the MCT. The respondents indicated that lacerations of the eye and chalazion would require referral after initial treatment by the assistant.

Genitourinary disorders - In this area there was a slight disagreement between instructors and students as to the action to be taken. With the exception of renal insufficiency, the instructors indicated that the MCT should be able to treat the patient and release him either on their own judgment or, at the most, after consulting the doctor. The students, on the other hand, indicated that referral would be necessary for most of the disorders listed.

Cardiovascular disorder - Complete independent action was not allowed for any of the disorders in this category. The level of treatment of each disorder varied among the remaining four choices depending on the severity of the disorder listed.

Abdominal and gastrointestinal disorders - With the exception of the ingestion of drugs, gastroenteritis and hernia, the MCT could be expected to perform emergency treatment and refer or refer only for the disorders in this

category. Of the three mentioned disorders, the respondents indicated the MCT could treat the first two after consultation while referral would be necessary in case of a hernia.

Neurological and psychiatric disorders - Varying degrees of treatment and referral were felt necessary by the majority of respondents for the disorders in this category.

Skin disorders - With the exception of allergic reaction and cellulitis, the respondents indicated that the MCT could treat and release patients with these disorders. The instructors felt that the two above mentioned exceptions required some consultation with the doctor, while the majority of students saw the need for referral in these cases.

Poisonous Plants and Animals

Animal related disorders - The instructors indicated the need for consultation for snake and spider bites while the majority of the students again felt referral would be necessary.

Plant related disorders - The majority of respondents agreed that the MCT could treat and release patients with disorders of this nature.

Identification and Management of Fractures and Dislocations

The respondents indicated a high preference for emergency treatment and referral for the disorders in this category and in all cases referral was indicated.

Physical Examination on All Systems

There was a marked disagreement between the instructors and students as to the MCT's capabilities in this area. The instructors indicated that no contact with the doctor was necessary, while students indicated that at least consultation and possibly referral would be necessary.

Public Health

Rabies control program - A high degree of independent action was perceived possible by the instructors while the students preferred referral after treatment in most of the situations described.

Emergency Medical Procedures

The title of this category of disorder indicated the type action most commonly prescribed, the exceptions in this case are the construction of nasal packs, closing of a minor wound and the litigation of vessels. For these disorders, the respondents indicated that the MCT could treat and release the patient. Finally, treating heat and cold injuries and performing lavage and gavage should require some level of consultation or referral to the doctor, but not on an emergency basis.

Bandages and Splints

For all types of bandages and splints listed, the respondents indicated that referral would be necessary.

Summary

The purpose of this Appendix has been to point out the level at which the MCT is trained to work and the level at which he feels capable of performing certain tasks. It should be quite clear after reviewing the questionnaire that the independent duty technician, acting in the role of the MCT, can perform certain basic medical procedures and treat the more common disorders independent of the doctor's direct supervision. Although this, alone, will not serve as justification for the proposed program, the fact that the MCT would work in the community and through his training and experience would be capable of detecting more serious diseases in their early stages and effecting their prevention through referral to his supervising doctor, acts as a strong argument in favor of the program.

APPENDIX C

QUESTIONNAIRE FOR CORPSMAN'S TRAINING AND CAPABILITIES

What amount of supervision do you feel would be required for the independent-duty corpsman to treat the following symptoms or perform the tasks described? The corpsman, in this case, is a senior specialist who has received training as an independent-duty man and has had from 8 to 20 years experience with the military. In order to qualify for the independent-duty training, the corpsman must be highly proficient in the performance of the tasks prescribed in his earlier training. For this reason, you are to assume that the corpsman is a highly competent, well-trained individual. Make all ratings as though the individual involved is an independent-duty medical technician, not a field aid man. For the disease or symptom assume that the proper diagnosis has been made.

The amount of independence listed at the head of the columns is further described as:

Treat and Release - patient should require no further treatment (an office revisit may be necessary in order to check the progress of convalescence).

Treat with Consultation - corpsman performs diagnosis and consults physician either in person or by telephone for recommended treatment.

Treat and Refer - corpsman diagnoses, performs preliminary treatment, and refers patients to doctor for more definite therapy.

Refer Only - corpsman examines and refers patient to doctor for treatment.

Emergency Treatment and Referral (Minimal Delay) - corpsman performs basic life-giving procedures and arranges for immediate contact with doctor for further care.

i = Instructors

s = Students

1 = Treat and release

2 = Treat with consultation

3 = Treat and refer

4 = Refer only

5 = Emergency treat and refer (minimal delay)

	1	2	3	4	5
1. Identification and Management of Patient Disorders					
a. Dental disorders					
(1) Toothache, unknown origin	2i	1s	4s 2i		
(2) Abscess	2s 2i	1s 1i	2s 1i		
(3) Cellulitis		3s 3i	1s 1i	1s	
(4) Lacerations	3s 3i	2s 1i			
(5) Broken and loose teeth			4s 3i	1i	1s
(6) Ulcerations and bleeding		2s 4i	3s		
(7) Apply a temporary filling	3s	1s	1s 3i	1i	
(8) Apply post-extraction hemorrhage packs	2s 3i	1s	2s		1i
(9) Pack dry sockets	2s 1i	2i	3i 1i		
b. Respiratory disorders					
(1) Airway obstruction	1s		2s		2s 4i
(2) Pneumothorax			2s 1i		3s 3i
(3) Flail chest			1s	1s	3s 4i
(4) Sucking chest wound			2s		3s 4i
(5) Respiratory arrest			1s		4s 4i
(6) Pulmonary embolism			1s		4s 4i
(7) Hemothorax		1i	1s		4s 3i
(8) Asthma	1s 2i	1s 2i	1s	1s	1s

	1	2	3	4	5
(9) Pneumonia		1s 4i	2s	1s	1s
(10) Bronchitis and tracheobronchitis	1i	3s 3i		1s	1s
c. Eye, ear, nose and throat (EENT) disorders					
(1) Laryngitis	3s 4i	1s		1s	
(2) Pharyngitis	4s 4i			1s	
(3) Tonsillitis	1s 4i	2s	1s	1s	
(4) Rhinitis	4s 4i			1s	
(5) Nosebleeds	4s 3i		1s 1i		
(6) Sinusitis	3s 4i	1s		1s	
(7) Sty	3s 3i	1s		1s	
(8) Conjunctivitis	2s 4i	2s	1s		
(9) Otitis	4i	3s	1s	1s	
(10) Foreign bodies of eye and ear	3s 2i	2i	1s		1s
(11) Lacerations of the eye			1s 1i	1s 1i	3s 1i
(12) Chalazion	3s 2i	2s	1i	2s 1i	
d. Genitourinary disorders					
(1) Cystitis	2i	1s 2i	1s	3s	
(2) Hemorrhage		1s 3i	1s 1i	3s	
(3) Renal stones		1s 3i	1s 1i	3s	
(4) Kidney infections		2s 3i	1s 1i	2s	
(5) Renal insufficiency		1s	2s 1i	1s 1i	1s 2i
(6) Venereal disease	1s 2i	2s 2i	1s	1s	
(7) Prostatitis	1s 2i	1s 2i	1s	2s	
(8) Non-specific urethritis	1s 2i	1s 1i	1s 1i	2s	

	1	2	3	4	5
e. Cardiovascular disorders					
(1) Acute pulmonary edema		3i	1s	2s	2s 1i
(2) Hypertension		4s 2i	1s	2i	
(3) Thrombophlebitis		1i	2s 1i	1s 1i	2s 1i
(4) Chest pain		1s	2s 1i	1s 1i	1s 2i
(5) Peripheral vascular disease		2i	1s 1i	3s 1i	1s
(6) Cardiac arrest			1s		4s 4i
f. Abdominal and gastrointestinal disorders					
(1) Acute abdomen		1s 1i	2s	1s 1i	1i 1i
(2) Hemorrhaging			1s	1s 1i	3s 3i
(3) Obstruction		1s	1s	2s 2i	1s 2i
(4) Penetrating wound			1s	1s	3s 4i
(5) Evisceration		1s	1s	1s	2s 4i
(6) Ingestion of drugs		2s 3i	2s 1i		1s
(7) Gastroenteritis	1s	2s 4i	2s		
(8) Hernia			2s 2i	3s 2i	
g. Neurological disorders					
(1) Coma			2s	1s	2s 4i
(2) Seizures			3s 3i	1i	2s
(3) Head injuries		2i	2s 1i		3s 1i
(4) Spinal injuries			1s 1i	1s	3s 3i
(5) Infections		1s 2i	1s	2s 1i	1s 1i
h. Psychiatric disorders					
(1) Acute anxiety		1i	2s 1i	3s 1i	1i
(2) Acute depression			2s 2i	3s 1i	1i

	1	2	3	4	5
(3) Gross stress reaction		1i	2s 1i	3s 1i	1i
(4) Acute psychosis			1s 2i	2s 1i	2s 1i
(5) Alcoholic hallucinations and delirium tremens (D.T.'s)		2i	1s 1i	2s	2s 1i
i. Skin disorders					
(1) Acne	4s 3i		1i	1s	
(2) Impetigo	1s 3i	3s	1i	1s	
(3) Herpes simplex	3s 3i	1s	1i	1s	
(4) Scabies	3s 4i			2s	
(5) Fungal infections	1s 4i	2s		2s	
(6) Allergic reactions		1s 3i	2s 1i	2s	
(7) Cellulitis	1i	2s 3i	2s	1s	
(8) Abscesses	2s 4i	1s		1s	
(9) Lymphangitis	3i	1s 1i	1s	3s	
(10) Pediculosis	3s 4i	1s		1s	
2. Poisonous Plants and Animals					
a. Signs and symptoms and management of					
(1) Snake bites		1s 3i	1s 1i	1s	2s
(2) Spider bites	1i	1s 3i	1s	2s	1s
(3) Poison Oak	3s 4i	1s		1s	
(4) Poison Ivy	3s 4i	1s		1s	
(5) Poison Sumac	3s 4i	1s		1s	
3. Identification and Management of Fractures and Dislocations					
a. Maxillo-facial			2s 1i	1s	2s 3i
b. Upper extremities and shoulder			3s 1i	1s	1s 3i

	1	2	3	4	5
c. Lower extremities and pelvis			2s 1i	1s	2s 3i
4. Perform Physical Examination on All Systems Using					
a. Inspection	4i	2s	3s		
b. Palpation	4i	2s	3s		
c. Auscultation	4i	2s	3s		
d. Percussion	4i	2s	3s		
5. Public Health					
a. Rabies control program					
(1) Control of rabies suspects	3i	1s 1i	2s	2s	
(2) Immunizations of animals	2s 3i	1s 1i	1s	1s	
(3) Post exposure treatment of patients		1s 3i	2s 1i	2s	
(4) Shipment of specimens	2s 2i	2i	1s	2s	
6. Emergency Medical Procedures					
a. Administer external cardiac massage			3s		2s 4i
b. Perform a tracheotomy			2s		3s 4i
c. Administer mouth-to-mouth resuscitation			2s		3s 4i
d. Use resuscitators (to include)					
(1) Stephenson Minuteman			2s		3s 4i
(2) AMBU			2s		3s 4i
e. Construct nasal packs	3s 3i		1s 1i		1s
f. Treatment of heat and cold injuries		2i	4s 2i		1s
g. Perform gavage and lavage	1s	1s 2i	2s		1s

	1	2	3	4	5
h. Perform closing of a wound (minor)	4s 4i	1s			
i. Perform ligation of vessels	1s 2i	1s 1i	2s 1i	1s	
7. Bandages and Splints					
a. Apply bandages					
(1) Velpeau	1i		4s 3i		1s
(2) Barton	1i		4s 3i		1s
(3) Figure of eight	1i		4s 3i		1s
b. Apply splints					
(1) Thomas leg			3s 3i		2s 1i
(2) Wire ladder			3s 3i		2s 1i
(3) Basswood			3s 3i		2s 1i
(4) Pneumatic			3s 3i		2s 1i
(5) Universal			3s 3i		2s 1i
8. Post Mortem Care					
a. Physical preparation of the remains	1s 1i	1i	3s 2i	1s	
b. Administrative and legal aspects	1s 1i	1s 2i	2s 1i	1s	

9. Personal comments as to other capabilities not included on this questionnaire (use back of page if necessary).

APPENDIX D

LABORATORY AND X-RAY PROCEDURES

1. Should be able to perform the complete blood count and platelet count. There is some doubt about the sickle cell study. The questions involve: What would be the purpose? How much equipment would the MCT have? What would we give him in refresher training before putting him in the situation where the tests would be required? The technique is relatively simple, and this individual should have no trouble becoming proficient in performing the test. The interpretation of the results of both the urinalysis and CBC is in question. Our technician would be able to collect the data and refer it via phone or radio to the supporting physician.

2. Our technicians should be able to perform the gross qualitative screening test available in kit form. The interpretation he would place on this would depend on what the supporting physician had requested the tests for; i.e., screening, follow-up for control of a particular patient, etc.

3. The technician should have no trouble in determining urinary bilirubin. The blood bilirubin determination would require equipment and time that would probably be beyond that routinely found in the independent duty technician's office.

4. This is much like footnote 3. If the MCT were provided with the equipment and given time to perform the tests, there is no question about him being able to "cookbook" the procedure.

5. Many of the enzyme determinations come in kit form and require only the solutions and glassware to complete the determination. The procedure would be, to use the phrase above, "cookbook" procedure. The need to perform such a test would depend on the requesting physician; that is, would he want the technician to perform an amylase test before making the decision to have the patient sent in to the regional hospital or does the physician want periodic SGOT determinations done for follow-up after possible coronary occlusion or overt occlusion before deciding to let the patient return to moderate activity, etc. The technician could do this, thus saving the patient hospital time, saving the trip into the supporting medical center or physician's office or save the physician the trip to the rural area of the technician's practice.

6. This is going to be determined by patient's acceptance and by how much of an umbrella will protect the individual medicolegally. In the Air Force the technician's part in this would be limited to providing the female patient with the aspiration equipment necessary to secure a specimen from the vagina, then once the patient had secured the specimen herself, the technician would be able to recover the

specimen from the collecting pipette, spatula or swab, innoculate the media or further prepare the specimen for shipment to a lab.

7. The independent duty technician can collect the specimen and prepare it for shipment. If he had the culture media or broth, he would be able to streak or innoculate the media and ship this to a lab. If he had the incubator, he could be trained to recognize the various colonies, but at the present time, we should assume that he would only collect and prepare specimens for shipment to someone else.

8. This is the simplest of all the procedures listed on the page. If the medical technician prepared a urine culture on a plate, he would need only to continue his sterile technique and drop the sensitivity discs on to the culture media. Independent duty technicians are not routinely instructed to, nor expected to know how to culture, read and evaluate the culture, nor run sensitivity tests.

9. This would only apply if there were a physician present. The collection of spinal fluid for cell count or culture would have been done by a physician. This is fairly well established medicolegally (a nurse anesthetist is prohibited from giving spinal anesthesia for the same reason). If the specimen were drawn by a physician, the technician should have no trouble using a procedures manual and performing the count.

10. There would be no difficulty in the technician learning to perform a VDRL; however, to perform one, he would have to prepare enough dilutant for 60 tests, thus this would be impractical.

11. Sputum studies would probably have to be limited to Gram stain for pneumococci, strep and staph. He could prepare adequate acid-fast strains, but the time involved and the problems with the technique would probably make it more sensible for him to collect specimens in case of possible tuberculosis, tumor, etc., prepare them correctly for shipment, and forward them to his supporting laboratory.

12. This footnote applies to all of the x-ray procedures, especially to B1, B2, B5, B6, and B9. He should be able to take these films with sufficient correctness to permit demonstration of gross defects. He should not be expected to perform these procedures with the finesse of a radiology technician. His use of these procedures would be limited to the collection of gross information for his own use or the supporting physician in trying to decide whether the patient should or should not be referred to the supporting medical center. As examples, in the case of the chest, is there, or isn't there gross pneumothorax, pneumonia, or fractured rib? In the extremities, is there a definite fracture or some

complication. He should not be expected to demonstrate the hairline fractures, etc., that lead to so many compensation problems because they are overlooked or misread by very experienced physicians. This same applies to films of the vertebrae, the pelvis and the skull. He would be able to use x-ray to demonstrate an opaque paranasal sinus, but should not be expected to go further than this. He could perform the flat films and the KUB, but the interpretation of these films must be left to the experienced eye and judgment of the surgeon.

13. There is no question of the technician's ability to do electrocardiography. He should not be expected to read (except for measurement) or interpret the electrocardiogram. It is possible to transmit the electrocardiogram by telephone and radio, thus, the technician could correctly position the patient and attach him to the EKG/Telewriter machine and send the information directly to the supporting medical center or physician.

If the thyroid function studies are confined to the BMR, he would have no difficulty performing this test. The interpretation and the results would be left to the consulting physician. The same applies to the pulmonary function test and tonometry.

APPENDIX E

QUESTIONNAIRE FOR TESTING PERCEPTIONS CONCERNING INDEPENDENCE OF TASK PERFORMANCE

The following pages contain a list of corpsman duties. Check the column or columns to indicate the amount of independent action that you feel the corpsman should take in each instance.

The actions described in each column are further defined as:

A. Corpsman examines, diagnoses, and treats entirely independent of the physician.

B. Corpsman examines, diagnoses, and consults physician by telephone for recommended treatment.

C. Corpsman examines and refers the patient to physician for confirmation and definitive therapy.

D. Corpsman administers emergency treatment and refers patient to physician.

The corpsman, in this case, is a senior specialist who has received training as an independent-duty man and has had from 8 to 20 years experience with the military. In order to qualify for the independent-duty training the corpsman must be highly proficient in the performance of the tasks prescribed in his earlier training. For this reason you are to assume that the corpsman is a highly competent, well-trained individual. Make all ratings as though the individual involved is an independent-duty medical technician, not a field aid man.

CORPSMAN DUTIES

A = Diagnoses and Treats

B = Diagnoses and Consults Physician

C = Examines and Refers Patient to Physician

D = Administers Emergency Treatment and Refers Patient to Physician

		A	B	C	D
1.	Treats maxillo-facial injuries				
2.	Does blood grouping and transfusion reaction				
3.	Administers oxygen				
4.	Immobilizes fractures and dislocations				
5.	Treats common diseases of the digestive system				
6.	Treats and handles the unconscious patient				
7.	Inserts rectal tubes				
8.	Treats injuries of the eye and external ear and drum				
9.	Applies bandages, minor dressings and hot and cold packs				
10.	Takes and records temperature, pulse, respiration and blood pressure				
11.	Catheterizes patients and irrigates catheters				
12.	Calculates the amount of a drug to be given to obtain the proper dose				
13.	Evaluates and treats common respiratory diseases				
14.	Administers subcutaneous and intramuscular injections				
15.	Gives enemas and backrubs				
16.	Treats chest injuries				

		A	B	C	D
17.	Administers first aid for various oral conditions				
18.	Treats head injuries				
19.	Constructs and administers diets				
20.	Treats certain parasitic infections				
21.	Makes up patient's individual medication cups by checking medical cards or with physicians				
22.	Does simple emergency room procedures (e.g., suture small lacerations)				
23.	Calculates the amount of a drug to be dispensed				
24.	Treats malaria and TB				
25.	Removes sutures				
26.	Performs cardio-pulmonary resuscitation				
27.	Performs on-the-spot treatment of emotional injuries				
28.	Immobilizes and cares for traumatic amputees and spinal cord injuries				
29.	Performs tracheotomy				
30.	Treats shock and control of hemorrhage				
31.	Treats skin diseases				
32.	Performs gastric lavage and gastric suction				
33.	Treats heat and cold casualties				
34.	Extracts teeth and gives injections				
35.	Treats common diseases of the genitourinary system				
36.	Inserts levine tubes				
37.	Administers blood and other intravenous solutions				

		A	B	C	D
38.	Administers barron pump				
39.	Treats infected wounds				
40.	Performs local care of burns				
41.	Treats minor wounds				
42.	Administers local anesthetic injections				
43.	Calculates the dose of a drug on the basis of body weight in kilograms				
44.	Obtains medical history of patient				
45.	Treats common diseases of the muskloskelital system				
46.	Treats certain parasitic infections				
47.	Treats injury by poisonous plants and animals				
48.	Performs mouth-to-mouth resuscitation				

APPENDIX F

ANALYSIS OF QUESTIONNAIRE RESULTS

Scores	
Doctors	Corpsmen
70	80
73	80
79	97
80	97
95	103
98	114
101	
102	
139	

$N = 15$

$n_1 = 6$ - Corpsmen

$n_2 = 9$ - Doctors

Scores arranged in increasing order of magnitude

70	73	79	80	80	80	95	97	97	98	101	102	103	114	139
D	D	D	D	C	C	D	C	C	D	D	D	C	C	D
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			5											

The purpose of the test is to determine if the two samples are from the same population, or from equal populations, i.e., if the perceptions of doctors and corpsmen concerning the level of task performance are the same. To do this the mean of the ranks must be determined:

$$\mu_1 = \frac{5 + 5 + 8 + 9 + 13 + 14}{6} = \frac{54}{6} = 9$$

$$\mu_2 = \frac{1 + 2 + 3 + 5 + 7 + 10 + 11 + 12 + 15}{9} = \frac{66}{9} = 7.33.$$

The higher mean of the ranks of the corpsmen scores indicates that they occupy the higher ranks. It must now be determined whether this is significant or whether it may be attributed to chance.

The following formula is used in this determination:

$$U = n_1 n_2 + \frac{n_2(n_2+1)}{2} - R_2$$ where n_1 = sample size for doctors

n_2 = sample size for corpsmen

R_2 = sum of the corpsmen's rankings

$$U = 9.6 + \frac{9(10)}{2} - 66$$

$$= 54 + 45 - 66$$

$$= 33$$

or equivalently

$$U = n_1 n_2 + \frac{n_1 (n_1 + 1)}{2} - R_1$$

$$= 54 + \frac{42}{2} - 54$$

$$= 21.$$

The smallest U is selected and compared to table K

$$U = n_1 n_2 - U' \qquad U = 21$$

$$21 = 54 - 33 \qquad U' = 33$$

$$21 = 21.$$

By using the tables of critical values of U in the Mann-Whitney test where $n_1 = 6$ and $n_2 = 9$, the value for U from the two populations tested here is greater than the U given by the table at every level of significance and, therefore, the null hypothesis cannot be rejected.[1]

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[1]Sidney Siegel, Nonparametric Statistics for the Behaviorial Sciences, New York: McGraw-Hill, 1956, pp. 119-120 and Table K.

APPENDIX G

OFFICE FURNITURE AND EQUIPMENT

Office Equipment

	Other	Family Practice
1. Consultation Room		
a. Desk	$ 179.95	
b. Desk chair	67.95	
c. Bookcase	54.95	
d. Armchairs (2)	89.90	
e. Lamp	20.00 Approx.	
	$ 432.75	$ 900.00
f. Examination table		
g. Instrument and supply cabinet		
h. Waste receptacle		
i. Stool		
j. Examining light		
k. Chair and writing surface		
i. Equipment stand or table	Approx.	
	$1,000.00	$1,000.00
2. Business Office		
a. Secretarial desk	$ 99.95	300.00
b. Secretarial posture chair	49.95	75.00
c. Side chair (1)	34.95	20.00
d. File cabinet (1)	64.95	150.00
e. Electric adding machine	87.95	225.00
f. Electric typewriter	197.98	400.00
	$ 535.73	$1,170.00
3. Reception Room		
Approx $50.00/chair (6)	$ 300.00	$ 600.00
TOTAL COST FURNITURE AND EQUIPMENT	$2,268.48	$3,670.00

APPENDIX H

AMBULANCE AND RELATED EQUIPMENT

Item Description	Cost	
Vehicle:		
4 wheel drive - Chevrolet* Carry-all	$3,980.00	
free-wheeling hubs	76.90	
350 cu. in. V-8 engine	36.90	
four-speed transmission	94.80	
		$4,188.60**
Additional Equipment:		
Light bar	$ 350.00	
Bunks	300.00	
Cabinets (built in)	50.00	
Portable oxygen equipment	75.00	
Built in oxygen equipment	135.00	
Resusitator	275.00	
Suction equipment	80.00	
Two radio-vehicle and base station	646.00	
		$1,911.00***
		$6,099.60

*Vehicle and related equipment prices are General Motors factory retail for the 1970 model, and were obtained from Vincent Chevrolet in Stillwater, Oklahoma.

**Total price does not include tax or transportation charges.

***Cost of additional equipment based on estimates provided by Tony's Ambulance Service, Stillwater, Oklahoma.

VITA

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Masters of Business Administration

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