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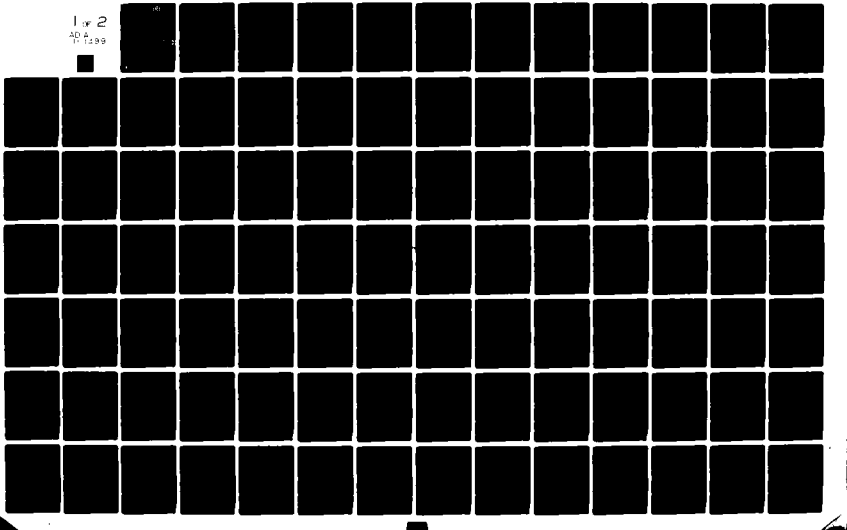

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Air Force Institute of Technology (ATC)
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ABSTRACT

A study was conducted using a mailed questionnaire to determine the attitudes of military pharmacists toward drug information center support.

The research involved four study areas including demographic information; historical experience concerning use, satisfaction, type of service desired and perceived need for this service; sources that were currently utilized to answer drug information questions; and hypothesis testing procedures.

Results showed that there were significant differences between the three service groups. The Army group indicated they utilized the services of a drug information center significantly less than the Air Force and Navy groups. All three service groups utilized the journals/texts category as the source most often utilized while obtaining information to answer drug related questions. The hypotheses testing procedures indicated that bed capacity was the only variable that was related to military pharmacists need for drug information center support. Those pharmacists that practice in clinics (no active bed capacity) indicated a significantly lesser need for drug information services than those who practice in hospitals (active bed capacity).

Recommendations for expanded future research in assessing the drug information needs of the military services were made.

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SURVEY: ATTITUDES OF MILITARY PHARMACISTS TOWARD DRUG INFORMATION CENTER SUPPORT

by

Leslie Gail "Rick" Jenkins

A Thesis Submitted to the Faculty of the

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In Partial Fulfillment of the Requirements
For the Degree of

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WITH A MAJOR IN PHARMACY PRACTICE

In the Graduate College

THE UNIVERSITY OF ARIZONA

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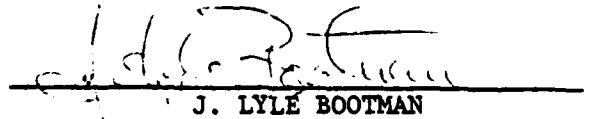

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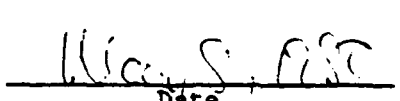

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This thesis is dedicated to my wife, Judy and my two daughters Robyn and Sara, who have given me continued love, support, encouragement, and understanding. Their unending patience during this diffcult time will never be forgotten. I love the three of you.

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ABSTRACT

A study was conducted using a mailed questionnaire to determine the attitudes of military pharmacists toward drug information center support.

The research involved four study areas including demographic information; historical experience concerning use, satisfaction, type of service desired and perceived need for this service; sources that were currently utilized to answer drug information questions; and hypothesis testing procedures.

Results showed that there were significant differences between the three service groups. The Army group indicated they utilized the services of a drug information center significantly less than the Air Force and Navy groups. All three service groups utilized the journals/texts category as the source most often utilized while obtaining information to answer drug related questions. The hypotheses testing procedures indicated that bed capacity was the only variable that was related to military pharmacists need for drug information center support. Those pharmacists that practice in clinics (no active bed capacity) indicated a significantly lesser need for drug information services than those who practice in hospitals (active bed capacity).

Recommendations for expanded future research in assessing the drug information needs of the military services were made.

CHAPTER 1

INTRODUCTION

The proliferation of scientific literature over the last three decades has led to an increasing need for an organized system to deal with the volumes printed annually. It is estimated that about two million new reports of research and development are printed each year of which approximately 50 percent contain information on drugs (Langlykke 1963). During this same time period a significant number of new drugs have been added to the market (McCabe, Henry, and Lawson 1977). When one considers the wealth of information available concerning drug products, the increasing number of products admitted to the market and the difficulty of assessing the quality of published information appearing in the plethora of different journals it is no wonder physicians face a dilemma while making therapeutic decisions (Pellegrino 1965).

Francke (1963) said "there is not need so much for more drug information sources as there is for the organization of information now available and for experienced, well qualified persons to disseminate it." This quotation stated the problem very well for that generation and it is also quite appropriate for today. The following decade and a half saw the mushrooming of approximately 90 Drug Information Centers across the U.S. (Halbert, Kelly, and Miller 1977).

The majority of these centers are co-located with University Health Sciences Centers. This is just as it should be for the 1974 Federal Drug Administration Drug Survey revealed that most physicians favor a university based drug information center (Applied Management Sciences 1974). Other studies have shown that physicians favor such a service and indicate a willingness to utilize such a program (Hirschman 1972, Dillon 1971, and Greth, Tester, and Black 1965).

One stipulation that the medical profession has placed on the success of this concept is that the information provided must be accurate, timely, and reliable (Greth et al. 1965, Nelson, Meinhold, and Hutchinson 1978). The originators of the Drug Information Center concept found soon after its inception that the average College of Pharmacy graduate lacked the qualifications needed to provide the answers to physicians' therapeutic and clinical questions (Walton 1967).

In order to correct this deficiency the pharmacy professional organizations working in conjunction with the Colleges of Pharmacy developed a new entity called the Drug Information Specialists. This individual receives special training, preferably post-graduate, in the various disciplines. Areas of additional support include: drug communications, pathophysiology, biostatistics, and computer sciences.

The philosophy of the Drug Information Center concept is to provide a system that is efficient in physically handling and storing the volumes that are necessary as source documents to answer questions presented by the various health care providers. In order for this concept to function efficiently and effectively an individual that is

specifically trained to read, interpret and make judgemental decisions based on current literature must be utilized to provide information in a patient specific, clinically significant form.

The practice of medicine in the Armed Forces, Department of Defense is in most cases much like that in any other hospital setting. Many of the hospitals provide the full range of medical specialities while other exist primarily as out-patient ambulatory care settings. The military services are responsible primarily for providing care to active duty military personnel. As facilities or space is available then services are offered to dependents of active duty personnel, retired members of the Armed Forces as well as their eligible dependents. In most cases all of the different categories of qualified recipients are treated at any facility. According to the FY1977 Annual Defense Department Report (Report of the Secretary of Defense 1976) about 9.5 million persons are eligible for some form of health care in military facilities. Approximately 20 percent of these are active duty military personnel.

In addition to the traditional categories of medical care specialties, the military physician is faced with specialities that are not prevalent in the practice of medicine outside the military. Aerospace medicine is a speciality for which physicians receive additional training after coming on active duty that deals with the special problems and needs of aviators. The stress placed on their organ systems, the distribution and disposition of drugs, while maneuvering supersonic aircraft require special training to understand and treat this population. The Missile Launch crews once again require

physicians to have additional training in order to help these individuals cope with the rigors of their duty. Additional training is required to be qualified to treat crew members who have been exposed to the vapors of fuels and oxidizers utilized to launch missiles. The United States Navy physician requires additional training to treat the stresses placed on an individual who is submerged in a submarine as well as flight medicine. The United States Army physician is trained to treat radiation exposure in the event of a nuclear attack. It is fair to assume that the military physician has the same need for drug information as any physician but in addition he has special needs for additional information that is not available through conventional sources. A Drug Information Center that would provide access to each physician on active duty would facilitate his conventional therapeutic requirements as well as meeting his special needs. This system could be implemented as a joint effort among the three branches or for each branch to be responsible for meeting the drug information needs for that service. However, it appears that a joint effort among the three branches would provide the most efficient, economical mechanism for providing drug information to its health care providers.

The Air Force presently has one Drug Information Center in operation, located at Malcolm Grow Medical Center, Andrews Air Force Base, Washington, D.C. It is operated by the Department of Pharmacy and is staffed by Drug Information Specialists. Neither the Army nor the Navy has an organized Drug Information Center. The Air Force

Drug Information Center is operated primarily for that facility but will honor requests from other facilities on a space available basis.

Statement of Problem

It has been pointed out by most professional pharmacy organizations and leaders in pharmacy practice that a real deficiency exists in providing drug information to both medical practitioners as well as the public. The Millis report (The American Association of Colleges of Pharmacy [AACP] 1975) supported this observation and added that the pharmacy professions; major contribution to the health care team should be that of providing drug information.

There appears to be a mechanism present in today's pharmacy practice, the Drug Information Center, to provide both health care practitioners as well as the public with good and reliable drug information. However, there seems to be a lack of commitment on the part of educators, legislators and the pharmacy profession to provide the basis for the needed service.

The military services have the same need for drug information as the private sector. The military services are at the same point as the private sector, that is decisions have to be made as to what direction pharmacy practice is going to take in the next decade. One important part of pharmacy practice is that of providing drug information to both its health care providers as well as its members. The drug literature is void of studies which evaluate the pharmacists' need for drug information support. Even though over the past decade and a half there have been a good number of articles written by the

pioneers of the drug information center concept they have been limited, with a few exceptions, to experiences gained while implementing such programs. This study will provide some of the data needed for making decisions on the future of drug information in the military services.

Statement of Purpose

The purpose of this study is to determine the perceived need, by active duty military pharmacists, for an organized drug information center program. Drug information centers may be administered in several different ways. This study will determine the type of drug information service military pharmacists perceive as an optimum for meeting their facilities drug information needs.

Objectives

This study will determine the current status of drug information as a service to providers of health care in the various military facilities. It will encompass four major study areas:

Study Area I: Demographic

The eight following study area objectives will be determined. The study objectives are to determine: (1) the military branch each military pharmacist serves; (2) the active bed capacity of the medical facilities represented by the military pharmacists who participated in this study; (3) the number of clinical specialities a medical facility provides its patients; (4) the level of services provided by the Department of Pharmacy for its medical staff members; (5) the level of outpatient services that are provided by the Department of

Pharmacy by each service group; (6) the level of inpatient services that are provided by the Department of Pharmacy; (7) the highest degree military pharmacist has earned; and (8) the number of years served by military pharmacists in each respective military branch.

Study Area II: Determine the opinions concerning the utilization, satisfaction, type and need for drug information center support.

The four following study area objectives will be determined: (1) the frequency which military pharmacists have utilized a Drug Information Center; (2) the level of satisfaction received by those who have utilized a drug information center; (3) the type of drug information service the members feel would most likely meet their drug information needs; and (4) the opinions of the service members perceived need for drug information center support.

Study Area III: Determine sources military pharmacists utilize while obtaining drug information for answering eight specific questions.

Information will be solicited to obtain the sources most often used for obtaining drug information concerning eight questions.

The seven sources that are of interest are: (1) Physicians' Desk Reference/Fact and Comparisons; (2) Journals/Textbooks; (3) Colleagues; (4) Continuing Education; (5) Detail Person; (6) Drug Information Center; and (7) Others--Medline, Medlars and etc. The eight specific questions addressed are: (1) Adverse drug reactions and interactions; (2) Therapeutic indications and contraindications for specific drugs; (3) Basic pharmacological and toxicological information; (4) Evaluation and comparisons of new and/or

investigational drugs, or information about foreign drugs; (5) Drug interference with laboratory tests; (6) Advice on dosage information, preferred routes and schedules of drug administration; (7) Intravenous incompatibilities and stability; and (8) Pharmacokinetic information concerning half-life ($t_{\frac{1}{2}}$), volume of distribution (Vd), protein binding, etc.

Study Area IV: Hypotheses Testing

The hypothesis testing procedure will be conducted on objectives in study area I and compared with the dependent variables in study area II. The objective of the hypotheses testing procedure is to determine if demographic variables are related to military pharmacists perceived need for drug information center support.

Hypothesis I: The military branch that a member serves should be an indicator as to the level of drug information center support a pharmacist needs. The Army and Navy both have larger medical facilities than the Air Force; and consequently their level of specialization in their facilities are greater too. Consequently, one would expect that the Air Force need for drug information center support would be less than either the Army or Navy.

Null Hypothesis I: There is no difference between the military branch a member serves and his perceived need for drug information center support.

Hypothesis II: Those pharmacists that practice in larger facilities should require more drug information support than those who practice in smaller facilities. The testing procedure will determine

if there is an association between bed size and a pharmacist's perceived need for drug information center support. It will also look at the difference in need between those pharmacists that practice in clinics (no bed capacity) and those that practice in hospitals.

Null Hypothesis II: There is no difference between those pharmacists that practice in facilities that have 1-200 beds and those that practice in facilities with bed capacities over 200 beds in their perceived need for drug information center support.

Hypothesis III: As the number of clinic specialities that a facility provides its patients increases, one would expect that the Department of Pharmacy would require more drug information center support. This support would enable the pharmacy staff to meet the drug information needs of this more specialized medical staff. The testing procedure will determine if the facility clinic services are associated with a military pharmacist's need for drug information center support. The number of clinic specialities that will be tested is the median number of services provided by all military pharmacists.

Null Hypothesis III: There is no difference between those military pharmacists that practice in facilities that provide services below the midpoint and those that practice in facilities that provide services above the midpoint level in their perceived need for drug information center support.

Hypothesis IV: The quantity and quality of service that a Department of Pharmacy provides its medical staff should be an indicator for determining its need for drug information center support. As

the number of services a department provides its medical staff increases the amount of drug information center support required should increase. This support is necessary in order to obtain the needed background information for implementing or sustaining services. The hypothesis testing procedure will utilize the median number of services to separate pharmacists into those that are assigned to departments of pharmacy that provide service below and above the rounded midpoint.

Null Hypothesis IV: There is no difference between those pharmacists that are assigned to departments of pharmacy that provide fewer services than rounded midpoint and those that are assigned to departments that provide greater than the rounded midpoint number of services in their perceived need for drug information center support.

Hypothesis V: Those military pharmacists that practice in departments of pharmacy that provide a large number of services to its outpatients should have a greater need for drug information center support than those who provide fewer services. The pharmacists were divided into two groups, those that practice in departments that provide services below and above the rounded midpoint number of services.

Null Hypothesis V: There is no difference between those military pharmacists who practice in departments of pharmacy that provide services below the rounded midpoint level and those that practice in departments above the rounded midpoint level in their perceived need for drug information center support.

Hypothesis VI: Those pharmacists that practice in departments that provide a high level of services to its inpatients should have a

greater need for drug information center support than those who practice in departments that provide a low level of services. In order to implement and to continue providing those services requires a great deal of support. The pharmacists are divided into two groups, those who work in facilities that provide services above and below the rounded midpoint number of services for the study group.

Null Hypothesis VI: There is no difference between those military pharmacists who practice in departments that provide inpatient services below the rounded midpoint and those who practice in departments that provide service above the rounded midpoint level in their perceived need for drug information center support.

Hypothesis VII: Military pharmacists who have earned an advanced degree should be motivated to keep abreast of new trends in pharmacy practice and be more aware of the advantages of such a service. The pharmacists will be divided into two groups, those with the initial Bachelor of Science in Pharmacy as their highest earned degree and those who have earned an advanced degree.

Null Hypothesis VII: There is no difference between those military pharmacists who have earned an advanced degree and those who have a Bachelor of Science in Pharmacy degree in their perceived need for drug information center support.

Hypothesis VIII: The Drug Information Center concept is a fairly recent innovation. Those pharmacists who have been practicing longer than 10 years probably were not exposed to the concept while obtaining their professional training. This testing procedure will

determine if the number of years in a military service is associated with a pharmacist's need for drug information center support. The testing procedure will test those pharmacists that have been in the service for 1-10 years and those that have been in longer than 10 years.

Null Hypothesis VIII: There is no difference between those pharmacists who have been in the military service for 1-10 years and those that have been in for greater than 10 years in the perceived need for drug information center support.

Definitions

Aerospace Medicine refers to a speciality in military medicine that specializes in the stress, strain and problems that are peculiar to flying aircraft at supersonic air speeds.

Detail Person refers to a drug manufacturer representative. This individual's purpose is to disseminate information to health care providers and to entice them to purchase his product.

Drug Information Center refers to a system that utilizes various sources of drug information while answering questions from a provider of health care. This system disseminates accurate drug information in a usable form.

Drug Information Specialist refers to a registered pharmacist who has received additional training in drug information systems. He is qualified to evaluate the literature and studies as to their design and make general recommendations concerning therapeutics questions.

Military Pharmacist refers to an individual on active duty in one of the triservices and a registered pharmacist in one of the 50 United States.

Physicians' Desk Reference refers to a compendia that list drug products information provided by manufacturers and only those manufacturers that are willing to pay to have their product included in this book.

Triservice refers to the United States Air Force, United States Army and United States Navy in a combined form. In this study it refers to a joint effort to provide drug information in an efficient and economical manner.

CHAPTER 2

RELATED LITERATURE AND RESEARCH

The purpose of this chapter is to discuss both the literature and research related to the development of the Drug Information Center concept. This chapter will begin by reviewing the historical significance of the drug literature explosion. The impact of the continuous proliferation of contemporary literature on the health care arena will be explored. Following this the evolution of the Drug Information Specialist and the contributions he is capable of making to the health care team. The chapter will conclude with the pharmacy profession's answer to handling the information explosion and providing a needed service to health care, also a discussion on some contemporary problems facing this system that must be corrected if this concept is to survive.

The Information Explosion

The information science concept had its beginning with Watson, Davis and their organization, The American Documentation Institute, in 1937 (Fairthrone 1975). This concept continued to flourish following World War II up to the present. The years following World War II were witness to a proliferation of printed material that was unprecedented in the history of civilization (Fairthrone 1975, Werdel and Adams 1976). Technical and military documents confiscated from the conquered nations

of Germany and Japan gave early evidence and in some cases laid the foundations of future developments. Soon after an information explosion of scientific and technical research became visible (Burchinal 1975).

Increases in medical research and the subsequent increase in new drug products, combined with changes in federal drug legislation and in medical pharmaceutical practices, came a natural increase in medical and pharmaceutical literature (Reilly 1972). It is estimated that about two million new reports of research and development are printed annually, 25 to 50 percent of which contain information on drugs and about 200,000 of which are termed "pharmaceutical" publications (Langlykke 1963). It has been said that 90 percent of the scientists of all times are living today and most of the entire scientific literature of the world has been published during the past 25 years (National Library of Medicine 1965).

New Drugs

In addition to the proliferation of literature published in the last two decades a formidable array of new drugs have been added to the market. As well as having powerful therapeutic effects, many of these agents have considerable toxic potential, produced either directly or indirectly through interactions with other drugs (McCabe et al. 1977). An estimated 25,000 to 30,000 different registered drugs are available in today's market. There are literally millions of prescriptions written for these products each year (Berkowitz and Chang 1978). This situation is not static, new drugs are continually

being developed, tested and marketed each year. One could safely predict with certainty that this trend will continue for the forseeable future.

Interpretation of the Literature

The picture is complicated even further as more drug literature is published and new drugs appear on the market. The user of drug information must use considerable discretion in the selection of material to be used. The literature is more complex each day and as technology progresses it contains more outdated information. Therefore, one must consider and be aware that both current and obsolete information are in circulation concurrently (National Library of Medicine 1965). It is fair to assume that between the researcher and clinician, lies a wealth of drug, therapeutic and scientific information. The utilization of this information would contribute to improved patient care if it were effectively communicated to and interpreted for the providers and consumers of health care (Reilly 1972).

However, Schor and Karten (1966) in their review of the top ten medical journals for the first three months of 1964 found that the interpretation of the literature is no easy task and a trained individual must be utilized to accomplish this function. They evaluated three issues of each journal to determine if conclusions drawn were valid in terms of the design of the experiment, the type of analysis performed, and the applicability of the statistical test used or not used. Their findings revealed that of the 149 analytical studies critically evaluated, less than 28 percent were considered acceptable

as written. Five percent were judged unsalvageable. In 73 percent of the reports read, conclusions were drawn where the justification for such conclusions were invalid. No journals surveyed had more than 40 percent of its analytical studies considered acceptable and two of the top ten had a zero acceptability rate. This study implies that the quality and credibility is such that considerable effort is required to evaluate and interpret the published literature.

Sources Used in Obtaining Drug Information

The plethora of new potentially toxic drugs has on the whole been released onto the market over the past 20 years. This is within the time interval since a significant number of practicing physicians and other health care providers have completed their basic studies. It is therefore of some importance to appreciate the methods by which they acquire knowledge of the indications, dosages and undesired effects attributed to these agents (McCabe et al. 1977). Studies show that most physicians depend on medical journals for the majority of their drug information (Harelik et al. 1975). One of the first studies concerning physician drug information sources conducted in 1958 showed that medical journal articles and detailmen ranked highest (Feiber and Wales). A study done three years later investigated the diffusion of new drugs among physicians. Once again medical journals received the highest rating by physicians (Winick 1961). In several studies, investigators (Henley et al. 1968, Linn and Davis 1972, Ruskin 1974, Harelik et al. 1975 and Marchand 1977) concluded that physicians

utilize medical journal articles as a primary source for drug information questions.

Even though these studies indicate that medical journals are the primary source of drug information for the majority of the polled physicians, the 1974 FDA Drug Study indicates that a physician spends only 19 minutes daily in obtaining drug information. There is little doubt that any person, even a person trained specifically in literature retrieval, can perform a comprehensive literature search needed to answer a drug information problem in that short period of time. The 19 minutes spent in obtaining drug information included opening drug related mail and time spent with manufacture representatives. In addition it is doubtful that most physicians have available the facilities required to house the countless volumes of medical journals, texts, etc. needed to do a comprehensive drug literature search. This author feels that there is a definite weakness in the design of the instrument that tested physicians' sources of obtaining drug information. It is postulated that possibly the respondents answered in a manner in which they felt they would be expected to respond. I feel it is fair to conclude that most health care practitioners practicing in a setting outside a university based health sciences center does not have available to him adequate sources to answer all his drug information needs.

Another source listed in the above studies is the utilization of manufacturer representatives of the various drug companies. It has been shown that much of the information physicians received from

this source is biased. Adverse reactions or contraindications of a particular drug may be suppressed by pharmaceutical manufacturer representatives (Drugs: Those Adverse Effects 1965).

The physician and other health care providers who practice in a facility that has adequate drug information resources are also confronted with some dramatic problems when attempting to obtain drug information from these sources. There are numerous sources available to them (Reilly 1972). These sources include a host of therapeutic oriented books (Current Diagnosis and Treatment, Current Therapy), periodicals and newsletters (Medical Letter on Drugs and Therapy, Food and Drug Administration Bulletin), secondary literature sources (de Haen, Drug in Use, Index Medicus, Excerpta Medica Abstracts), on-line systems (MEDLINE, MEDLARS) and a host of primary journal articles.

Difficulties in Obtaining Drug Information

Unfortunately, these sources are rarely accessible for use when drug related questions arise. A study on the methods by which drug information is disseminated to physicians and their reliance on available sources of drug information indicate that textbooks, detail people, medical periodicals and pharmaceutical literature are used most frequently (Henley et al. 1968). This study and another (National Library of Medicine 1963) show that the Physicians' Desk Reference (PDR), because of its availability (e.g. distributed free of charge to many physicians by pharmaceutical manufacturers) and convenience is the most frequently mentioned and used source of drug

information for the physician. The PDR publishes only manufacturers' material and only those manufacturers that are willing to pay to have their products included into this compendia. This collection represents little more than the package insert. Other sources that may be available include the American Hospital Formulary Service, AMA Drug Evaluations, and Martindales' Extra Pharmacopeia. The usefulness of these texts cannot be overlooked, but it is impossible for these sources to keep up with new drugs admitted to the market or new clinical data regarding older drugs, considering they are only revised periodically. Therapeutically oriented textbooks are a secondary source of information and usally lag from one to two years behind journal literature. Automated on-line retrieval systems are either considered secondary or tertiary sources of information and their information lag is from weeks to one year behind the cited material. Services such as Index Medicus, de Haen's Drugs in Use, and Excerpta Medica Abstracts do not appear in these sources for a period up to a year after they are published, making it difficult to search the recent literature for new developments. Journal articles are a source of primary information and most of the time the most current documents availabe on a topic (Ruger and Michelson 1978). Answers to common questions that physicians and other health care providers ask are usually available in the medical literature, but they often do not have the resources available to pursue solutions to these problems. The health care practitioners need for drug information is often unique and cannot be provided easily by conventional or accessible

sources. The need does not occur at any specific time interval or any set time of the day. The practitioners' needs often involve the immediate problem of a specific patient (Vrabel and Amerson 1972).

Ruskin (1974) conducted a survey of over 10,000 physicians in the United States including all medical specialties and geographical areas. One interesting finding is that physicians on an average spend 19 minutes daily acquiring drug information. Busy clinicians find it impossible to keep abreast of all advances being made everyday in drug therapy. Also an increasing specialization in medical practice physicians often find themselves confronted with problems concerning unfamiliar drugs (Vrabel and Amerson 1976). These deficiencies have resulted in an inappropriate drug use and an unacceptable frequency of drug induced diseases (Rosenberg and Kirschenbaum 1976b).

Results of these Difficulties

With the vastness of the literature and the time restraints of a busy clinician it is actually impossible for physicians to keep abreast of all the drug innovations and adverse reactions that are reported (Henley et al. 1968). Caranasos, Stewart, and Cluff (1974) and Miller (1974) reported on the toxicity of drugs. Their findings indicate that two to five per cent of admissions to hospitals are a direct result of unwanted drug effects. Moreover, once in the hospital, patients are at even greater risk of experiencing an undesired side effect attributable to one or more drugs. Miller (1973) reported that twenty-eight percent of admissions had experienced one or more side effects during their hospital stay. Thus the magnitude of the problem

appears to be immense and it has been suggested that the cost of undesired drug effects may exceed three billion dollars annually (Mehnon 1971).

Physicians' Attitudes Toward Drug Information

When one considers the obstacles that physicians and other health care providers face while attempting to obtain drug information, it is no wonder that the majority of the physicians polled by the Food and Drug Administration Drug Information Survey (Moser 1974) demonstrated an interest in new types of drug information sources. These new types of information included computerized and telephone link to university consultants, a new detail person with specialized training from a university program and a new drug compendia produced by a non-governmental agency. Ruskin's (1974) survey indicated that sources currently utilized by physicians for drug information are not a satisfactory mechanism for the continuing flow of knowledge and information about drugs that is constantly needed by the physician.

It is easy to conclude that the ever increasing complexity of therapeutics has not been matched by the provision of readily available and comprehensive drug information for the medical and related professions (Leach 1978). Partly because of this there has been an unnecessary incidence of adverse effects (Care in Prescribing 1976), inappropriate or suboptimal drug treatment (How Do Doctors Learn About Drugs 1975) and financial loss from drug waste (Hart and Marshall 1976). But more tragic is the fact that between 60,000 and 140,000

deaths are estimated to occur each year due to adverse drug reactions (Shimomura and Watanabe 1975).

Conclusion

McCarron (1975) describes factors which cause significant drug therapy problems in the hospital. Of the five factors, four are basically due to inadequate knowledge, a lack of information or the generation of data concerning drug entities. Physician and other health care providers must be selective and use critical judgment in assessing their drug information (Keefer 1966).

The Millis report on "Pharmacists for the Future", (AACP 1975) recognized that one of the deficiencies in the health care system is the lack of adequate information for those who prescribe, dispense and administer drugs. Consequently, two of the major problems which must be solved in order to provide efficient delivery of the health care are the communication and utilization of selective drug information (Reilly 1972).

The Drug Information Specialist

Francke (1963) was quoted as saying "there is not need so much for more drug information services as there is for the organization of information now available and for experienced and well qualified persons to disseminate it". No individual physician can hope to maintain a complete source of information. Therefore, the establishment of drug information centers operated by qualified persons would meet the requirements for providing accurate and timely drug information. This center would possess both the volumes and a trained

individual to properly utilize these references to meet the needs of physicians and other health care providers which arise from situations involving patient care, teaching and research.

As the groundwork was laid and the need for a system to consolidate and coordinate the large number of literature sources evolved, innovative pharmacy leaders, Francke (1963) and Walton (1967) saw this as an opportunity for hospital pharmacists to contribute to the health care team. Initially, it was felt the pharmacist was the most highly trained and qualified individual to provide information concerning drugs. However, it was realized quite early in the development of the drug information service that the information requested by practitioners could not be provided adequately by the recent graduate of a college of pharmacy (Walton 1967). Francke (1966) and Walton (1967) both described a new entity called the "Drug Information Specialist" as a professionally functional individual who applies his body of biomedical knowledge, scientific principles and professional judgment in the selective utilization and communication of drug literature data. This clinical specialist would require additional training in drug literature evaluation, pathology, biostatistics, experimental design and clinical drug communications. Those authors also saw the need for a documentation specialist, one who is method-oriented and specializes in schemes for handling information regardless of the subject. They felt that the trained drug information specialist working in conjunction with a documentation specialist would possess the credentials for providing unbiased, accurate drug information. The

advent of new pharmacy curricula which included courses in clinical sciences and pathophysiology, the younger pharmacist, with at least some clinical training, could finally communicate his drug knowledge in a clinical context. Decentralization of pharmacy services and the concept of clinical involvement have evolved into accepted pharmacy practices. These innovative services have placed in the patient care environment a resource that can utilize literature sources and provide patient specific information (Moynahan 1970).

Of the various clinical roles proposed for the pharmacist, the drug information specialist was probably the earliest identified and accepted responsibility (McLeod 1978). The Drug Information Specialist deals with the separation of the pertinent from the irrelevant information. Confronted by an enormous body of literature, the specialist is particularly concerned with relevance. It is his task to isolate those documents that are vital to improving health care and to relate their importance to the clinician (Ruger and Durgin 1978). The two basic requirements for a drug information specialist simply are (1) communication skills and (2) a working knowledge of literature sources (Burkholder 1965).

Francke (1965a) theorized that in the field of drug information "tens of pharmacists could serve the needs of thousands of physicians serving millions of patients". The information cycle as described by Cohan and Craver (1961) is: creation, publication, identification, recording, organization, storage, recall and ultimately utilization. However, the most important part of the drug information problem deals with the facilitation of the later step, utilization.

That is to get this data into the minds and hands of physicians, nurses, and other allied health care professionals. Daily these providers of health care require such data for the care of patients, teaching and research (Francke 1965b).

It may sound as though this author is building a case to eliminate the staff pharmacist from being a provider of drug information. Quite the contrary is true. The role of the Drug Information Specialist is not to eliminate this source of information but to support it. The ideal situation utilizes the pharmacist for routine and initial encounters with physicians and the drug information specialist serving as a secondary consultant only when a therapy problem is complex or the literature search large (Wertheimer, Schefter, and Cooper 1973).

One might ask the question, is there a need for additional drug information and if so, why should the pharmacists be expected to be the dispenser of this drug information? (1) There is a need for more and better drug information. If the present system of information dissemination was adequate, alleged irrational prescribing (Simmons and Stolley 1974, and Senate Eyes 1974) and noncompliance would not be the problem they are today. (2) The pharmacists receive formal professional training concerning drugs and their uses. This instruction provides him with the knowledge that is necessary to be a provider of drug information to other health care team members. (3) It has been well established that there is a need for additional drug information and also that the recently trained pharmacist is the most qualified person to provide this information. Professional survival

dictates that the mechanical skills of compounding and dispensing must make way for the skill of communication and patient education. As the report of the Study Commission on Pharmacy (AACP 1975) states "If pharmacists are to participate in primary and preventive care, it will not be so much as dispensers of drugs but rather dispensers of drug information, both to individuals providing direct patient care and to the community" (Kitt and Sperandio 1977).

A survey conducted in 1972 (Hirschman) regarding the adequacy of physician and pharmacist sources of drug information revealed that both professional groups regard themselves as inadequate as a source of drug information. These professionals stated that they would prefer written documentation, as could be provided by a drug information specialist operating out of a drug information center over any other source of information. An earlier study (Greth et al. 1965) indicated that physicians need information and they indicated they would request it from a pharmacist if it were immediately available and if it comes from good information sources. On other occasions physicians have personally indicated that a drug information specialist could better meet their information needs than what they were currently using (Dillion 1971; Hamm, Stanaszek and Sommers 1973; Weibler 1973). These reports lead to the conclusion that both physicians and pharmacists have a need for additional drug information and both groups agree that it could be successfully provided by an individual with special training in drug information retrieval and utilization (Harelik et al. 1975).

In order for this arrangement to be successful to all parties involved the Drug Information Specialist must obtain the ability to communicate on a peer basis with these practitioners. Proper communication with the inquirer is an important consideration in providing a useful service. Regardless of the nature of a question, the basic requirement is to define the problem. In many instances this becomes relatively simple. However, in other instances a knowledgeable qualified person must communicate with the inquirer to discretely assist him in framing the question. Once the question or problem is known then a satisfactory response will likely follow (Amerson and Walton 1971).

Once the question is determined then the information specialist must provide the inquirer with a sufficient amount of information to make his therapeutic decision. The concept of peripheral data play an important part in the amount of information that is to be provided. If 95 percent of the information is utilized by the inquirer, the search may have been too narrow. The result of this search may indicate that the information provided was inadequate. Conversely, if less than 80 percent of the furnished information is utilized, the search may have been too wide. An 85 - 90 percent utilization of information by the requestor assures that any peripheral needs were met and that extraneous data was minimal (Beltran 1971).

When one considers that physicians are not able to maintain therapeutic currency, concurrently with their practice of medicine it is ludicrous to think that a staff pharmacist can keep abreast of drug information skills while performing his daily tasks. It then becomes

evident that an individual who has a comprehensive knowledge of drugs as well as a background in the information process can be a valuable asset to the health care providers. The magnitude of this position dictates that this person's practice be limited to providing drug information support to other health care providers. This Drug Information Specialist is equipped with all the resources (time, ability and literature sources) available to research a problem and provide a comprehensive answer to a therapeutic problem. Today we are faced with a situation where information output and technology are progressing so rapidly that, in order to be effective, the drug information specialist must not neglect the function of documentalist. He must become intricately involved with systems use, theory and design. Likewise it is true that the documentalist cannot be effective if he is not clinically oriented (Johnston et al. 1976). It is for this reason that the optimum location for a Drug Information Specialist is in a Drug Information Center located in a university medical library. Here he will have available a valuable source, the medical library and a staff of medical librarians. This valuable resource in combination with the information sources available to him in the Drug Information Center (Iowa Drug Information System, de Haen's Drugs in Use, etc.) will provide the resources required to answer most drug information questions.

The Drug Information Center

The Drug Information Center has evolved due to a need to provide a centralized sytem which disseminates current, unbiased valid

information in a timely manner to health care providers (Reilly 1972; Vrabel and Amerson 1976). Recognition of the need for such a service is evident in England where Leach (1978) defines the objective of their Drug Information Service as providing advisory information to medical and allied staff in hospitals and in the community to achieve maximum safety, efficiency and economy in drug use. The idea of processing, controlling and disseminating drug information developed practically parallel to the concept of clinical pharmacy (McLeod 1978). One of the first Drug Information Centers originated in 1959 at the Los Angeles County/University of Southern California Medical Center (McCarron and Thompson 1974). This center was staffed exclusively by physicians and was not placed under the directorship of a pharmacist until June 1973. The first fully operated Drug Information Center under the auspices of a pharmacist originated in 1962 at the University of Kentucky (Burkholder 1963). This center has continued to serve as the prototype for many later organizations. Since that time, the concept of providing continuing and somewhat structured drug information from a physical location specifically designed for this purpose has expanded (Anderson and Latiolais 1965, Zilz 1967, Henley et al. 1968). For the most part, due to economic reasons, the development of Drug Information Centers has been limited to institutions with library services characteristic of major medical facilities. Unfortunately, with few exceptions, the scope of support to practitioners has not extended from the university biomedical community into areas where limited availability of resources exist (Amerson and Walton 1971). This weakness has been recognized and in an effort to broaden the scope

of contact and provide service to those outside the university community, a trend toward regionalization of drug information centers has emerged in recent years. An example of such a program is the Michigan Regional Drug Information Network. This system consists of a network of drug information centers providing statewide services (Pearson et al. 1970).

Serving as a regional information center enables this network to reach out into all sections of a geographical area. The center offers assistance to other pharmacists who provide drug information to physicians. By utilizing this type of system drug data can be expanded and better manipulated. Also access to otherwise unavailable information is facilitated by the Drug Information Center.

Development of Regional Centers

In 1965 the President of the United States created a commission headed by Michael DeBakey, M.D. to investigate the current status of treatment in this country of heart disease, cancer, stroke and related diseases. The report of the Commission served as the impetus for federal legislation culminating in the passage of Public Law 89-239. The provision of this law included the creation of the Division of Regional Medical Programs (RMP) within the Department of Health, Education and Welfare and the appropriation of $50 million (Pearson et al. 1970). The purpose of this law was for regional medical programs established in 1964 to function as an action-oriented consortium of health care providers responsive to and resolving health needs and problems on a regional basis (Regional Medical Programs Services [RMPS]

1971). They brought health care providers together to meet needs that could not be met by individual efforts (Groth 1975). Local resources and needs were taken into account and thus Regional Medical Programs were a potentially important force for bringing about changes in the provision of personal health services and care (RMPS 1971). During the nine years subsequent to the enactment of the law this program was successful in providing the epitome for developing health care programs on a regional basis. The Michigan Regional Drug Information Network is an example of a drug information system implemented as a result of this program. Their goal was to help bridge the gap between the health professionals and the estimated 200,000 articles of medical interest published each year. It operated as a rapid random access service whose function was concerned with total information about drugs (Pearson et al. 1970). The network consisted of a main center located at the University of Michigan Hospital Pharmacy and a group of subcenters and affiliates throughout the state of Michigan. Nine of the ten subcenters are located in hospitals and the remaining one was located in a community pharmacy (Pearson, Thadium, and Phillips 1972). On February 1, 1973, a telegram was sent to all Regional Medical Programs from the Regional Medical Programs Service in Washington, D.C., announcing a June 30, 1973, termination date for all programs. This action directly affected all drug information services who received their start and funding under this program. Suddenly, they had to obtain sources of support or terminate that portion of the program subject to the Regional Medical Program support. Unfortunately, the mortality rate was high and most of the regional

drug information programs have either been discontinued or have been forced to greatly reduce the scope of service provided by the center (Schweigert 1976). Several attempts since then have been made to regionalize drug information services with the overall objective being to organize drug information and to eventually share cost between several facilities (Vrabel and Amerson 1976).

Fee-For-Service Program

The demise of this federal program and the loss of public funding several centers attempted to supplement their budgets by charging a fee for services rendered. However, in 1974 Rosenberg conducted a survey of 54 Drug Information Services operating in the United States, Memorial Hospital Medical Center of Long Beach, California, was the only one which charged a fee-for-services provided. A 1976 update of this survey shows that there were then three drug information services which charged a fee-for-services (Rosenberg and Kirschenbaum 1976a).

As a result of the setback which eliminated the funding that was provided by the regional medical program the drug information concept lost much of its force. This also resulted in a halt to the effort of providing drug information outside the university setting. A study conducted in 1975 (AACP 1975) identifies a primary deficiency in health care as a lack of available drug information and the failure of the present system of pharmacy to develop, organize, and distribute knowledge and information about drugs.

Drug Information at Medical Libraries

Patricia Moynahan (1970) has indicated that the drug information center should migrate toward medical library facilities in a given geographical area and provide supportive services to large numbers of institutions and biomedical communities. The location of Drug Information Centers in an established medical library is a rational approach toward providing the physician with rapid, unbiased documented data about the pharmaceutical properties of drugs and their therapeutic applications. The medical library provides the center access to a well established pharmacy and medical collection. The union of both of these information services reduces duplication of effort and results in a more economical and efficient system (Rivers and Martin 1974).

With the centers being located in medical libraries they become centralized locations for information, about drug therapeutic uses, side effects, adverse reactions, availability, identification, dosages and poison information, which can provide a unique clinically relevant service to physicians (Vrabel and Amerson 1976).

Summary

This author feels that it is obvious that a system needs to be developed to efficiently handle and effectively disseminate the volumes of information available on drugs. It appears that with the present state-of-the-art this can best be handled by a pharmacist who is trained or has specialized training in drug information working in a university based drug information center. In this setting a well

stocked medical library is present, making available the resources needed to answer the varied questions that frequently surface while a physician or other providers of health care are caring for their patients. The information specialist operating out of a medical library contains the credentials for providing unbiased, rapid and accurate drug information.

Problems Contemporary Drug Information Centers Face

After extensively reviewing the literature this author feels there are three major problems that Drug Information Centers face today. (1) Physicians reluctance to call a Center. (2) Lack of consistency in the quality of information provided from center to center. (3) Lack of a mechanism to charge users for provided information.

Clinical pharmacy is a recent development. A large number of pharmacists with specialized drug therapy knowledge did not exist or at best did not interact actively with physicians regarding therapeutics before the early 1970's. Hence, the majority of physicians in practice today are not cognizant of the potential competency in pharmacists (Nelson et al. 1978). If a physician has encountered primarily distributive product oriented pharmacists, his cognitive image of pharmacists may be perceived as useful for providing information about prices, commercial drug availability, and dosage forms, but therapeutic information is sought from other sources (Williamson and Kabat 1971). In order to solve this problem therapeutic oriented pharmacists must interact daily with physicians one-on-one in patient care settings. They must demonstrate competence on an individual basis

in solving therapeutic problems. It is clear that unless the physician perceives the pharmacist to be competent, becomes comfortable in relying on him, and learns to seek him out as the primary source of therapeutic consultation the pharmacists' role in drug therapy may never be achieved (McLeod 1978). One may conclude that once this interaction occurs, his cognitive image will expand to recognize the pharmacist as a potential source of clinical information (Nelson et al. 1978). As time passes and the physician becomes more dependent on the pharmacist as a source of drug information, then will the true significance of the drug information concept surface.

The clinical pharmacist requires documentation and reference sources to provide answers to questions asked by practitioners. This needed support can be provided by a drug information center. The combination of the clinical pharmacists, working side-by-side with the physician and the drug information specialists, providing resource support, posses the credentials for providing accurate and timely drug information. Once this is accomplished the drug information center will be utilized more efficiently and also the physician and other health care providers will be aware of the contributions that the pharmacy profession can make to the health care team. Once this awareness is brought to a level of consciousness then other health care providers will be more willing to utilize this resource.

The second problem is a lack of consistency in the quality of information provided from center to center. Halbert et al. (1977) conducted a survey of the 90 drug information centers. The centers were contacted by telephone with a standard question, requiring

identification, toxicity, therapeutic use and dosing information. These authors noted, by the results, that a consistent lack of a minimum standard of quality and competence required to be associated with being called a drug information center exists. This study also reveals a marked deficiency in communication skills. Hirschman (1972) has said that a drug information pharmacist must question every caller for a complete background. Systematic approaches for gathering pertinent information and location of the desired answer have been published (Watanabe et al. 1975). Yet in 74 per cent of the calls the initial question was accepted at face value without anything but the spelling being questioned. The only activity that occurred with reasonable certainty was the identification of a drug product. Halbert et al. (1977) recommend that the profession develop a system that will assure a minimum level of quality and competence. Once these standards are established then a mechanism must be developed to guarantee compliance. Pearson et al. (1972) describe an in-house drug information service review committee that is designed to insure the maintenance of high standards of quality in the dissemination of drug information. The established standards must include provision for utilization of qualified drug information specialists as well as a list of sources that must be housed in the facilities library. Without either the required sources or the skills to properly utilize and evaluate the sources one cannot be sure of the quality of the product provided to the requestor.

The third problem is the lack of a reimbursement system for the provider of information either on a fee-for-service or fee-per-use

basis. After the Regional Medical Program was halted in 1973 (Groth 1975) many of the drug information centers were eliminated due to a lack of funds for continuation of their services. Little progress has been made toward establishing a drug information center that charges either on an annual contract or a fee-per-use system. Of the 61 Drug Information Centers surveyed by Rosenberg and Kirschenbaum (1976b) only six centers listed some mechanism for charging subscribers. However, two of the six centers mechanism for charging consisted of donations contributed by the users. Only two of the six centers stated formally that they charge a fee for utilizing their services. A subsequent survey conducted by Ruger and Michelson (1978) revealed that five drug information centers of 40 responding either received public funding or a form of subscribers fee.

In this day of tighter fiscal control which often results in budget trimming drug information centers must be more self sufficient or face the consequences of the present economical environment. They cannot be dependent on university or hospital funding as their sole source of revenue, if they intend to enlarge their boundaries and provide their much needed services to other facilities in their cities, counties or states. This lesson should be an easy one to recall for the same situation occurred when the last generation of drug information centers depended on the Regional Medical Program for their future and proliferation. Unfortunately, the funds were eliminated as rapidly as they were generated. An attempt to obtain funding via public law through state legislatures appears to be the most viable mechanism for obtaining seed money to start centers. But, concurrently,

a state-wide mechanism for providing drug information to practitioners on some type of fee basis must follow immediately in order to guarantee its continual existence. The ulitmate goal must be that every practitioner have access to a center in order that he might obtain unbiased and valid information concerning drugs while treating his patients. Then and only then will the challenges presented in "Pharmacists for the Future" (AACP 1975) be fulfilled and that is: "Pharmacists are seen as health professionals who could make an important contribution to the health care system of the future by providing information about drugs to health practitioners". These challenges should be taken seriously and colleges of pharmacy should seek and obtain grants to implement pilot projects to show the value of these services, proven by scientific experimentation rather than by rhetoric presentation being attempted.

Summary

The physician or other health care providers are faced with a significant problem when attempting to deal with the volumes of literature that has been published and will continue to be published. Time constraints placed on these practitioners by their practice allow an insufficient amount of time to maintain competency with the rapid changes in the medical literature. Studies show that these practioners have indicated their need and willingness to use a service that can assist them in filling this void. The Drug Information Center concept is a viable mechanism that has been in existence for 18 years and could easily provide this service. However, it is important that consideration

be given to the lessons learned and that have been written about in the literature while establishing these centers. They should be located in university based medical libraries, which serve a large geographical area and provide immediate access to the user. It is an expensive operation to maintain a drug information center therefore, public funding should be sought to assist in establishing these services, since it will be the public who will be receiving the benefit of these services. However, provisions must be made to charge individual users for these services. It is mandatory that these centers be staffed with an individual trained in drug information. This will facilitate the provision of accurate, unbiased and timely drug information.

CHAPTER 3

METHODOLOGY

The purpose of this research is to determine if there is a need for additional drug information services among active duty Pharmacy Officers in the United States Air Force, United States Army and the United States Navy.

Design of the Study Instrument

The survey instrument was a questionnaire, its design was based upon the formulated study objectives. The design and arrangement of the questionnaire itself was based upon the research recommendations made by Berdie and Anderson (1974) and Babbie (1973). The questions were reproduced by typeset printing to obtain a professional appearance, print reduction and format design. The survey was precoded to facilitate keypunching.

Prior to conducting this survey, the proposed survey instrument was pretested by the hospital pharmacy graduate students at the University of Arizona to review for readability and clarity. In addition, the survey was administered to both the Director and Assistant Director, Pharmacy Services, Davis-Monthan Air Force Base, Arizona to ascertain their opinions and comments on the appropriateness and face validity of the instrument. Upon completion of the pretest process, suggestions received from these groups were incorporated into the final questionnaire. The survey questionnaire is found in Appendix A.

The Sample

The sampling frame for this research consisted of all Air Force, Army and Navy Pharmacy Officers that were stationed at medical facilities within the Continental United States. The investigator selected total sampling over random sampling due to the low number of military pharmacists who fit the criterion for inclusion into this study.

Design of the Study

This study consisted of two survey mailings and two reminder postcard mailings following a method suggested by Berdie and Anderson (1974). The first mailing was on December 14, 1979, when a questionnaire (Appendix A) and cover letter (Appendix B) were sent to each qualified Pharmacy Officer, a total of 371 officers. On December 20, 1979, a subsequent reminder postcard (Appendix B) was sent to each of the 371 military pharmacists on the mailing list. On January 4, 1980, a second mailing of the questionnaire and a revised cover letter (Appendix B) was mailed to all those officers who had not yet responded, as determined by an overt identifier and work sheet (Appendix B). Subsequently, on January 12, 1980, the same reminder postcard as mentioned above was sent to these same non-respondents.

A return deadline date beyond which no returned questionnaire was put into the pool of collected data was arbitrarily set at February 4, 1980, by the investigator. All responses from returned questionnaires were transferred into code to computer coding forms prior to actual keypunching. This method provided for a means of

checking the data before keypunching took place. The keypunching procedure for all cases was performed by the investigator. All keypunched data cards were in turn verified by an independent observer with the computer coding forms.

The Statistical Package for the Social Sciences (SPSS) (Nie et al. 1975) was used to tabulate and analyze all data, providing both descriptive analyses and the hypothesis testing procedures for all null hypotheses. Descriptive analyses included frequency distributions, measures of central tendency and standard deviation. Hypotheses testing procedures included non-parametric statistical tests (chi-square analysis). The alpha level for rejecting the null hypothesis was less than or equal to 0.05.

Assumptions

The one assumption for this study is that the list provided by the Pharmacy Consultants to the three services Sugrgeons General was accurate and reflected all officers that were eligible for this study.

Limitations

There were three limitations to this study. First, the survey population was limited to active duty officers of the three services who were stationed within the Continental United States. This eliminated from the sample the opinions of both civilian pharmacists employed by the three services and also those officers stationed at foreign stations. Secondly, there is no way to determine if a person's response was a valid one. Hence, prejudicial or false responses cannot be judged. Finally, the results or conclusions

reached by this study apply to only those pharmacists and facilities who responded to the survey and only for the time period covered by the study.

Chapter 4

RESULTS AND DISCUSSION

The overall questionnaire response from the 371 pharmacists was 338 (91.1 percent). There were 101 questionnaires mailed to Air Force Pharmacists with a usable response of 94 (94.0 percent). One Air Force questionnaire was returned by the Postal Service indicating an incorrect address. Eliminating this questionnaire from the Air Force population resulted in an usable Air Force population of 100. However, two returned questionnaires were eliminated from analyses because they were incompletely filled out resulting in an usable response of 94 (94.0 percent). There were 165 questionnaires mailed to Army Pharmacists. Among the Army questionnaires two were returned with the respondents indicating that they no longer practice in the pharmacy profession. Also six Army questionnaires were returned by the Postal Service indicating either an incorrect address or that the member was no longer stationed at that duty station. Eliminating these eight responses from the total Army population left an usable population of 157. In addition six returned questionnaires were eliminated due to incomplete responses as well as two returned questionnaires were eliminated due to not being returned prior to the deadline. This resulted in a usable response of 134 (85.9 percent). There were 105 questionnaires mailed to Navy pharmacists and 100

(95.2 percent) were returned and usable. Table 1 provides a summary of survey response information.

Table 1. Summary of Survey Response by Military Pharmacists

Service Groups	Usable Response	Usable Surveyed	Response Rate (percent)
Air Force	94	100	94.0
Army	134	157	85.4
Navy	100	105	95.2
Total	328	362	90.6

Descriptive Analyses and Hypotheses Testing

The completed questionnaires were studied in terms of the formulated objectives in the four major study areas. The following material describes the findings for each objective in each study area. The data analyses dealt with only those pharmacists that were on active duty with one of the three service groups -- Air Force, Army or Navy. Each respondent was stationed at a medical facility located within the continental United States.

For each group descriptive analyses were peformed on objectives in four study areas: (1) demographic information; (2) data concerned with the opinions on the use and need for Drug Information Center support; (3) the sources presently utilized by military pharmacists for answering eight drug information questions; and (4) hypothesis testing

procedures. An indepth presentation of data analysis is presented in the remainder of this chapter.

Study Area I: Demographic Information

In this study area eight variables were chosen that the investigator felt would have an impact on a military pharmacist's perceived need for drug information center support. The purpose of this study area was to gather information that will be utilized later for hypothesis testing to determine if these variables are indeed related to a military pharmacist's need for drug information center support.

Objective 1: Establish respondents into three service groups. Table 2 shows the breakdown of each respondent by service group. Many of the analyses that were performed dealt with these three groups. For most of the objectives in Study Area I, chi square analyses were performed to determine if there is a difference between the three service groups and their responses for an objective. Also, the service groups will be utilized in analysis of data in Study Area II and IV. The table shows that of the total population 28.7 percent of the respondents belonged to the Air Force group, 41 percent and 30.3 percent served the Army and Navy respectively.

Objective 2: Determine the active bed capacity of military hospitals and clinics. Table 3 shows the response for three bed capacity ranges for the three service groups. The range intervals represent a collapsed version of the eight range intervals used by the American Hospital Association (1978) in its description of hospital

Table 2. Breakdown of Survey Respondents by Service Group

Service Groups	Number of Respondents	Percent of Total Population
Air Force	94	28.7
Army	134	41.0
Navy	100	30.3
Total	328	100.0

bed capacities. In addition, a zero bed capcity was added in this study since several of the military pharmacists practice in clinics (no active bed capacity). Immediately after looking at and analyzing Table 3 it is obvious that the Air Force facilities were substantially smaller than the Army and Navy facilities. Sixty-six percent of the Air Force pharmacists were stationed at facilities which had 100 or fewer active beds (including zero beds). While the Army had only 19 percent of its pharmacists practicing in this size facility. Approximately, 33 percent of the Navy pharmacists practiced in this facility size. Generally the Army pharmacists practiced in facilities that are larger than the other two service groups. Eighty-two percent of the Army pharmacists practiced in facilities with a bed capacity greater than 100 beds. Navy facilities were larger than the Air Force but smaller than the Army's. They had 67 percent of its pharmacist members practicing in facilities with greater than 100 beds while the Air Force had only 34 percent of their pharmacists assigned to this size facility. In summary, Army medical facilities had the largest bed capacities of the three service groups followed by the Navy and then the Air Force.

Objective 3: Determine the number of speciality clinic services that a medical facility offered its patients. The types of services and their frequency are summarized in Table 4. In the three service groups, the three most frequently provided services to Air Force eligible recipients were pediatrics (96 percent), primary care (94 percent) and flight medicine (91 percent). In the Army, pediatrics (94 percent), internal medicine (92 percent) and obstetrics/gynecology

Table 3. Frequency of Responding Military Pharmacists by Military Group for Four Bed Capacity Ranges.

	Service Groups					
	Air Force		Army		Navy	
Bed Capacity	Number	Percent	Number	Percent	Number	Percent
Zero	12	13	9	7	17	17
1 thru 100	49	53	15	12	15	15
101 thru 399	23	25	54	42	33	33
400 and Over	8	9	52	40	34	34
Total	92		130		99	

(91 percent) were the most frequently provided services. Pharmacists in the Navy indicated that 95 percent work in facilities that provided pediatric services, 94 and 89 percent indicate their facilities provided primary care and internal medicine, respectively. Every facility that was represented in this study provided clinic services of some magnitude to their beneficiaries. As you analyze Table 4 closely you will notice that overall, the Army and Navy provided more specialized clinic services as opposed to the more general care type clinics found at Air Force facilities. An example of the more specialized clinic would be cardiology, where both the Army and Navy provided this service substantially more than the Air Force. The more general care type of service is seen in the hypertension clinic where the three groups provided this service to the same extent.

Table 5 shows the frequency of the numbers of services that are provided by the facilities that military pharmacists are assigned. The mean number of services provided was 11.25 and the median service as 11.68. Table 6 represents the chi square testing procedure to determine if there was any difference between the three service groups that provided services below or above the rounded midpoint service. Results of the analysis indicates a statistically significant difference existed between the three service groups and the level of services their facilities offer their patients. About two-thirds of the Air Force group provided services below the rounded midpoint service while the Army and the Navy are approximately evenly split between the two levels of service. The conclusion from this objective is that the Army and Navy offer

Table 4. Frequency of Outpatient Services Provided by Military Facilities by Service Group.

	Service Groups					
	Air Force (n=94)		Army (n=134)		Navy (n=100)	
Type of Clinic	Number	Percent	Number	Percent	Number	Percent
Family Practice	68	73	88	66	74	74
Flight Medicine	86	91	63	47	39	39
Hematology/ Oncology	31	33	79	59	53	53
Allergy	60	64	105	78	57	57
Renal/Urology	48	51	106	79	64	64
Cardiology	36	38	97	72	64	64
Pediatrics	90	96	126	94	95	95
Rheumatology	26	28	65	49	48	48
Primary Care	88	94	119	89	94	94
Respiratory-Pulmonary	40	43	83	62	53	53
Diabetes-Endocrine	31	33	66	49	55	55
Hypertension	63	67	99	74	74	74
Dermatology	53	56	114	85	88	88
Neurology	36	38	91	68	63	63
Ob/Gyn	85	90	122	91	86	86
Internal Medicine	83	88	123	92	89	89
Other	33	35	42	31	44	44

Table 5. The Frequency of the Number of Services Provided by Facilities that are Represented by Military Pharmacists in the Study

Number of Services Provided	Military Pharmacists	Frequency Percent
1	4	1.3
2	4	1.3
3	6	1.8
4	6	1.8
5	10	3.0
6	17	5.2
7	26	7.9
8	24	7.3
9	20	6.1
10	23	7.0
11	20	6.1
12	22	6.7
13	18	5.5
14	19	5.8
15	49	14.9
16	38	11.6
17	22	6.7
Total	328	100.0

Mean 11.25
Median 11.68

more specialized clinic services as well as a greater number of services than the Air Force.

Table 6. Chi Square Analysis of Service Group by Services Provided Above and Below Twelve Services.

	Services Provided			
Service Group	Below Twelve	Percent	Above Twelve	Percent
Air Force	64	67.1	30	32.9
Army	69	51.5	65	48.5
Navy	49	49.0	51	51.0

$x^2 = 8.61$; df = 2; $p < 0.01$

Objective 4: Determine the level of services provided by the department of pharmacy to their medical staffs. Table 7 describes the types of services that departments of pharmacy provided their medical staffs by service groups. Each service group indicated that a monthly newsletter and in-service presentations to nursing personnel were the services most often provided to their medical staffs. Although only four to six percent of the military pharmacists indicated their departments provide no services, the median service provided was only three.

Table 8 illustrates the number of services provided by a department of pharmacy and the frequency of responding pharmacists for each number of services. Table 9 shows that there is a statistically significant difference between the three service groups in the level of

Table 7. Frequency of Services Provided for the Medical Staff by the Department of Pharmacy for the Three Service Groups.

Type of Service	Service Groups: Air Force (n=94) Number	Air Force (n=94) Percent	Army (n=134) Number	Army (n=134) Percent	Navy (n=100) Number	Navy (n=100) Percent
1. Monthly Newsletter	66	70	105	78	71	71
2. In-Service Presentations, Nursing	71	76	107	80	66	66
3. In-Service Presentations, Medical Conference	38	40	39	39	29	29
4. Provide Drug Reviews on New Drugs	53	56	60	45	42	42
5. Provide Feedback on Results of Drug Use Reviews	66	70	54	40	36	36
6. None of these services are provided	6	6	6	4	5	5
7. Other	8	9	10	7	12	12

Table 8. Frequency of the Number of Services Provided to the Medical Staff by a Department of Pharmacy.

Number of Services	Frequency of Pharmacists	Percent of Total
0	20	6.1
1	36	11.0
2	88	26.8
3	72	22.0
4	61	18.6
5	45	13.7
6	6	1.8
Total	328	100.0

Mean 2.85
Median 2.80

Table 9. Chi Square Analysis of Service Group by Services Provided to the Medical Staff Above and Below Three Services.

	Services Provided			
Service Group	Below Three	Percent	Above Three	Percent
Air Force	49	52.1	45	47.9
Army	93	69.4	41	30.6
Navy	74	74.0	26	26.0

$x^2 = 11.6$, df = 2; $p < 0.001$

services provided. It indicates that the Air Force is approximately evenly distributed between the below and above rounded midpoint groups whereas both the Army and Navy provided substantially fewer services. That is the majority of their departments of pharmacy provided fewer than the rounded midpoint service. In conclusion, although the Air Force provided a statistically significantly greater level of services than the other two service groups the level of services provided was very low.

Objective 5: Determine the level of outpatient services that were provided by a department of pharmacy to its patients by service group. Table 10 shows a complete breakdown of responses by service groups for each of the 14 types of services. The only service that was provided by the majority of the respondents was that of giving verbal instructions to the patient for the proper use of their medications. The three service groups each provided the same three services most frequently. In addition to the one already discussed providing written instructions for the proper use of medications and providing written instructions for the proper use of medications and providing education materials concerning health or medication related topics were provided second and third most frequently, respectively. Table 11 reflects the number of services provided as well as the mean (2.7 services) and the median service (2.4).

Analysis of the chi square testing procedure represented on Table 12 reveals there is no significant difference between the service groups and the level of services each department of pharmacy provides to their outpatients. The state of the art of pharmacy practice

Table 10. Frequency of Outpatient Services Provided by the Department of Pharmacy.

Type of Service	Service Groups					
	Air Force (n=94)		Army (n=134)		Navy (n=100)	
	Number	Percent	Number	Percent	Number	Percent
1. Maintain Medication Profiles	5	5.3	19	14.2	12	12.0
2. Utilize a system to assure medication compliance by contacting and interviewing patients	7	7.4	8	6.0	5	5.0
3. Patient Consultation service, either individually or by telephone	22	23.4	50	37.3	31	31.0
4. Poison control information for pediatric patients	20	21.3	30	22.4	15	15.0
5. Hypertension screening program	6	6.4	3	2.2	1	1.0
6. Issue individual medication cards for patients to carry with them	2	2.1	9	6.7	1	1.0
7. Give the patient or sponsor verbal instructions for the proper use of their medications	75	79.8	122	91.0	91	91.0
8. Give the patient or sponsor written instructions for the proper use of their medications	37	39.4	53	3916	55	55.0

Table 10. Continued.

	Service Groups					
	Air Force (n=94)		Army (n=134)		Navy (n=100)	
	Number	Percent	Number	Percent	Number	Percent
9. Provide notification to outpatients that it is time to refill or renew their medications	12	12.8	19	14.2	13	13.0
10. Provide educational materials to outpatients concerning health or medication related topics	29	30.9	47	35.1	25	25.0
11. Anticoagulation Service	1	1.1	2	1.5	1	1.0
12. Diabetes education program	10	10.6	12	9.0	3	3.0
13. None of the above services	7	7.4	11	8.2	4	4.0
14. Other	5	5.3	11	8.2	4	4.0

Table 11. Frequency of the Number of Services Provided by a Department of Pharmacy for its Outpatients

Number of Services	Frequency of Pharmacists	Percent
0	21	6.4
1	63	19.2
2	85	25.9
3	76	23.2
4	45	13.7
5	17	5.2
6	10	3.1
7	6	1.8
8	2	0.6
9	1	0.3
10	2	0.6
Total	328	100.0

Mean 2.7
Median 2.4

Table 12. Chi Square Analysis of Service Group by Services Provided for Outpatients Below and Above Two Services.

	Services Provided			
Service Group	Below Two	Percent	Above Two	Percent
Air Force	51	54.3	43	45.7
Army	67	50.0	67	50.0
Navy	51	51.0	49	49.0

$x^2 = 0.42$, df = 2; $p < 0.81$

concerning the level of services provided to outpatients is at a low level. The services provided by the military groups are little more than the basic essentials of handing out the prescription.

Objective 6. Determine the level of inpatient services that were provided by the departments of pharmacy to its patients by service group. Table 13 represents a break down of eight inpatient service possibilities and how each service group responded. The figures represent only those pharmacists assigned to facilities that provided inpatient services. IV Admixture programs both simple additives and comprehensive services were provided most frequently by the three service groups. An interesting observation dealing with the two IV admixture categories was that in both the Army and the Navy more pharmacists were involved with a comprehensive program than a simple additive whereas, in the Air Force fewer provided a comprehensive program than the simple additive program. Unit dose distribution service is another service provided by most departments. However, once again both the Army and the Navy provided this program more frequently than the Air Force. Table 14 represents a breakdown of the number of services provided as well as the frequency of military pharmacists working in departments that provided that number of services to its inpatients. The mean and median services is 3.9. Table 15 shows the results of chi square testing procedure of the three service groups by inpatient services provided below and above the rounded midpoint. The level of significance indicates there is no statistically significant difference between the three service groups and their level of services provided for inpatients.

Table 13. Frequency of Inpatient Services Provided by the Department of Pharmacy.

Type of Service	Service Group					
	Air Force (n=82)		Army (n=125)		Navy (n=83)	
	Number	Percent	Number	Percent	Number	Percent
1. IV Admixture-Simple additives	68	82.9	116	92.8	76	91.6
2. IV Admixture-comprehensive, antibiotic reconstitutions, hyperalimentation etc.	60	73.2	124	99.2	79	95.2
3. Unit Dose Distribution System	46	56.1	108	86.4	72	86.7
4. Drug Monitoring	44	53.7	58	46.4	41	49.4
5. Patient Discharge Interviews	12	14.6	25	20.0	8	9.6
6. Drug Histories on Admission	2	2.4	4	3.2	4	4.8
7. Physician Consultation	37	45.1	46	36.8	47	56.6
8. Other	1	1.2	27	21.6	8	9.6

Table 14. Frequency of the Number of Services Provided by a Department of Pharmacy for its Inpatients

Number of Services	Frequency of Pharmacists	Percent
0	3	1.0
1	11	3.8
2	34	11.7
3	74	25.5
4	62	21.4
5	75	25.9
6	20	6.9
7	9	3.1
8	2	0.7
Total	290	100.0

Mean 3.9
Median 3.9

Table 15. Chi Square Analysis of Service Group by Services Provided for Inpatients Below and Above Four Services.

	Services Provided				
Group	Below Four	Percent	Above Four	Percent	Total
Air Force	55	67.0	27	33.0	82
Army	77	61.6	48	38.4	125
Navy	52	62.7	31	37.3	83
Total	184	63.4	106	36.6	290

$x^2 = 0.67$, df = 2; $p < 0.71$

Objective 7: Determine the highest degree military pharmacists had earned. Table 16 reflects the highest degree earned by military pharmacists by the three service groups. The Bachelor of Science degree in Pharmacy was the degree indicated by the majority of all military pharmacists as their highest degree attained. Sixty-two percent of the Air Force pharmacists indicated this degree while 71 percent and 67 percent was indicated by the Army and Navy, respectively. Of the advanced professional degrees, Master of Science, Pharmacy; Doctor of Pharmacy and Doctor of Philosophy, 27 percent of the Air Force pharmacists having indicated one of those degrees while 21 percent of both the Army and Navy had earned an advanced professional degree. Other advanced degrees; Master of Science, other than Pharmacy and Other, 10 percent of the Air Force pharmacists had earned degrees in this category. Eight percent of the Army and 12 percent of Navy had earned degrees in the "Other Advanced Degree" categories. Overall, 38 percent of the Air Force, 29 percent of the Army and 33 percent of the Navy practicing pharmacists had earned a degree higher than their initial professional degree.

Table 17 illustrates that there is no statistical difference between the three service groups and the highest degree they have attained.

Objective 8: Determine the number of years that each military pharmacist had served in his respective service group. Table 18 shows the breakdown by four year groups by the three service groups. The Army group had over 50 percent of its pharmacists in the 0-4 category while both the Air Force and Navy groups had only about

Table 16. The Highest Academic Degree Earned by Military Pharmacists by Service Group

	Service Group					
	Air Force		Army		Navy	
Degree	Number	Percent	Number	Percent	Number	Percent
B.S. Pharm.	58	62	95	71	67	67
M.S. Pharm.	16	17	24	18	10	10
M.S. Other	7	7	4	3	7	7
Pharm.D. 6 yr.	0	0	3	2	9	9
Pharm.D. > 6 yr.	7	7	1	1	1	1
Ph.D.	3	3	0	0	1	1
Other	3	3	7	5	5	5
Total	94		134		100	

Table 17. Chi Square Analysis of Three Service Groups by the Highest Degree Attained by Military Pharmacists

	Highest Degree Attained		
Service Group	B.S. Degree	Advanced Degree	Total
Air Force	58	36	94
Army	95	39	134
Navy	67	33	100
Total	220	108	328

$x^2 = 2.11$, df = 2; $p < 0.35$

Table 18. Number of Years Military Pharmacists Have Served by Service Group

	Service Group					
	Air Force		Army		Navy	
Year Group	Number	Percent	Number	Percent	Number	Percent
Zero thru 4	32	35	67	51	31	32
5 thru 11	39	43	42	32	35	36
12 thru 20	18	20	19	15	28	29
21 and over	2	2	3	2	3	3
Total	91		131		97	

one-third of their pharmacists in this group. The Navy group had its pharmacists approximately evenly divided among the three-year groups including 0-20 years of service while the Air Force pharmacists were concentrated more in the 5-11 year group with 43 percent falling into this category. Table 19 represents the chi square testing procedure to determine if there is a difference between the three service groups and the years served by military pharmacists. The 12-20 year group and the 20 and over group were combined in order to meet the cell frequency requirements for this testing procedure. The data analysis does indicate a statistically significant difference between the three service groups and the years served in their respective military groups. The results indicate that the Army was a much younger (years served) group than either the Air Force of the Navy. Also the Navy group is consistent in the three groups and appears to have less turnover.

Study Area II: Opinions Concerning the Use and Need for Drug Information Support.

In this study area four variables were studied to obtain information that dealt with drug information centers. The data collected from the respondents included information concerning their utilization, satisfaction, preferences and perceived need for a drug information center. Also, additional analyses were performed to gain further insight into factors that play a role in developing a military pharmacist's perceived need for drug information center support.

Objective 1: To determine the frequence with which military pharmacists had utilized a drug information center. Table 20 provides

Table 19. Chi Square Analysis of Three Service Groups by Three Years Served Categories

	Years Served Categories			
Service Group	0-4	5-11	12-30	Total
Air Force	32	39	20	91
Army	67	42	22	131
Navy	31	35	31	97
Total	130	116	73	319

$x^2 = 13.38$, df = 4; $p < 0.01$

a breakdown of the use of a drug information center by the three service groups. The data indicates that the Air Force and Navy pharmacists had utilized the services of a drug information center more than the Army. A little more than 50 percent of the Army pharmacists had utilized these services compared with approximately 70 percent for the Air Force and Navy groups. The Table also shows the chi square analysis of the three service groups with utilization of a drug information center. The data analysis indicates there is a statistically significant difference between the three service groups and their utilization of a drug information center.

Table 20. Frequency Military Pharmacists have Utilized a Drug Information Center by Three Service Groups.

	Service Groups							
	Air Force		Army		Navy		Total	
Response	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Yes	65	69.1	72	53.7	67	67.7	204	62.4
No	29	30.9	62	46.3	32	32.3	123	37.6
Total	94		134		99		327	

$x^2 = 7.29$, df = 2; $p < 0.05$

Objective 2: Determine those who had utilized the services of a drug information center if the services received were satisfactory and met their needs. Of the 204 military pharmacists who indicated in Objective 1 that they had utilized a drug information center, 195

(95.6 percent) responded to this question. Ninety-four percent indicated they were satisfied with the services received from the center they had used.

Objective 3: Determine the type of drug information service the members of the three service groups would prefer. Table 21 provides a breakdown of five alternatives or possibilities that were presented for each respondent to select his/her most desirable means of providing drug information center support to the members of their military service. The overall response of 320 pharmacists, 63 percent indicated they favored a Triservice information center. The results of the chi square testing procedure indicates there is no significant difference between the three service groups and the type of drug information center they feel would best meet their needs. It was necessary to analyze only the first three alternatives of services due to cell frequency requirements of the testing procedure utilized.

Additional analyses were performed to see if other variables such as utilization of a center and satisfaction with the services provided by the cneter had any impact on a military pharmacist's preference for a particular type of service. Analyses performed were: (1) Selected those military pharmacists who had utilized a drug information center previously and received satisfactory results. Then the three service groups were tested utilizing the stated criteria by three drug information service alternatives. Results indicate there was no statistically significant difference between the groups in their preference for an information service ($x^2 = 6.4$, $df = 4$; $p < 0.17$), approximately 61 percent preferred this service system.

Table 21. Frequencies of Alternatives that Military Pharmacist Groups Perceive as the Most Likely to Meet Their Drug Information Needs.

	Service Groups					
	Air Force		Army		Navy	
Alternatives	Number	Percent	Number	Percent	Number	Percent
Triservice	59	63.4	77	59.2	64	66.0
Individual Service	17	18.3	15	11.5	8	8.2
Individual Medical Facility	9	9.7	27	20.8	18	18.6
No Need for Drug Information Services	1	1.1	6	4.6	3	3.1
Other	7	7.5	5	3.8	4	4.1
Total	93		130		97	

$x^2 = 8.6$, df = 4; $p < 0.07$

(2) Selected those military pharmacists who had utilized a drug information center previously but the services received did not meet their information need. These criteria were tested in the same manner as the first analysis. Again the same results were found ($x^2 = 2.9$, $df = 2$; $p < 0.23$); (3) Selected those pharmacists who had not utilized a drug information center previously and performed the same analysis as in (1) and (2). Findings indicate there is no statistical difference between the three service groups and their choice of the type of drug information service they preferred ($x^2 = 5.05$, $df = 4$; $p = 0.28$); and (4) Analyzed those who had utilized a drug information center previously and those who had not utilized a center previously to determine if there was a difference between the type service they preferred and found that both groups indicated the same service but those who had never utilized the service previously preferred the Triservice program significantly more than the other group ($x^2 = 7.0$, $df = 2$; $p < 0.05$). Of those that had previously utilized a drug information center, 63.2 percent preferred the Triservice system while 76.1 percent of those that had not previously utilized a drug information center preferred the Triservice system. In conclusion, it appears that of the alternatives presented each service group feels conclusively that the Triservice Drug Information Center Program would most likely meet military pharmacists drug information needs.

Objective 4: Determine the perceived need for drug information center support. Table 22 shows a breakdown of service group by their opinion on whether a drug information center would meet their drug information needs better than their present sources. Of the

320 military pharmacists who responded to this question, 65 percent indicated that utilizing a drug information center would better satisfy their drug information needs than would their present sources. The Table also indicates that there is no statistically significant difference between the three service groups and their perceived need for drug information center support.

Table 22. Military Pharmacists' Response by Service Group Dealing with Whether a Drug Information Center Would Meet Their Drug Information Needs Better Than Their Present Sources.

	Service Groups					
	Air Force		Army		Navy	
Response	Number	Percent	Number	Percent	Number	Percent
Yes	61	68.5	84	62.7	62	63.9
No	8	9.0	19	14.2	13	13.4
Not Sure	20	22.5	31	23.1	22	22.7
Total	89		134		97	

$x^2 = 1.55$, df = 4; $p < 0.82$

An additional analysis performed was to compare those who had utilized a drug information center previously with those who had not and determine if a difference existed between the two groups in their perceived need for drug information center support. Results of the chi square testing procedure reveal there is no statistically significant difference between the perceived need for drug information center support of those who had used an information center before and

those who had not utilized a drug information center previously (x^2 = 2.75, df = 2; $p < 0.25$).

The respondents were asked to rate the combined efficiency of their present drug information sources into: (1) highly efficient; (2) efficent; (3) inefficient. Table 23 shows that 70.8 percent of all military pharmacists rate their sources to be either efficient or highly efficient. The Table also relates the results of chi square analysis which indicate there is no statistically significant difference between the three service groups and the way they rated their drug information sources.

Table 23. Respondents' Appraisal of Their Drug Information Sources by Service Group.

	Service Groups					
	Air Force		Army		Navy	
Rating	Number	Percent	Number	Percent	Number	Percent
Highly Efficient	10	10.9	12	9.0	6	6.0
Efficient	54	58.7	84	63.2	64	64.0
Inefficient	28	30.4	37	27.8	30	30.0
Total	92	100.0	133	100.0	100	100.0

x^2 = 0.78, df = 4; $p < 0.78$

Additionally, the variables that dealt with rating the efficiency of their drug information system and the drug information type they felt would most likely meet their drug information needs were analyzed. Table 24 represents a chi square analysis between the

two variables and the data indicates there is no significant difference between the type of drug information service preferred by pharmacists who practiced in facilities they assessed as having a highly efficient or inefficient drug information system ($x^2 = 8.6$, df = 4; $p < 0.07$).

Table 24. Chi Square Analysis Between the Variable Dealing with Rating One's Drug Information Source and the Type of Drug Information Service One Perceives as Most Likely to Meet Their Drug Information Needs.

	Types of Drug Information Services			
Response	Tri-service	Indiv. Service	Indiv. Med. Fac.	Total
Highly Efficient	14	3	8	25(8.6)
Efficient	125	22	37	184(63.2)
Inefficient	59	15	8	82(28.2)
Total	198(68.0)	40(13.7)	53(18.3)	291(100.0)

$x^2 = 8.6$, df = 4; $p < 0.07$

In conclusion of Study Area II, data analysis has shown that by far, the majority of military pharmacists have utilized the services of a drug information center. However, the Army group utilized the services less than the other two service groups. Military pharmacists who have utilized this service are overwhelmingly satisfied with the services they received. The majority of the military pharmacists surveyed indicated they favor a Triservice Drug Information Service over the other four alternatives.

The three service groups all indicated that they feel the service of a drug information center would meet their drug information needs better than their present sources. Finally, the three service groups rated their present drug information sources as being efficient.

Study Area III: Determine and Analyze the Sources Presently Utilized by Military Pharmacists for Answering Eight Drug Information Questions.

This study area consisted of asking the survey participants a series of eight drug information questions and having them select the choice they presently utilize most often while answering that type of question. Table 25 includes a complete breakdown of the eight questions asked and the response the survey participants chose as the one drug information category utilized most often. Analysis of the data indicates that most military pharmacists utilized the Journals and Texts category most often while answering drug information questions. In five of eight questions, this category was utilized most often. The first question was approximately evenly divided between the two categories of sources, Physicians' Desk Reference and Facts and Comparisons. In the remaining two questions the survey sample indicated that the Physicians' Desk Reference and Facts and Comparisons categories were utilized most frequently.

Of the five remaining categories of sources that could have been selected, Colleagues, Continuing Education and Detail Persons were indicated by the respondents as being used least of all. The two remaining categories of sources Drug Information Center and Other, were used substantially less often than the Physicians' Desk Reference

Table 25. Frequency Response of Drug Information Sources Utilized by Military Pharmacists for Eight Selected Questions.

Questions	Drug Information Sources						
	Physicians' Desk Reference/Facts and Comparisons	Journals/ Texts	Colleague	Continuing Education	Detail Person	Drug Information Center	Other Medline, Mediars
Adverse Drug Reactions and Interactions	41	48	1	1.0	0	6	3
Therapeutic Indications and Contraindications for Specific Drugs	67	27	0.5	1	0.5	3	1
Basic Pharmacologic and Toxicological Information	19	69	1	1	0	8	2
Evaluation and Comparisons of new and/or Investigational Drugs or Information About Foreign Drugs	13	46	2	4	3	22	10
Drug Interference with Laboratory Tests	11	71	1	2	1	10	4
Intravenous Incompatibility and Stability	3	80	2	0.5	0.5	6	8
Advice on dosage information and preferred routes and schedules of drug information	53	35	1.5	1.5	2	5	2
Pharmacokinetic information concerning half-life and protein binding etc. Volume of distribution	4	75	0	2	2	13	4

and Facts and Comparisons and Journals and Texts categories, but they were relied upon more frequently than Colleagues, Continuing Education and Detail Persons.

The Drug Information Center category is relied upon most often for information on evaluating and comparing new and/or investigational drugs or information about foreign drugs. The other category includes the automated sources that are not available to most military pharmacists and they are relied upon most often for finding information about the same category as the Drug Information Center.

The data from this study parallels data collected from a study conducted by Smith, Sorby and Sharp (1975) in which they found that physicians utilize journals and texts as the most frequently consulted source of drug information.

However, data from the present study indicates that pharmacists rely on colleagues less often than physicians. Several studies, Pearson et al. (1972), Bauer and Wortzel (1966), and Smith et al. (1975), all are consistent in the fact that physicians rely heavily upon their colleagues as a significant source for drug information. The same studies referred above indicated that physicians rely heavily upon pharmaceutical manufacturers for drug information transmitted via medical sales representatives, medical journal advertisements or direct mailings. This study reveals that pharmacists rely very little on manufacture sales representatives (detail persons) as a source of drug information.

It is interesting to note that pharmacists rely on several categories of sources for various questions. An example is the need of

information concerning evaluation and comparison of new and/or investigational drugs or information about foreign drugs. The majority of the pharmacists utilize journals and texts (46 percent), but a significant number (22 percent) rely upon the services of a drug information center while 13 percent utilize the Physicians' Desk Reference and Facts and Comparisons category. These results are consistent because this is a broad category and depending on how the surveyee interprets the question the information could be found in any of the three sources indicated by the respondent.

In summary, this study indicates that both physicians and military pharmacists rely heavily on journals and texts as their primary source of drug information. But here the similarity ends; the military pharmacist depend very little on colleagues, continuing education and detail persons as sources for drug information while other studies indicate physicians, to a large extent, rely on these categories for drug information.

Study Area IV: Hypotheses Testing

The purpose of this study area was to test the variables presented in Study Area I with the military pharmacists' perceived need for drug information center support. Each of the variables that were tested were compared via the Chi Square testing procedure with question number 17 (Appendix A). The question asked: "Based on your knowledge would a drug information center satisfy your drug information needs better than your present sources?" There were three alternatives available for the respondents to choose: (1) yes (2) no

and (3) not sure. There are eight hypotheses to be tested. A summary of the hypotheses testing procedures follows.

Hypothesis I. The military service groups are separate entities all serving under the Department of Defense. The military pharmacist assigned to each group had as his/her primary function that of practicing pharmacy in a medical facility. These criteria were established apriori for inclusion into this study. Considering these elements one would conclude that there would be no difference between the three service groups in their perceived need for drug information center support.

Null Hypothesis I. There is no difference in the pharmacists' perceived need for drug information center support and the military branch the pharmacist serves. Since the probability of rejecting a true null hypothesis was greater than 0.05, the null hypothesis was retained ($x^2 = 1.6$, $df = 4$; $p < 0.82$). The conclusion drawn from this testing procedure was that there appears to be no relationship between a military service branch and a pharmacist's perceived need for drug information center support.

Hypothesis II. There were two purposes for testing the variable dealing with facility size (active bed capacity). The larger the size of a facility (bed capacity) one would expect that more services and specialities would be provided and would in turn require a higher level of drug information center support than a smaller facility. This support would be required to provide their respective medical staffs with drug information services that would be utilized in direct patient care. One purpose was to determine if

the perceived need for drug information center support is different between those military pharmacists who practice in medical facilities with an active bed capacity (hospitals) and those who are assigned to clinics (no active bed capacity). The other purpose was to see if a difference exists between those pharmacists that practice in hospitals below the median bed size and those who practice in facilities above the median bed size in their perceived need for drug information center support. The hypothesis testing procedure is therefore, divided into two subhypotheses.

Null Hypothesis IIa. There is no difference in the pharmacists' perceived need for drug information center support between those who practice in clinics (no active beds) and those that practice in hospitals (active bed capacity). Since the probability of rejecting a true null hypothesis was less than 0.05, the null hypothesis was rejected ($x^2 = 8.84$, df = 2; $p < 0.05$).

Null Hypothesis IIb. There is no difference in the pharmacists' perceived need for drug information center support between those who practice in hospitals below the median bed size (200 beds) and those who practice in hospitals above the median bed size (200 beds). Since the probability of rejecting a true null hypothesis was greater than 0.05, the null hypothesis was retained.

In summary, the variable bed size has a mixed association with need for this service. Those pharmacists who practice in clinics indicated a statistically significant lesser need than those who practice in hospitals for this service. However, there is no difference in pharmacists' perceived need for this service between those who practice

in smaller hospitals (below the median bed size) and those that practice in larger hospitals (above the median bed size).

Hypothesis III. As the number of speciality clinic services provided by a facility increases, one would expect the level of drug information center support required to support the needs of the more specialized medical staff. The hypothesis testing procedure considered those facilities that provide fewer than the median service for all three groups and those facilities that provide more than the median service.

Null Hypothesis III. There is no difference between those pharmacists who practice in facilities that provide a low level of services (0-12) and those who provide a high level of service (13-17) in their perceived need for drug information center support.

Since the probability of rejecting a true null hypothesis was greater than 0.05, the null hypothesis was retained ($x^2 = 3.0$, $df = 2$; $p < 0.23$). The conclusion is that the number of specialities offered by a facility is independent of military pharmacists' perceived need for drug information center support.

Hypothesis IV. The purpose of this testing procedure was to determine if the level of services that a department of pharmacy provides for its medical staff is related to the pharmacy staff's need for drug information center support. One could easily presume that those departments that provide more services would have a greater need for drug information than those that provide fewer services.

Null Hypothesis IV. There is no difference in a military pharmacist's perceived need for drug information center support between

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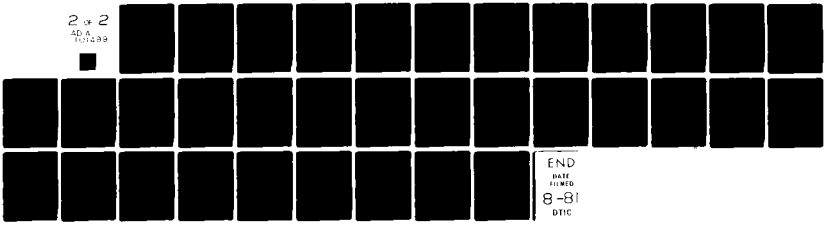


those who practice in a pharmacy department that provide a few services and those assigned to departments that provide a higher level of services.

Since the probability of rejecting a true null hypothesis was greater than 0.05, the null hypothesis was retained ($x^2 = 0.09$, $df = 2$; $p < 0.95$). The conclusion is that the level of services provided by a Department of Pharmacy appears to be independent of military pharmacists' perceived need for drug information center support.

Hypothesis V. It is logical to conclude that if a Department of Pharmacy was to provide more service to its outpatients then it would have a greater need for drug information center support than those that practice in departments that provide fewer services. As the level of services that a department provides increases, its drug information center support demands should also increase.

Null Hypothesis V. There is no difference between the perceived need for drug information center support by military pharmacists who practice in departments that provide fewer than two services and those who practice in departments that provide more than two services to its outpatients.

Since the probability of rejecting a true null hypothesis was greater than 0.05, the null hypothesis was retained ($x^2 = 1.97$, $df = 2$; $p < 0.37$). The results show that there is no evidence to indicate that the level of services provided by a Department of Pharmacy to its outpatients is related to military pharmacists' perceived need for drug information center support.

Hypothesis VI. The same rationale considered in Hypothesis V is true for the level of services a Department of Pharmacy provides its inpatients. Of the nine possibilities including no services, the median service was four.

Null Hypothesis VI. There is no difference between the perceived need for drug information center support by military pharmacists who practice in departments that provide fewer than four services and those that practice in departments that provide more than four services to its inpatients.

Data was collected only from those pharmacists who practice in inpatient service facilities.

Since the probability of rejecting a true null hypothesis was greater than 0.05, the null hypothesis was retained ($x^2 = 0.70$, $df = 2$; $p < 0.70$). The results indicate that the level of services a Department of Pharmacy provides its inpatients is probably independent of a pharmacist's perceived need for drug information center support.

Hypothesis VII. The variable to be tested is the highest degree attained by a military pharmacist and to determine if there is any difference between those who have earned an advanced degree and those who have not in their perceived need for drug information center support. It can be argued that pharmacists who have earned an advanced degree should be motivated to keep abreast of new trends in pharmacy practice and be aware of the advantages of such services. Therefore, it can be assumed that those military pharmacists who have earned an advanced degree should have a greater need for the innovative service

and drug information support, than those who have not earned an advanced degree.

Null Hypothesis VII. There is no difference between those military pharmacists who have earned an advanced degree and those who have earned a Bachelor of Science in Pharmacy in their perceived need for drug information center support.

Since the probability of rejecting a true null hypothesis is greater than 0.05, the null hypothesis is retained ($x^2 = 2.09$, $df = 2$; $p < 0.35$). The results of the testing procedure indicate that there is no evidence to support the notion that degree earned has any relationship to military pharmacists' perceived need for drug information center support.

Hypothesis VIII. The Drug Information Center concept is a relatively new innovation in pharmacy practice. Those military pharmacists who have been in the military service longer than 10 years probably did not receive exposure to the concept while attending college. It is conceivable that those pharmacists who have been on active duty for longer than 10 years are not aware of the services and support that a drug information center can afford a practicing pharmacist.

Null Hypothesis VIII. There is no difference in the perceived need for drug information center support between those military pharmacists who have been in the military for 1-10 years and those who have been in for more than 10 years.

Since the probability of rejecting a true null hypothesis is greater than 0.05; the null hypothesis was retained ($x^2 = 0.51$, $df = 2$;

$p < 0.77$). The conclusion drawn from this testing procedure is that there is probably no relationship between the time in military service and perceived need for drug information center support.

A summary of the Null hypothesis testing procedures reveals that only one of the eight variables tested is related to the perceived need for drug information center support. That variable is facility size (bed capacity) when comparing those that practice in clinics (zero bed capacity) and those that practice in hospitals (active bed capacity). The latter group indicated a greater need for drug information center support.

Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This study represents an in depth look at the drug information needs of active duty military pharmacists practicing in the continental United States. Several demographic variables were looked at in terms of their impact on military pharmacists' perceived need for drug information center support. Also analysis were done to determine the relationship of past experiences with a Drug Information Center with military pharmacists' perceived need for drug inforamtion center support. For each variable, data was collected and analyzed to see if any difference existed between the three military service groups and the variables measured.

Summary and Conclusions

The overall response rate for the study was 91.1 per cent. The investigator was elated with the response rate and attributes its success to two reasons. First, military personnel, regardless of their service group, have a great deal of comradery and support other members when feasible. Part of the success can be attributed to my being an active duty military member which was evident in the signature block of the cover letter (Appendix B). Secondly, the author feels that most military members approach their duty in a professional manner and are interested in any possibility of increasing the quality of patient care. For the most part, they are aware of the services

that a drug information center can provide. The subject was one of interest and they felt that the data collected might possibly pave the way for such a service in the future. In other words, they could see that participation in the study might benefit them in the future.

The first study area was to collect and analyze demographic variables. In addition, each variable was analyzed utilizing the Chi-Square testing procedure to see if any difference existed between the three service groups in the measurement of the variables. The data collected in this study area became instrumental in Study Area IV where these variables were once again tested by the Chi Square testing procedure to determine if a relationship existed between the variable and a military pharmacist's perceived need for drug information center support.

The eight objectives that were determined in this study area were: (1) the service group each respondent is a member of; (2) active bed capacity of each medical facility; (3) the number of speciality clinic services that a medical facility offers its patients; (4) the level of services that are provided by the Department of Pharmacy for its medical staff; (5) the level of outpatient services that are provided by the Department of Pharmacy for its patients; (6) the level of inpatient services that are provided by the Department of Pharmacy for its patients; (7) the highest degree earned by military pharmacists; and (8) the number of years that each military pharmacist has served in his respective service group.

Since the data in Study Area I and Study Area IV are closely related and in combination fulfill a significant portion of this study's purpose, they will be discussed together.

The results showed that the majority of the study group consisted of Army pharmacists followed by Navy and Air Force in descending order. Results of hypothesis testing procedure indicated there is no statistically significant difference between the three groups and their need for drug information center support.

Data that was collected on facility size (bed capacity) indicated that Army facilities are larger than both the Air Force and Navy. When determining the impact facility size has on a military pharmacist's need for drug information center support, it was found that pharmacists who practice in clinics (no active beds) have a lesser need for this service than those who practice in hospitals (active beds). There was no statistical difference noted between those pharmacists that practiced in smaller hopsitals compared to larger hospitals in their need for drug information center support. The results of this data are what one would expect, that is, clinic settings require less drug information support than hospitals. Clinics are facilities that have no inpatient services and therefore, do not have the medical staff specialization which larger facilities provide. With this decrease in medical staff specialization and facility size follows a lower level of drug information need to support such a staff.

The clinical services that are provided by medical facilities vary among the three service groups although the three clinical services that are most often provided are consistent among the three groups.

The Air Force group provides statistically significantly fewer services than the other two groups. The military services are a young productive population and the services provided most frequently are consistent with the population. Pediatrics, Primary Care and Obstetrics and Gynecology are the services that are provided most often at military facilities. The Army and the Navy not only provide more serives, but they are also more specialized in nature. The results of the hypothesis testing procedure (Study Area IV) reveal that there is no relationship between the level of clinical services a facility provides its patients and the need a pharmacist perceives for drug information center support.

In a related variable that deals with the services a department of pharmcy provides its medical staff, it was found that a low level of service is being provided. This finding supports the conclusion drawn in the last hypothesis testing procedure and that is the medical facilities are providing clinical services to its patients at a high level but the departments of pharmacy are remiss in the level of support they are providing to the medical staff. The Air Force service group provides statistically more services to its medical staff than do the Army or the Navy. The results of the hypothesis testing procedure (Study Area IV) did not indicate that the level of services a department of pharmacy provides its medical staff is related to the need of military pharmacists for drug information center support.

This author feels that once the departments of pharmacy increase their level of support they provide to their medical staff, then their need for drug information center support will increase dramatically. As pharmacy departments begin providing drug utilization

reviews, in-service presentations at medical conferences, provide drug reviews on new products and other services routinely, then their need for drug information center support will increase.

Analysis of services that are provided by departments of pharmacy to its outpatients and inpatients indicate that all three service groups provided the same level of services to their patients. Once again the level of services were extremely low in each case. The level is lower in services provided to outpatients. The three service groups provided the same three outpatient services most often, but they provided only verbal instructions to their patients for the proper use by their medication with any consistency. The other two services provided were written instructions for the use of their medications and educational materials concerning health or medication related topics. Inpatient services are provided at a higher level than outpatient services. The same three services were provided by each service group most often. IV Admixture-simple and comprehensive were the services most often provided as well as Unit Dose Distribution system. Once again, there is no relationship between the level of either outpatient or inpatient services a department of pharmacy provides its patients and military pharmacists' perceived need for drug information center support. The state of the art of pharmacy practice in the military services is such that pharmacists do not require drug information center support to practice pharmacy at their present level. Evidence has been presented to indicate that the level of services that departments of pharmacy provide to both its medical staff as well as its patients is little more than what is

required to hand out or to distribute the drug. Emphasis should be placed on increasing the level of services to both areas and as the level of services increase then the need for drug information support will increase also.

The next variable analyzed was to look at the highest degree earned by military pharmacists. The responses indicated no difference between the three service groups in the highest degree earned. In all three groups the Bachelor of Science in Pharmacy was the highest degree earned by the majority of military pharmacists. Overall, about one-third of military pharmacists had earned an advanced degree. The hypothesis testing procedure (Study Area IV) for this variable indicates that no relationship existed between the highest degree earned and a military pharmacist's perceived need for drug information center support.

The last objective or variable to be studied was that of length of time each member had served in its military branch. The three service groups did differ statistically in the number of years served in their respective military service. The data indicates that the Army pharmacists had served in their service group less time than either the Air Force of the Navy. This possibly indicates that the Army group has a higher turn-over of personnel or they have obtained a large number of pharmacist slots over the past four years. In either case, the results would be skewed to the lower year categories. The survey instrument was not designed to elicit this type of information so conclusions cannot be drawn from this observation. The Navy group appears to be the most consistent group with its members evenly split over the 0 - 4, 5 - 11 and 12 - 20 year groups. The Air Force

group has its members congregated in the 5 - 11 group. An explanation for this observation is that pharmacy became a separate service in 1969 and consequently, most pharmacists have been on board since that time. Prior to that time, pharmacists in the Air Force were usually medical service officers.

Study Area II dealt with the Drug Information question. Four objectives were analyzed to determine (1) the frequency with which military pharmacists had utilized a drug information center; (2) from those who had utilized this service if the services received were satisfactory and met their needs; (3) the type of drug information service members of the three service groups feel would most likely meet their needs and; (4) the three service groups' perceived need for drug information center support.

The collected data indicates that the majority of all military pharmacists had utilized the services of a drug information center. There was a statistically significant difference among the three service groups in their use of this service. Chi square analysis results indicate that the Army pharmacists have utilized this service statistically less than the Air Force and the Navy. A possible explanation for the Army group indicating a lower level of utilizing this service is that a facility itself may utilize a center but its use is limited to only a few pharmacists in that facility. When you consider the facilities' total staff and their frequency of utilization, the figures would be skewed in favor of a lower utilization rate since the instrument measured each pharmacist's experience with a drug information center and not the facilities. This is a possible

weakness of the survey instrument. Another possible explanation is that the Army pharmacists may be unfamiliar with the services of a drug information center. The results indicated the Army utilized services of a drug information center to a lesser degree than both the Air Force and Navy.

The next objective was to determine the level of satisfaction, of those who had utilized the services of a center. Results indicate that they were overwhelmingly satisfied with the information they received from the center. Each service group was equally satisfied with the services they received from centers.

In analyzing the data related to the type of drug information service military pharmacists feel would most likely meet their needs, it was found that the majority or about two-thirds were in favor of a Triservice joint military venture. A very small portion of the three service groups indicated no need for any type of service. The three service groups were consistent in this observation.

Several other observations were made in attempting to determine if satisfaction and utilization had any impact on a pharmacist's preference for a particular type of service. Results of data analysis indicate that those pharmacists who had utilized a center previously preferred the Triservice Drug Information service statistically less than those who had never utilized a drug information center previously. That is, those pharmacists who had never utilized a drug information center previously indicated a statisitically higher level of preference for the Triservice system than did those who had utilized a drug information center previously. An explanation for this attitude is

that those who had utilized a center before had probably established a rapport with the Center's staff and felt confident with the results they had received. Whereas, those who had previously never utilized a center would be more inclined to favor a military system and be more comfortable with a system managed by and for military pharmacists.

Whether one has been satisfied with the results received or not makes no difference in the type of service one prefers. Overall, the type of drug information service preferred by all three groups was the Triservice system.

The military pharmacists in the three service groups all feel that a drug information center would better meet their drug information needs than their present sources. Utilization of a drug information center previously or not makes no difference in one's opinion concerning this need. Military pharmacists indicated the services provided by a drug information center are important and they felt the service is a needed one in order to provide medical staff members with the support they need in providing direct patient care.

Military pharmacists rated the overall efficiency of the drug information system they have developed at their facilities as efficient or highly efficient. They feel that by combining the sources they have available on the premises and the services of the drug information center that they are presently utilizing provides an efficient mechanism for providing drug information support to medical staff members and patients.

The results of Study Area III indicated that military pharmacists utilized Journals and Texts most often when obtaining drug

information of a technical nature. When questions arise of a general nature they utilize the Physicians' Desk Reference and Facts and Comparisons most frequently. Note the question dealing with information about new and/or investigational and foreign drugs. It is recognized that the major medical journals have information concerning newly approved drugs. They may provide adequate information necessary to make a rational judgment as for therapeutic use, side effects, precautions, contraindications, dosage sizes, manufactures, efficacy, etc. on new drugs. However, with foreign and investigational drugs, much of the information is widely scattered. This is probably the reason that a significant percentage of military pharmacists indicated utilizing a drug information center to obtain this type of data. The survey instrument was not specific enough in the question that was asked and the respondents indicated using three sources. Analysis of survey results indicate that military pharmacists rely upon colleagues, continuing education and detail persons to a minimal extent. The Drug Information Center and the category which contains the automated indexing services are utilized to support journals and texts in obtaining information in technical areas.

Recommendations

Over a decade of literature has pointed out that there is a need for drug information center services and medical staff members have indicated a need and willingness to utilize such services. The results of this study reveal further evidence to support this need by military pharmacists. In the near future military pharmacy chiefs will

be faced with determining the direction pharmacy practice is to take. An integral part of pharmacy practice is that of providing drug information to its medical staff members as well as its patients. The purpose of this study was to gather data on military pharmacists' attitudes about the drug information question.

At this point in time it does not appear feasible to recommend a Triservice Drug Information system. The majority (64 percent) of all military pharmacists have utilized an existing drug information center and the services they received satisfactorily met their drug information needs. One could then conclude that there is no mandate for a military sponsored system. Had the information they received been unsatisfactory one could assume that possibly the military services have a need that cannot be met by existing centers. The results of this study clearly show that the drug information needs of the military can be met by existing centers.

Military pharmacists agree that the services of a drug information center are needed and can better meet their needs than their existing sources. This indicates they feel that the sources they have available to them are inadequate to provide the drug information support that medical staff members need. However, when asked to rate their combined overall drug information system in most cases they rated it efficient to highly efficient. This indicates that their sources are inadequate to provide the support they feel is necessary, but when these sources are combined with the drug information centers they have utilized, their own system becomes efficient in meeting their drug information needs.

The majority of military pharmacists indicated that their choice of drug information is a Triservice program. A possible explanation for the large response in favor of a Triservice program is that the respondents were answering this question in a manner in which they felt would be expected of them. The cover letter clearly states that opinions were being solicited as to the feasibility of a Triservice effort. This comment could have biased the respondent in favor of the Triservice option rather than the response reflecting his actual preference. An inconsistency appears to exist between the Triservice program they indicated and the response you would expect from the survey results. When one examines the trend in the preference indicated by those who have utilized a Center previously and those who had not utilized a Center, you observe that the previous group indicates a possible reluctance to change systems. Obviously, the study instrument was not designed in such a manner to differentiate between the two.

This investigator feels that a Triservice Drug Information system should be studied and a mechanism for implementation developed. Once military Departments of Pharmacy increase their level of services that they provide to both their medical staffs and patients then their demand for drug information center support will surely increase. At that time a Triservice Drug Information service would possibly be an efficient and economical means of providing this service to its pharmacy staffs. However, at the present time military pharmacists' drug information needs are being met quite satisfactorily by existing centers.

In order for existing drug information centers to be both efficient and dependable on a consistent basis a mechanism must be developed by each service group to allow for medical facilities to contract for these services. Criteria must be established for selecting a center, this paper provides an excellent literature review which contains several recommendations that have developed over one and one-half decades. Providing an opportunity for each facility to contract for drug information services would be an efficient and economical system. This would allow facilities to contract for the services they need to support their medical staff which will vary with the size of the facility as well as the level of specialized services the facility provides to its patients.

There are several advantages for utilizing an existing drug information center. Most of the drug information centers across the country are University based at Health Sciences Centers and are staffed by Drug Information Specialists. Also, because of their co-location with a Health Sciences Center these facilities have a large number of consultants available to support the Drug Information Center. All of these centers provide 24-hour on-call service and most of them are open 24 hours. These criteria are all important to consider while deciding on which facility to contract for services.

The survey instrument used in this study may provide a means of monitoring variables that reflect or measure the need for drug information services. The questionnaire did have its limitations. First of all, data needs to be identified with the various medical facilities. This study was limited to opinions of military pharmacists

towards drug information support. By combining the two data bases, information would be available to determine the facilities' needs and to determine if different sized facilities would have different requirements. This study did not allow this question to be answered unequivocally because the data was weighed in favor of the larger facilities due to their larger staffs.

It will be necessary for improved means of measuring the sources that military pharmacists utilize while answering drug information questions. More refined response scaling that better reflects the degree to which the sources are utilized will be valuable in future research. In the future when studies are conducted to analyze the services that are provided it would be worthwhile to allow respondents to indicate their choices on a scale which would better reflect the actual frequency that the service is provided. A 5-point Likert type scale is recommended by this investigator which would allow a scale from never up through all the time. With this type of data the results could be analyzed more rigorously and a better estimation of the services that are being provided could be derived.

Two additional studies need to be conducted in the future in order to obtain an unequivocal answer to the drug information question. Since there are three groups involved in this question it is necessary to evaluate the drug information needs of the other two groups -- the medical staff and the patient. A survey questionnaire should be developed that would rate or appraise the drug information services that are being provided for these two groups. Once it is administered and data analyzed then the results will provide a basis for developing

a drug information program that will meet the needs of all military personnel.

Finally, it is essential to remember the importance of gathering definitive data on innovative service as well as changing trends in services that are currently being provided. This data can be utilized as a barometer to help measure the drug information needs of the future. It is the continuing knowledge of innovation and trends that gives the leaders of the military pharmacy profession a rational basis for policy making, decision making, and effective management of pharmacy practice in the military service.

APPENDIX A

THE SURVEY QUESTIONNAIRE

SURVEY TO DETERMINE THE PERCEIVED NEEDS FOR A TRISERVICE DRUG INFORMATION CENTER

Identifier No. _____ SCN 80-49 (1 4)

NOTE: This identifier number will be used for accounting purposes only. Also, it will serve as a means by which I can return the results to you, should you desire. THE CONFIDENTIALITY OF ALL RESPONDENTS IS GUARANTEED.

The number in parentheses on the right are to facilitate key-punching efficiency. Please ignore them as you complete the questionnaire.

INSTRUCTIONS FOR COMPLETING THE QUESTIONNAIRE:

This questionnaire has been designed to enable you to complete it in a minimum amount of time. Unless otherwise directed please place a circle around the number that most closely describes your response to the question. Select only ONE answer unless the question is followed by the statement "may be more than one response."

Remember this questionnaire is a survey to determine your opinions concerning drug information needs at your **PRESENT** duty station. Please disregard from your response any opinions you may have from previous duty stations.

1. What military service are you a member of? (5)
   (1) United States Air Force (2) United States Army (3) United States Navy
2. How many years have you been in this military service? _____ (6 7)
3. The highest education degree that you hold is: (8)
   (1) B.S. (3) M.S. Other (5) Pharm. D. Greater than 6 yr. (7) Other, Please specify ____
   (2) M.S. Pharmacy (4) Pharm. D. 6 yr. (6) Ph. D.
4. In what year did you earn this degree? _____ (9 12)
5. Does your pharmacy department provide INPATIENT services? (1) Yes (2) No (13)
6. *The active bed capacity of your hospital is ____ beds.* (14 17)
7. Which type(s) of INPATIENT service(s) does your department provide on a regular basis? (May be more than one response.)
   (1) IV Admixture -simple additives (18)
   (2) IV Admixture -comprehensive, antibiotic reconstitution, hyperalimentation, etc. (19)
   (3) Unit Dose Distribution System (20)
   (4) Drug Monitoring (21)
   (5) Patient Discharge Interview (22)
   (6) Drug Histories on Admission (23)
   (7) Physician Consultation (24)
   (8) Other, please specify _____ (25)
8. The average number of new OUTPATIENT prescriptions your pharmacy fills each workday is __ ____. (26 29)
9. How many hours per day can OUTPATIENTS obtain prescriptions from your outpatient pharmacy?
   Weekdays _____ hours/day Saturdays _____ hours/day Sundays _____ hours/day Holidays _____ hours/day (30 33)
10. What type(s) of ambulatory (OUTPATIENT) service(s) does your department routinely provide? (May be more than one response.)
    (1) Maintain medication profiles (34)
    (2) Utilize a system to assure medication compliance by contacting and interviewing patients (35)
    (3) Patient consultation service, either individually or by telephone (36)
    (4) Poison control information for pediatric patients (37)
    (5) Hypertension screening and monitoring program (38)
    (6) Issue individual medication records for patients to carry in their wallets or purses (39)
    (7) Give the patient or sponsor VERBAL instructions for the proper use of medication, side effects, precautions and storage (40)
    (8) Give the patient WRITTEN instructions for the proper use of medication, side effects, precautions and storage (41)
    (9) Provide notification to outpatients that it is time to refill or renew their maintenance medication (42)
    (10) Provide educational materials to outpatients concerning health or medication related topics (brochures, information sheets, etc.) (43)
    (11) Anticoagulation service (44)
    (12) Diabetes education and monitoring program (45)
    (13) None of the above services provided (46)
    (14) Other, please specify _____ (47)

11. What type(s) of service(s) does your pharmacy department provide the medical staff (nursing, laboratory, physicians, etc.) (May be more than one response.)

(1) Monthly newsletter (48)
(2) In-service presentations, nursing (49)
(3) In-service at medical conferences (50)
(4) Provide the medical staff with drug reviews on new drug entities or new indications for old drugs (51)
(5) *Provide feedback to medical staff member concerning results of Drug Use Reviews* (52)
(6) No services provided (53)
(7) Other, please specify _____ (54)

12. How many full-time equivalents (FTE's) comprise your hospital pharmacy staff, both outpatient and inpatient service? (One FTE is defined as being one employee working 40 hours per week.) (Use fractions if appropriate.)

(a) Pharmacists _____ (55)
(b) Pharmacy Interns _____ (56)
(c) Clerks or Technicians _____ (57)
(d) Secretaries _____ (58)
(e) Volunteers _____ (59)

13. What type(s) of service(s), OUTPATIENT and/or INPATIENT, does your hospital provide? (May be more than one response.)

(1) Family Practice (60)
(2) Flight Medicine (61)
(3) Hematology/Oncology (62)
(4) Allergy Clinic (63)
(5) Renal/Urology (64)
(6) Cardiology (65)
(7) Pediatrics (66)
(8) Rheumatology (67)
(9) Primary Care (68)
(10) Respiratory-Pulmonary Clinic (69)
(11) Diabetes, Endocrine Clinic (70)
(12) Dermatology (71)
(13) Hypertension (72)
(14) Neurology (73)
(15) OB/GYN (74)
(16) Internal Medicine (75)
(17) Other, please specify _____ (76)

14. Please indicate where you presently most often obtain your information for drug use related questions. Please circle ONLY one per category.

	PDR/ Facts and Comparisons	Journals/ Texts	Colleagues	Continuing Education	Detail Person	Drug Information Center	Other Medline Medlars IPA, etc.	
Adverse drug reactions and interactions	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(77)
Therapeutic indications and contraindications of specific drugs	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(78)
Basic pharmacologic and toxicological information	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(79)
Evaluation and comparisons and new and/or investigational or information about foreign drugs	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(80)

	PDR/ Facts and Comparisons	Journals/ Texts	Colleagues	Continuing Education	Detail Person	Drug Information Center	Other Medline Medlars IPA, etc.	
Drug interference with laboratory tests	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(1)
Intravenous incompatability and stability	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(2)
Advice on dosage information and preferred routes and schedules of drug administration	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(3)
Pharmacokinetic information concerning half-life, volume of distribution, protein binding	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(4)

15. How often do you have to make an effort to obtain information of the type listed above? (5)
    (1) two or more times a day (3) less than once a week (5) rarely
    (2) once a day or less (4) once monthly

16. Rate the combined efficiency of your present drug information sources. (6)
    (1) highly efficient (2) efficient (3) inefficient

17. Based on your knowledge would a drug information center satisfy your drug information needs better than your present sources? (7)
    (1) Yes (2) No (3) Not sure

18. Have you ever utilized a drug information center to obtain an answer to a drug related question? (8)
    (1) Yes (2) No (proceed to question 22)

19. Where was the Drug Information Center located? Institution _____ City and State _____

20. Does your facility have a contract with this institution to provide reimbursement for drug information services? (9)
    (1) Yes (2) No (3) Not sure

21. Did the services you received meet your information needs? (1) Yes (2) No (10)

22. Based on experiences at your present facility how often do you think you would utilize a Drug Information Center? (11)
    (1) two or more times a day (3) less than once a month (5) rarely
    (2) once a day or less (4) once a month (6) not sure

23. If a Triservice Drug Information Center were approved, funded and implemented during what time of the day do you feel you will have the greatest need? (Rank 1-4, 1 representing the greatest frequency.)
    0800-1200 _____ 1201-1800 _____ 1801-2000 _____ 2001-0759 _____ (12-15)

24. Please indicate your preference for the type of drug information service you feel would most likely meet your drug information needs. (16)
    (1) Triservice program
    (2) Individual service program independent of the other military services
    (3) Individual medical facilities make their own arrangements
    (4) Have no need for this type of service
    (5) Other, please specify _____

25. Have you ever used the Drug Information Center located at Malcolm Grow Regional Medical Center, Andrews AFB, Md.? (17)
    (1) Yes (2) No

26. Do you desire a copy of the results of this study? (1) Yes (2) No (18)

THIS COMPLETES THE QUESTIONNAIRE. THANK YOU VERY MUCH FOR TAKING THE TIME TO FILL IT OUT. PLEASE MAIL IT WITHOUT DELAY IN THE ENCLOSED POSTPAID ENVELOPE.

APPENDIX B

PERTINENT CORRESPONDENCE

THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA 85721

COLLEGE OF PHARMACY
DEPARTMENT OF PHARMACY PRACTICE

7 December 1979

Dear Colleague:

In accordance with para. 8, AFR 12-35 the following information is provided as required by the Privacy Act of 1974.

(1) 5USC 301 *Departmental Regulations;* 10 UCS 8012 *Secretary of the Air Force, Powers, Duties, Delegation of Compensation,* and/or DOD Instruction 1100.13 17 Apr 68. *Surveys of Department of Defense Personnel,* and/or AFR 30-23, 22 Sept 76 *Air Force Personnel Survey Program.*

I am asking your help and only 10-15 minutes of your valuable time. Every active duty pharmacy officer in the United States Air Force, United States Army and United States Navy, who is assigned to a health care facility has been selected to participate in a study to determine and evaluate if a need exists for a Drug Information Center operated by the three services. This study is being undertaken by the University of Arizona College of Pharmacy to determine if current drug information sources utilized by military pharmacists are perceived as being adequate. In addition, opinions are solicited as to the feasibility of attempting a triservice effort in staffing and managing such a program.

I have developed the enclosed survey as a means to collect data on military pharmacists. The results of this survey will lead to valuable information in the planning and development of a system to handle the drug information needs of military pharmacists and physicians while treating patients in military health care facilities. Completion of the survey should only require a few minutes of your time. Your cooperation is essential to the success of the study.

In return for your generous help, I will gladly send you a copy of the results. Merely indicate your desire on the last page of the survey.

A WORD ON CONFIDENTIALITY

Please be assured that all information gathered through this process will be confidential. Specific data will not be identified with any individual or institution. The "identifier number" used on the questionnaire will be used only to facilitate our follow-up techniques and to prevent you from receiving bothersome reminder letters. Also, it will serve as a means by which we may return the results to you.

Even though this is strictly a volunteer response and no adverse action will be taken against non-participants, it is hoped that it will be a sincere representation of your thoughts. So why not sit down with a hot cup of coffee and complete the survey as soon as you can? Please use the enclosed envelope for returning your survey.

Again, thank you for taking the time to help me out, and I'll be looking forward to hearing from you.

Sincerely,

Leslie G. ("Rick") Jenkins, CAPT., USAF, BSC
Graduate Student, University of Arizona

17 December 1979

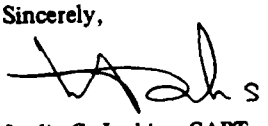
Dear Colleague:

Recently I mailed you a questionnaire asking for your participation in an important survey.

If you have already returned the questionnaire, please consider this card a "Thank You" for your valuable help.

If you have not had a chance to return the completed form yet, could you do so as soon as possible? Your participation is vital to the success of my study.

Sincerely,



Leslie G. Jenkins, CAPT., USAF, BSC.
Graduate Student

THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA 85721

COLLEGE OF PHARMACY
DEPARTMENT OF PHARMACY PRACTICE

27 December 1979

Dear Colleague:

Recently I sent you a survey questionnaire concerning your thoughts on drug information in the military services. As my sample size is limited, your response is very important to the accuracy of my survey of military pharmacists.

The survey will take only about 10 minutes of your time to complete, and you can return it in the enclosed envelope. If you've already done so, many thanks. If you have not yet had a chance to answer, I would be most grateful if you would do so now. Your response will be held in strict confidence, of course.

Just in case my original went astray in the mails or became otherwise lost or misplaced, I've enclosed another survey form and return envelope. I'll be waiting to hear from you!

Sincere thanks,

Leslie G. Jenkins, CAPT., USAF, BSC.
Graduate Student

Questionnaire #_____ Name_____

Telephone_____

	Date Sent	Received
1st mailing	_____	_____
2nd mailing	_____	_____
3rd mailing	_____	_____
Telephone	_____	_____
Final action	_____	_____
Key punch	_____	_____

Complete Questionnaire

Date _____

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