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# A STUDY TO DETERMINE

# THE IMPACT OF THE RECENTLY ESTABLISHED PRIMUS CLINICS ON THE PATIENT WORKLOAD IN THE PEDIATRIC CLINIC, GENERAL OUTPATIENT CLINIC AND EMERGENCY ROOM AT DARNALL ARMY COMMUNITY HOSPITAL

A Graduate Management Project

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by

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The 1984 Department of Defense Authorization Act directed DoD to conduct demonstration projects designed to improve the military direct health care system. The success of ambulatory health care centers in the private health care industry prompted military officials to directthe implementation of a demonstration project using satellite health clinics. The Army Medical Department (AMEDD) established ten of these clinics to extend and complement the military direct health care system. The Army Surgeon General officially designated this project as the Primary Care for the Uniformed Services (PRIMUS) Program. The PRIMUS clinics were to become an important extnesion of the military health care system. The purpose of this study was to determine the impact of the PRIMUS clinics on the patient workloard in the Pediatric Clinic, General Outpatient Clinic, and Emergency Room at Darnall. A statistical analysis of the patient workload data from the past two years determined that the workload in each of these clinical areas decreased since the PRIMUS clinics opened in June 1988. Proper management of this valuable program is essential to maximize the efficient delivery of primary heatlh care services to eligible beneficiaries. the Commander, Darnall ACH, has made several change s toclinic operations to ensure the optimal integration of PRIMUS into the total health care delivery system at Fort Hood.

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# CHAPTER I

# INTRODUCTION

## Conditions Which Prompted the Study

The health care industry in the United States is in the midst of an evolutionary change toward cost effective primary care. This trend is a direct result of governmental pressure on the health care industry to maintain some control over the spiraling cost of medical care. One method that the government has used to exert this pressure is in the form of prospective reimbursement for Medicare expenditures based on diagnosis related groups (Horn, Buckle, and Carver 1988, 53). This action, along with an increased awareness among third party payers, has driven the health care industry to become more innovative in the provision of primary care. The purpose of this innovation is to optimize efficiency while maintaining high standards of quality care (Hudak 1988, 1).

The private health care industry began to make substantial changes in the organization of health care delivery systems to become more efficient and responsive to patient concerns. New organizations were developing designed to improve patient access to primary care without decreasing the quality of health care provided. Hospitals were beginning to establish satellite health centers to maintain or increase their market share. Jarvis noted that reducing the travel distances for patients improved convenience and was a major factor in improving access to care (1987, 29). The private health care industry opened

the first conveniently located ambulatory care center, initially known as a free-standing emergency center, in Delaware in 1973. An estimated 3800 of these ambulatory care centers were in operation by 1986 and recorded more than 61 million patient visits during that year (U.S. Congress, House, Committee on Appropriations, Surveys and Investigation Staff 1987, 5). The private health sector has become well aware of the financial benefits realized by these ambulatory care centers. Hospitals can improve their financial position by establishing ambulatory care centers to capture market share or increase the total number of patients using hospital services. Consequently, for-profit and not-for-profit hospital chains and independent hospitals continue to invest in this method of providing primary care (Hudak and Mouritsen 1988, 282).

Congressional concern about the accelerating cost of health care has not been limited to the private sector. An unprecedented growth in the utilization and cost of the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) resulted in specific mandates for the Department of Defense (DOD). The 1984 Department of Defense Authorization Act directed DOD to conduct demonstration projects designed to improve the military direct health care system. These projects would specifically address the areas of access, quality, efficiency and cost effectiveness (Hudak and Mouritsen 1986, 2).

The DOD response to this directive was to develop and

implement several demonstration programs that would improve on these areas of the military direct health care system. The CHAMPUS Reform Initiative (CRI) is the largest of these programs. The CRI utilizes fixed-price contracts with several private health care organizations to provide medical care to nonactive duty beneficiaries. This program is currently being tested in California and Hawaii. Another major reform initiated by DOD is catchment area management. This approach would make commanders of military treatment facilities solely responsible for providing health care to all eligible beneficiaries in their catchment area. Commanders would receive resources to provide health care based on the number of beneficiaries in their catchment area. This program is currently being tested at Fort Sill, OK and Fort Carson, CO. A third reform measure developed was based on the use of satellite primary health care clinics (U.S. Congress, CBO 1988, xi-xxi). The Army Medical Department (AMEDD) established satellite primary health care clinics to extend and complement the military direct health care system. Under the original plan, AMEDD personnel would staff these primary care clinics to minimize costs and provide training for military health care providers. However, the AMEDD rejected this proposal due to existing manpower constraints (U.S. Congress, House, Committee on Appropriations, Surveys and Investigations Staff 1987, 6).

The military health care delivery system has become overwhelmed with increasing patient demands and limited

resources to meet those demands. The economic imbalance between supply and demand has given rise to a significant problem with patient access to primary medical care. The DOD recognized this problem as a major source of dissatisfaction with the military health care delivery system. Fink stated that he believed that the military direct health care system could no longer respond to both peacetime beneficiary needs for accessibility and continuity of care, and remain prepared to meets its combat medical support requirements (1985, C1). The Department of Defense has become well aware of the deficiencies in the military health care delivery system. Improvements to this system must be accomplished for medical, economic, and political reasons (Hudak and Mouritsen 1988, 282).

The success of ambulatory health care centers in the private health care industry prompted military officials to direct the implementation of a demonstration project using satellite health clinics. The Army Surgeon General approved the establishment of the first contractor-owned, contractor-operated primary care center for military health care beneficiaries in November 1984. He officially designated this project as the Primary Care for the Uniformed Services (PRIMUS) Program. The PRIMUS clinics were to become an extension of the military direct health care system. An organization from the private health care industry would own and operate these clinics. However, the clinics would remain under the operational control of the military direct health

care system. The implementation of PRIMUS not only demonstrated a shift toward ambulatory care, but also introduced a change of emphasis toward increased access and convenience for military health care beneficiaries. This program also established the contracted primary care provider as a "gatekeeper" for medical care. This individual would be responsible to provide appropriate primary care, or referral to the military medical treatment facility (MTF) for specialty care (U.S. Congress, House, Committee on Appropriations, Surveys and Investigations Staff 1987, 6).

The mission of the PRIMUS clinics is to provide primary care to military health care beneficiaries similar to that which they would receive at the MTF. The clinics are organized and staffed to treat episodic illness and injuries in such diverse disciplines as family practice, general medicine, pediatrics, obstetrics/gynecology, optometry, and internal medicine. The physicians who are credentialed to practice in the PRIMUS clinics must be board certified in their specialty areas. The contracted civilian health care organization is responsible for the credentialing of all health care providers in the PRIMUS clinics (Tomich 1986, 14). The PRIMUS clinics also provide primary care through physician extenders such as physician assistants and nurse practitioners. PRIMUS clinics provide limited pharmacy, radiology, and laboratory services to support their primary care mission. PRIMUS clinics are open every day of the year and provide care on a no appointment,

walk-in basis. Appropriate staffing levels preclude excessive waiting times and promote patient satisfaction. The contractor tailors the actual staffing and size of the PRIMUS clinics to meet the projected or experienced patient workload at each site. The specific goals of the PRIMUS program are:

1. Act as an extension of the Army Health Care System.

2. Improve access, convenience, and satisfaction of military beneficiaries.

3. Reduce over utilization of military health care facilities.

4. Provide quality, cost effective primary care.

5. Recapture CHAMPUS users (Melton, 1988).

The Army opened its first PRIMUS clinic in Fairfax, Virginia in October 1985. Within six months it became clear that PRIMUS was an overwhelming success. The actual patient workload was more than twice the amount projected (Cohn 1987, 25). Patient surveys consistently indicated a 99% acceptance rate. Health care beneficiaries found PRIMUS to be a very attractive alternative to crowded clinics in military treatment facilities and less costly than the CHAMPUS deductible and copayments (Hudak and Mouritsen 1986, 9-10). The military quickly expanded the PRIMUS program to include funding for those sites where there was a need to expand primary care services to underserved health care beneficiaries (Kimble 1987a, 4).

In the Fort Hood community, there was a greater demand for

health care than there were services available at Darnall Army Community Hospital to meet this demand. As a result, the hospital received authorization to contract for primary care centers owned and operated by a civilian health care organization. Darnall contracted with The Sisters of Charity of the Incarnate Word, Houston, Texas, to provide health care to eligible beneficiaries on a regular basis by establishing two PRIMUS clinics.

The Army's portion of the PRIMUS program has rapidly grown to an annual funding level in excess of $24.5 million for fiscal year 1988 (Melton 1989, personal interview). This represents a significant resource utilization within the U.S. Army Health Services Command (HSC). Proper management of this valuable program is required to maximize the efficient delivery of primary health care services to eligible beneficiaries. Commanders of MTFs with PRIMUS clinics in their catchment areas are responsible for the integration of PRIMUS into their overall health care delivery services. Health Services Command has directed the documentation of any improvements or increases in efficiency achieved as the result of PRIMUS operations. This information will then be available to demonstrate the need for continued Congressional support for this program (U.S. Department of the Army, HSC 1988).

## Statement of the Problem

The problem statement was to determine the impact of the recently established PRIMUS clinics on the patient workload in the pediatric clinic, general outpatient clinic, and emergency room at Darnall Army Community Hospital.

## Objectives

The specific objectives of this study were to:

1. Review the literature pertaining to contracted primary outpatient care, catchment area management, and patient case mix.

2. Review documentation concerning the development and implementation of the PRIMUS concept.

3. Assess patient workload data for twelve months prior and twelve months subsequent to the opening of the PRIMUS clinics to determine the direction and magnitude of the effects these clinics have had on patient workload in the pediatric clinic, general outpatient clinic, and emergency room.

4. Determine if there was a significant change in utilization among different health care beneficiary groups (i.e., active duty, family members, and retirees) of the pediatric clinic, general outpatient clinic, and emergency room.

5. Determine if there was a significant change in the number of routine patients treated in the emergency room as a result of the implementation of the PRIMUS clinics.

6. Determine if changes would be required to standard

operating procedures in the pediatric clinic, general outpatient clinic, and emergency room to ensure the optimal integration of PRIMUS into the total health care delivery at Darnall.

## Criterion

A t-distribution was used to assess the impact of the PRIMUS clinics on the patient workload of the pediatric clinic, general outpatient clinic, and emergency room. A two-sided alternative was used to determine significance in changes to workload data. A 95% confidence interval was used to assess any changes to workload data (i.e., the alpha level was .05).

## Assumptions

For the purposes of this study, it was assumed that:

1. Workload data for the pediatric clinic, general outpatient clinic, emergency room, and the PRIMUS clinics would be available and accurate.

2. There would not be any significant changes in mission, population supported, or resources available for Darnall Army Community Hospital that could adversely impact this study.

3. The quality of care provided by the PRIMUS clinics would be consistent with that provided by the pediatric clinic, general outpatient clinic, and emergency room at Darnall.

4. The present organization and resources for primary medical care at Darnall may not represent the most efficient and effective use of available resources.

## Limitations

The following limitations of this study are recognized:

1. The results of this study are applicable only to the Darnall Army Community Hospital catchment area.

2. Patient triage categories (emergent, urgent, and nonurgent) provided the only assessment of patient acuity. These triage categories are defined in Appendix A.

## Literature Review

### Military Health Care System Problems

The military health care system is beset with numerous problems that have attracted Congressional interest. An accelerating rise in the cost of medical care, beneficiary dissatisfaction with health care provided, and concerns regarding the reported inadequate readiness for war have focused the need to change the military's health care system (U.S. Congress, Congressional Budget Office 1988, xi). This system must be ready to meet the demands of war, as well as satisfy the peacetime medical needs of more than 9 million active and retired military personnel and their dependents (Hale 1988, 1).

The Congressional Budget Office (CBO) noted that the provision of health care to nonactive duty beneficiaries, (i.e. family members and retirees), costs the Department of Defense more than $3 billion each year (1988, xi). Sections 1074 and 1076, Title 10, U.S. Code entitle members of the uniformed services to medical care in any military health care facility.

Nonactive duty beneficiaries may obtain medical care subject to the availability of resources. It is a common misconception that dependents and retirees are entitled to receive the same free care as active duty personnel (U.S. Congress, House, Committee on Appropriations, Surveys and Investigations Staff 1987, 30-31).



## The Need for CHAMPUS Coverage

When nonactive duty beneficiaries are unable to obtain their health care services from military treatment facilities, they may use the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS). This health plan is not free. Health care beneficiaries must share part of the costs of medical treatment in the form of deductibles and copayments. Retirees and family members may use CHAMPUS for outpatient treatment at any time. They may also use CHAMPUS in a true medical emergency when delay could cause death or serious injury. However, the CHAMPUS program has different rules regarding inpatient hospital treatment. Nonactive duty beneficiaries must obtain a nonavailability statement from the commander of the local military medical treatment facility for inpatient hospital treatment. The CHAMPUS program requires this nonavailability statement for reimbursement if the beneficiary resides within the "catchment area" of a military treatment facility. The DOD specifically defined these catchment areas by zip codes. Health care beneficiaries can determine if they are in a military catchment area by calling

their local CHAMPUS Health Benefits Advisor (CHAMPUS Handbook 1986, 41-42).

Many nonactive duty beneficiaries have turned to CHAMPUS to supplement their use of military facilities. Hale noted that the use of CHAMPUS funds increases the overall cost of the military health care system because treatment in the civilian community is generally more expensive than that received within the military system (1988, 3). This increased use of CHAMPUS also raises dissatisfaction of health care beneficiaries with the military system because they must pay higher out-of-pocket expenses for CHAMPUS deductibles and copayments (U.S. Congress, CBO 1988, xiii).



## Escalating Costs

The cost of CHAMPUS has soared in recent years from $485 million in 1979 to more than $2.3 billion during fiscal year 1987 (Hale 1988, 1). Several explanations have been proposed to interpret this rapid increase in CHAMPUS costs. Kimble attributed part of the rise in costs to restricted access of nonactive duty beneficiaries to the military medical system due to resource constraints and to inflation within the health care field (1987b, 8). Hale also cited high rates of medical inflation and growing numbers of military retirees and family members as contributing causes. He believes that these causes are probably beyond the control of the Department of Defense. However, he went on to note that the DOD could control the comparatively heavy use of health care by military

beneficiaries and the inefficient use of existing military resources (1988, 2).

Previous studies established that military health care beneficiaries seek medical care almost one and one-half times more often than their civilian peers (U.S. Congress, CBO 1988, xii). However, it is difficult to estimate precisely the extent of medical care provided to beneficiaries who live outside the catchment area of a military medical treatment facility (MTF). Many of these health care beneficiaries rely on private health insurance to pay for their medical care. Health care beneficiaries residing within a catchment area of an MTF generally seek health care treatment in the military hospital or use CHAMPUS for their medical care. These military health care beneficiaries visit physicians and are admitted to hospitals more often than other civilians on a per capita basis (U.S. Congress, CBO 1988, xii).

Hale noted that this heavy use of military facilities raises cost without necessarily promoting better health. He suggested that some of the high use might be reduced without harming health (Hale 1988, 2). Evidence to support this hypothesis can be found in the civilian sector. Health Maintenance Organizations (HMOs) have reduced hospital admissions, apparently without sacrificing the quality of care provided to the patient. Some researchers have found that the utilization of medical care in an HMO and a standard insurance plan was significantly related to the patient's age, sex, race,

health status, and prior use of health care facilities. Patients sought medical care from the HMO more frequently than through the insurance plan because there was no deductible payment required by the HMO, unlike the insurance plan (Diehr, Martin, Price, Griedlander, Richardson, and Reidel 1984, 49-50). Kuder and Levitz found that individuals with an established relationship with a regular source of care visited the physician more often than individuals without a usual source of care. They determined that this variable was more significant than income, travel distance, or waiting time. Conversely, the lack of a usual source of care was found to be a significant obstacle to patients seeking medical care (Kuder and Levitz 1985, 579-96). These findings would indicate a plausible explanation for the heavy use of medical care by military health care beneficiaries. They do not have to pay for ambulatory health care received in a military treatment facility, and the MTF represents a usual source of care. When military health care beneficiaries do not obtain care directly from a MTF, they may use CHAMPUS to receive care from a civilian health care provider. Thus, CHAMPUS also represents a usual source of care at a relatively low cost to the patient. An ever increasing reliance on CHAMPUS, however, has resulted in soaring costs to the government.

## Military Health Care System Reforms

The spiraling rise in cost of CHAMPUS has led to several proposed reforms to the military health care system. The CHAMPUS Reform Initiative (CRI) began last year in California and Hawaii. Under this program, a private health care organization has assumed the responsibility for all CHAMPUS care provided in a large geographic area through a fixed price contract. Costs are anticipated to be contained through the use of preferred provider organizations (PPOs) and sharing agreements with military treatment facilities for staff and supplies (Hale 1988, 3).

Another proposed reform measure is the use of catchment area management. This approach would make commanders of military treatment facilities solely responsible for providing health care to all eligible beneficiaries in their catchment area. Commanders would receive the resources to provide health care based on the number of beneficiaries in their catchment area. The commander could then use the funds provided to increase his inhouse capabilities, sign agreements with PPOs, or contract out selected services to local providers in the private health care industry. Beneficiaries would then enroll in the program of their choice and pay fixed per capita fees. The payment of these fees would be independent of the use of services provided (U.S. Congress, CBO 1988, xvi).

Several MTFs have established a number of smaller-scale initiatives. These include selective PPO contracts for mental

health benefits; special sharing arrangements with private health care providers under the Partnership Program; and the use of PRIMUS clinics.

## Contracted Primary Care

The Army now has 10 PRIMUS clinics established under contract with private health care organizations. These clinics provide a wide range of outpatient services to nonactive duty beneficiaries, including some preventive benefits not available under CHAMPUS (such as physicals, mammograms, and PAP tests). Health care beneficiaries do not have to pay for the outpatient services provided by these clinics. The Navy and Air Force also have contracts with organizations in the private health care industry to provide free outpatient care. The Navy has named their clinics NAVCARE while the Air Force has retained the PRIMUS name for their clinics. These clinics are similar in operation to the Army PRIMUS program with only a few minor differences (Melton 1989, personal interview).

PRIMUS and NAVCARE clinics are receiving high praise from military health care beneficiaries and project officers for increasing access to primary care. Congressional critics, however, say that these clinics are a luxury the military cannot afford (Henry 1989, 2). Although PRIMUS and NAVCARE have increased access and patient satisfaction, they have done little to stop the cost escalation of CHAMPUS. Previous studies have shown that competitive bidding and fixed price contracts have demonstrated that PRIMUS can provide primary

care at a cost significantly less than a CHAMPUS outpatient visit (Melton 1989, personal interview). Despite the money spent to provide primary care through contract clinics, the cost of CHAMPUS has continued to grow at a rate even higher than medical inflation (Henry 1989, 2). Previous researchers determined that the cost of providing primary care in a PRIMUS clinic may be cheaper than a similar visit paid through CHAMPUS. However, the high demand for health care has caused the overall cost of the PRIMUS program to increase. Citing a need to be more conservative with limited funding, the services have slowed their expansion of the PRIMUS program (Kimble 1988, 9).



## Increased Access to Health Care

Williams cited two methods to increase and improve patient access into a health care delivery system. The first method increases the purchasing power of the patient with a resultant increase in demand for health care. An example of this method would be the Medicare and Medicaid programs. Health care consumers covered by either of these programs can now "afford" to seek medical treatment whereas they probably would not have sought medical care prior to the implementation of these programs. The second method involves an increase in supply of health care services that can lead toward improvements in availability and organization of health care resources. An extension of care capabilities, such as the opening of PRIMUS clinics, would represent an example of this method (Williams

1987, 8-9). White adds that this increased capability could also exemplify an intervention for the beneficiary's purchasing power since these clinics provide a no-cost alternative to the cost sharing requirements of CHAMPUS (1988, 19).

The overall cost of PRIMUS will continue to rise due to the increasing number of patients who receive health care treatment in PRIMUS clinics. This is the result of the increased accessibility provided to patients by this new element of the military direct health care system. This phenomena is identified as induced demand or the provision of care to the "ghost population." This refers to the large number of health care beneficiaries who, for a variety of reasons, are not being seen in any health care delivery system. These patients seek medical care when free and convenient means of meeting their health care needs become available in the health care market. Free care at a PRIMUS clinic encourages beneficiaries to use the military direct health care system when they might not otherwise seek medical treatment. The House Appropriations Surveys and Investigations Staff stated, "the possibility of effecting a substantial reduction in CHAMPUS costs as a direct result of PRIMUS and NAVCARE appears to be nonexistent" (U.S. Congress, 1987, iv & 24).

## Cost Sharing Proposals

The fixed price contract with private health care organizations for PRIMUS results in paying a flat fee per visit. Critics point out that this method of contracting is

not cost-efficient. They stated that this form of contracting encourages patients to overuse the clinics and offers no incentive to the contractor to discourage unnecessary visits (Hale 1988, 10; Henry 1989, 14). One method suggested by critics to reduce costs places the contractor "at risk" by paying them a flat fee for all patient care provided, independent of the number of patient visits. Another proposed solution would be to charge military health care beneficiaries a nominal fee for each visit to a PRIMUS clinic (U.S. Congress, CBO 1988, 88-89; Hale 1988, 10).

Lopez examined the appropriateness of the latter proposal as a possible solution to some of the problems that beset the military health care system. She noted that in a health care system that provides medical care without charge, some non-price deterrents in the form of longer waiting times and delays in obtaining appointments are common. These deterrents are essential in a free care system to regulate some of the demand for health care (1987, 246). Her research indicated that copayments demonstrated a significant impact in the areas of utilization and revenue. However, the negative impacts on other criteria such as health, morale, and retention indicated that a nominal user fee would not be the optimal solution to resolve the problems of the military health care system (Lopez 1987, 250).

## Is PRIMUS a Cost-Efficient Alternative?

Researchers studied the PRIMUS program to determine if it provides a more cost-efficient alternative to the same type of care given in a military medical treatment facility. White conducted an extensive research project in this area at Dewitt Army Community Hospital, Fort Belvoir (1988). She determined that for some selected diagnoses and evaluative procedures, the military treatment facility could provide care at a lower cost than the PRIMUS clinic located in Woodbridge, Virginia. However, she also found that the PRIMUS clinic could provide lower cost care than the same treatment modalities and diagnostic procedures conducted in the emergency room at Dewitt Army Community Hospital (White 1988, 87-88). It would appear that the Woodbridge PRIMUS clinic is functioning as an extension of the military direct health care system as intended. Although White could not demonstrate cost-efficiency within the scope of her study, the PRIMUS clinic in Woodbridge, Virginia increased patient access and satisfaction while providing quality, cost-effective primary care. This PRIMUS clinic is currently meeting some of the original goals of the overall PRIMUS program. White identifies the growing concern of health care providers and beneficiaries that a shortage of specialty care now exists for those patients referred from the primary care gatekeeper in either the military treatment facility or the PRIMUS clinic (1988, 98).

## Research Methodology

Two distinct phases marked this research effort to determine the impact of the recently established PRIMUS clinics on patient workload. The first phase involved the collection of workload data to determine the number of patient visits to the pediatric clinic, general outpatient clinic, and emergency room during the twelve months preceding the implementation of PRIMUS. Workload data for these clinics was also collected for twelve months after the opening of the PRIMUS clinics on 4 June 1988. This information was then segregated further to identify beneficiary categories on a monthly basis. The beneficiary categories identified were active duty, retirees, and family members of active duty or retirees. Those individuals not falling into one of these categories were identified as "others" (e.g., authorized federal employees and civilians). The Patient Administration Division provided this information by using the Medical Summary Report (MSR) Worksheet and Feeder Reports (HSC Form 464) submitted by the clinics. Workload data for the emergency room was also segregated to identify patient triage categories (i.e., emergent, urgent, and nonurgent).

The second phase of this research involved the evaluation of the data to determine if a significant impact had occurred in the workload of the pediatric clinic, general outpatient clinic, and emergency room. This impact was described by the number of patient visits for the twelve months before and

after the opening of the PRIMUS clinics. Workload in the emergency room was further evaluated to determine if there had been a significant change in the number of nonurgent patients who received treatment as a result of PRIMUS clinic operations. A direct comparison by beneficiary category was also conducted between the first five calendar months of 1988 and 1989 to determine if a significant impact had occurred in the usage of these hospital clinics by various groups of health care beneficiaries.

The average or mean was determined for each of these variables on a monthly basis for pre- and post-PRIMUS data for the periods indicated previously. A t-test for these variables was conducted and a t-value determined. The computed value was compared at the .05 alpha level to those t-values located in the standard t-tables. If the computed value was larger than that in the table, then the opening of the PRIMUS clinics may have significantly affected the workload in the pediatric clinic, general outpatient clinic, and emergency room. The magnitude and direction of these effects determined the extent of my recommendations to ensure the optimal integration of PRIMUS into the total health care delivery system at Darnall Army Community Hospital.

# CHAPTER II

# DISCUSSION

## Overview

This study began with a familiarization of the clinical areas of interest. I visited the general outpatient clinic, pediatric clinic, emergency room, and both PRIMUS clinics to gain an understanding of their operations. An evaluation of the mission, organization, and staffing of these clinics established a framework of the direct health care system in the Darnall Army Community Hospital catchment area. Nonactive duty health care beneficiaries in the Fort Hood area have the option to receive primary care in any of the above noted clinics. Active duty military personnel receive primary care at their assigned battalion aid stations and troop medical clinics (TMCs).

The population supported by Darnall Army Community Hospital includes approximately 200,685 eligible health care beneficiaries. There are more than 39,000 active duty military personnel assigned to Fort Hood. Twenty-seven percent of the population supported consists of active duty family members. Retirees and their family members comprise another forty-nine percent of the population supported. The demand for health care in the Fort Hood community is greater than the services available at Darnall Army Community Hospital to meet this demand. The addition of the two PRIMUS clinics has increased

the accessibility of eligible health care beneficiaries to primary care in the Fort Hood community.

## General Outpatient Clinic

The general outpatient clinic (GOC) is responsible for the diagnosis, treatment, and proper medical disposition of adult patients (17 years of age and up) with minor health problems and injuries. This clinic provided primary care for adolescents from 13 to 17 years of age prior to the arrival of a trained adolescent pediatrician in September 1988. These patients are now seen in the pediatric clinic. The GOC also provides care for some patients who need chronic care or prescription refills when other clinics are closed. There are eight military physicians and one civilian physician currently assigned to provide primary care in the GOC. Several other primary care physicians provide health care treatment in this clinic on a part-time basis.

The present physician staffing in the GOC is consistent with the number of health care providers authorized by the current Tables of Distribution and Allowances (TDA) Documentation. However, the number of physicians available to treat patients in this clinic fluctuated over the past two years. The average number of health care providers available decreased during the period of this study. Most of the turnover in physician availability occurred during the summer months. The Medical Expense and Performance Reporting System (MEPRS) Section of the Resource Management Division provided

the number of full time physicians and their total number of hours available in the GOC during each month of the study period (Appendix B).

The GOC is open seven days/week. Same-day or routine appointments are available in the GOC through the central patient appointment system. A limited number of walk-in appointments are also available. These walk-in appointments are normally used to treat the nonurgent or routine patients referred from the emergency room. The hours of operation for the general outpatient clinic are from 0700-2100 Monday through Friday, and from 1200-2100 Saturdays, Sundays, and holidays. Seven military units use the GOC as their troop medical clinic. The GOC conducts active duty sick call from 0700-0800 Monday through Friday. The Medical Officer of the Day (MOD) is responsible for the delivery of primary care to the active duty personnel on sick call. The physician assigned to this duty treats patients from 0700-1630. Upon completion of sick call, the MOD will assist in the treatment of any overflow patients or nonurgent walk-ins referred from the emergency room. Five physicians provide primary patient care during the day shift (0800-1630). Two physicians provide this care during the second shift (1200-2100). The central patient appointment system schedules four patients per hour for each health care provider. A health care provider in the GOC with a full patient appointment schedule could conceivably provide health care treatment to approximately 640 patients per month.

However, administrative requirements and other commitments prevent most health care providers from achieving this maximum workload. The patient appointment system provided a record of the actual number of patients seen by each health care provider during the past eight months (Appendix C).

Pediatric Clinic

The mission of the Department of Pediatrics is to provide quality care to health care beneficiaries under the age of seventeen. The general pediatric services provided by this department include: a pediatric outpatient clinic, a well-baby clinic, a neonatology service, a pediatric inpatient unit, and an exceptional family member program. There are seventeen pediatricians (13 military and 4 civilian) and two pediatric nurse practitioners assigned to this department. The current TDA recognizes requirements for only fourteen pediatricians and five pediatric nurse practitioners. The overage of three pediatricians compensates for the shortage of three pediatric nurse practitioners.

The Department of Pediatrics experienced a significant turnover in personnel similar to that of the general outpatient clinic. The number of physicians available to treat patients in this department also fluctuated over the past two years. The average number of health care providers available increased during the period of this study. The MEPRS Section provided the number of full time pediatricians and their total number of

hours available during each month of the study period (Appendix D).

While most of the assigned physicians perform direct patient care in the pediatric outpatient clinic, the remaining providers are responsible for direct patient care in other areas of the hospital. The Chief, Department of Pediatrics is responsible for the overall operation of the department. Along with his many administrative responsibilities, he also provides direct patient care in the clinic or to patients admitted to the pediatric unit. Two of the military physicians are neonatologists. They are responsible for the care given to infants admitted to the Neonatal Intensive Care Unit (NICU). One military physician provides 24-hour coverage for the 18-bed pediatric inpatient unit. This ward is seldom filled to capacity due to a critical shortage of ancillary support personnel. Pediatric patients must be diverted to other health care facilities when the census on this unit reaches 12 to 15 inpatients. The decision to divert patients to other health care facilities is dependent upon the acuity of the patients on the unit and the ancillary support personnel available. One civilian physician provides health care to military dependents in the exceptional family member program. The Chief, Pediatric Clinic assigns one physician to "float" in the clinic area. This physician provides care to all walk-in patients and assists in the same-day or well baby clinics when required. The "float" physician remains in the hospital all night to

provide care for pediatric inpatients or emergencies. The nurse practitioners are responsible for providing direct patient care in the well-baby clinic. The nurse practitioners typically provide care to 44 healthy babies each day in this clinic.

The pediatric clinic is open seven days/week. Parents can obtain a same-day appointment for their sick or injured children through the central patient appointment system. A limited number of walk-in appointments are also available. The hours of the pediatric clinic are from 0900-1900 Monday through Friday, and 1300-1800 on Saturdays, Sundays, and holidays. The patient appointment system schedules eight patients per hour for each health care provider assigned to work in the same-day appointment clinic. The patient appointment system provided a record of the actual number of patients seen by each pediatrician during the past eight months (Appendix E).

Emergency room

The mission of the Department of Emergency Medicine (DEM) is to provide pre-hospital care and emergency medical services to all military health care beneficiaries and other patients in need of immediate medical care. The emergency room provides Level Two emergency health services 24 hours/day to patients in life-threatening condition (Appendix A). Physicians evaluate all patients entering the emergency room to determine the severity of their condition. The physician will assign the patient to one of three categories (emergent, urgent, or

nonurgent) during this initial triage. The physician will frequently refer these nonurgent patients to other clinics during normal duty hours. The physicians in the emergency room must see all patients that arrive for treatment after normal duty hours.

There are seven military physicians assigned to staff the Department of Emergency Medicine. The present physician staffing in the emergency room is consistent with the number of health care providers authorized by the current TDA. The number of physicians available to work in the emergency room has not significantly changed during the past two years.

Darnall Army Community Hospital is fortunate to be one of three Army sites to provide an Emergency Medicine Residency Program. There are currently eighteen physicians enrolled in this program. Due to the enormous troop population and active training programs conducted at Fort Hood, Darnall has sufficient trauma and urgent patients to support this residency program. This program requires a variety of patient categories and degrees of injury/illness to ensure a proper patient case mix for the accreditation of this training program. The Residency Review Committee, a national organization that accredits residency programs, carefully monitors the acuity level of the patients during the accreditation process. The Emergency Medicine Residency Program received laudatory comments from the Residency Review Committee during their inspection in May 1989. This outstanding program was

reaccredited by the Residency Review Committee during this visit.

## PRIMUS

The two Primary Care for the Uniformed Services (PRIMUS) Clinics opened on 4 June 1988. The Sisters of Charity of the Incarnate Word Health Care System, Houston, Texas operate these clinics under a contract with the U.S. Army. The PRIMUS clinics will provide more than 96,000 outpatient visits at a cost of $5.4 million during fiscal year 1989.

The PRIMUS clinics provide primary medical care to eligible health care beneficiaries in the Fort Hood community. The PRIMUS clinics use the Defense Eligibility Enrollment System (DEERS) to determine eligibility for care. Active duty soldiers receive their primary care at their assigned battalion aid stations and troop medical clinics. PRIMUS providers cannot limit or restrict the duty of soldiers by issuing quarters slips or profiles. Therefore, the PRIMUS clinics do not provide primary care for the active duty soldier. This policy ensures that family members and retirees have maximum access to the PRIMUS clinics for their primary care needs.

The governing board of the Sisters of Charity of the Incarnate Word carefully monitors and evaluates the credentials of the clinical staff. This monitoring and evaluation process ensures that PRIMUS health care providers have received the proper training to enable them to provide quality medical care. Each physician in the PRIMUS clinic must have completed an

accredited residency training program in a primary care specialty (e.g. family practice, internal medicine, pediatrics, emergency medicine, or obstetrics/gynecology). The medical director of the PRIMUS clinics is a board certified pediatrician. These well-qualified clinicians ensure that military health care beneficiaries receive high quality primary medical care.

The PRIMUS clinics are open seven days/week. The hours of operation are from 0700-2000 Monday through Friday, and from 0700-1400 on Saturdays, Sundays, and holidays. Each PRIMUS clinic provides primary care on a walk-in basis. The only exception to this policy is for optometry care. Health care beneficiaries must obtain a PRIMUS optometry appointment through the central appointment system at Darnall. A limited number of routine women's health examinations are also available on an appointment basis. These examinations include a routine gynecological evaluation, a pap smear, and a breast exam. The specific services available at the PRIMUS clinics include:

1. Acute minor illness care for children and adults.
2. Health and wellness education programs.
3. Laboratory and radiology services.
4. Pharmacy services for prescriptions received from PRIMUS physicians.
5. Optometry examinations (excluding contact lenses).
6. Well women examinations (Killeen clinic only).

The PRIMUS clinics cannot provide health care treatment for medical emergencies involving potential life-threatening injuries. The PRIMUS clinics also do not provide obstetrical care, orthopedics, routine physical examination, immunizations, or well baby examinations. Health care beneficiaries may receive these medical services at Darnall Army Community Hospital. The PRIMUS clinics must refer all patients who require more definitive or specialized health care to a health care provider at the MTF. PRIMUS providers cannot refer any patients directly to CHAMPUS; even if the referral is for a service that is not available at Darnall. PRIMUS providers must refer these patients to the appropriate clinic at Darnall. A physician at Darnall will then determine if the patient's condition is manageable by one of the available specialists in a military medical treatment facility. A patient whose medical condition requires specialty care not available at Darnall will be sent to a military medical center or to a local civilian hospital under the CHAMPUS program. Patients referred to CHAMPUS must see the Health Benefits Advisor prior to receiving health care treatment in a local civilian health care facility. This procedure ensures that the patient understands their responsibilities under the CHAMPUS program.

## Data Collection

Workload data for the general outpatient clinic, pediatric clinic, and emergency room was collected to determine the number of patient visits to these clinics during the twelve

months preceding and subsequent to the opening of the PRIMUS clinics. A review of the workload records maintained in the Resource Management Division provided the necessary data for this study. The monthly workload report submitted to Health Services Command by the Patient Administration Division verified the reliability of this information.

The data collected for the year prior to the opening of the PRIMUS clinics represented a normal distribution. The number of primary care visits to each clinic varied from month to month during this first year of the study period (Table 1). Seasonal influences accounted for some of this variation. Patient workload was generally low during the summer and high during the winter. The total number of patient visits to each clinic during this year indicates the substantial amount of primary care provided by these clinics to the Fort Hood community. The average monthly clinic visits or mean ($\bar{x}$) was computed using the formula:

$$\bar{x} = \Sigma x \; / \; n$$

where: $\Sigma x$ = the total number of patient visits

$n$ = number of months in the sample

The standard deviation, s, of the sample was also computed for each clinic. Due to the small number in the sample, (i.e., $n < 20$), the following unbiased formula was used to calculate the standard deviation:

$$s = \sqrt{\frac{\Sigma x^2 - (\Sigma x)^2 \; / \; n}{n - 1}}$$

Table 1

Primary Care Visits to the General Outpatient Clinic, Pediatric Clinic, and Emergency Room: June 1987 - May 1988

| | Jun | Jul | Aug | Sep | Oct | Nov |
|---|---|---|---|---|---|---|
| General Outpatient Clinic | 4203 | 3833 | 4450 | 4927 | 4798 | 5435 |
| Pediatric Clinic | 4823 | 4745 | 4748 | 5139 | 5990 | 5545 |
| Emergency Room | 5479 | 5591 | 5505 | 5861 | 6143 | 5645 |

| | Dec | Jan | Feb | Mar | Apr | May |
|---|---|---|---|---|---|---|
| General Outpatient Clinic | 7140 | 6866 | 7126 | 6374 | 6925 | 8262 |
| Pediatric Clinic | 5510 | 5550 | 5803 | 5299 | 5084 | 5268 |
| Emergency Room | 5876 | 7048 | 6923 | 5289 | 5955 | 6117 |

| | Total Visits | Mean | Standard Dev |
|---|---|---|---|
| General Outpatient Clinic | 68,339 | 5695 | 1382 |
| Pediatric Clinic | 63,504 | 5292 | 406 |
| Emergency Room | 71,432 | 5953 | 549 |

The number of primary care visits to these same clinics for the twelve months subsequent to the opening of the PRIMUS clinics is located in Table 2. The total number of clinic visits to each clinic, the arithmetic mean, and standard deviation are provided using the same formulas as before. A graphic representation of the total number of visits to these primary care clinics is located at Appendix F. A graphic representation of the workload data contained in Tables 1 & 2 for the general outpatient clinic, pediatric clinic, and emergency room is located at Appendices G, H, & I respectively.

Table 2

Primary Care Visits to the General Outpatient Clinic, Pediatric Clinic, and Emergency Room: June 1988 - May 1989

| | Jun | Jul | Aug | Sep | Oct | Nov |
|---|---|---|---|---|---|---|
| General Outpatient Clinic | 5956 | 3479 | 4801 | 4597 | 4678 | 4532 |
| Pediatric Clinic | 4329 | 3248 | 4668 | 4300 | 5717 | 5034 |
| Emergency Room | 5038 | 5213 | 4444 | 4432 | 4623 | 4471 |

| | Dec | Jan | Feb | Mar | Apr | May |
|---|---|---|---|---|---|---|
| General Outpatient Clinic | 4160 | 5182 | 3982 | 4339 | 3425 | 4294 |
| Pediatric Clinic | 4809 | 5212 | 5572 | 5872 | 4674 | 4928 |
| Emergency Room | 4544 | 5142 | 4114 | 4821 | 5220 | 5467 |

| | Total Visits | Mean | Standard Dev |
|---|---|---|---|
| General Outpatient Clinic | 53,407 | 4451 | 696 |
| Pediatric Clinic | 58,363 | 4864 | 719 |
| Emergency Room | 57,529 | 4794 | 416 |



## Methodology for Statistical Analysis

This researcher conducted a statistical analysis to determine if the opening of the PRIMUS clinics may have had a significant impact on the workload of these three clinic areas. A direct comparison between the workload data in Tables 1 and 2 provided some measure of control over external variables such as seasonal influences and physician turnover rates. The null hypothesis was that the opening of the two PRIMUS clinics in Killeen and Copperas Cove did not have a significant impact on the workload of the GOC, pediatric clinic, and emergency room. The alternate hypothesis was that the opening of the two PRIMUS clinics may have had a significant impact on the workload of

these three primary care areas. Three primary assumptions must be made to infer the results of the statistical analysis to the overall population from which the sample was drawn. The three primary assumptions made to test the null hypothesis were:

1. That the data presented in Tables 1 and 2 were representative of a normal distribution. By assuming the normality of the population from which the sample is drawn, probability statements may be made about the population based on the sample.

2. That the data was random and independent. This assumption does not assure that the results obtained from a statistical analysis of the sample are representative of the overall population due to the laws of probability.

3. That there was a homogeneity of variance among the data. This assumption allows the variance of the sample to be a good estimator of the overall variance within the normal population.

These primary assumptions allow the researcher to address only the problem at hand and nothing else. Thus, the data from the sample can be used to predict or approximate the values of the mean and variance for the population.

To test the null hypothesis, the following nine-step procedure for hypothesis testing was adopted from Daniels (1983, 162-164):

1. Clearly define the population to ensure that the data

are understood by the reader. This data forms the basis of the testing procedures used by the researcher.

2. Identify the independent and dependent variables.

3. Identify the functional relationship between the independent and dependent variables.

4. Clearly state the null and alternate hypotheses.

5. Establish the confidence interval or alpha ($\alpha$) level to determine statistical significance.

6. Identify the test statistic to serve as the decision maker for the rejection or acceptance of the null hypothesis and compute the results.

7. Identify the degrees of freedom (d.f.) to determine the statistical significance of the test statistic. The degrees of freedom is calculated using the formula:

$$d.f. = n_1 + n_2 - 2$$

8. Locate the critical value for the number of degrees of freedom identified for the test statistic.

9. Interpret the results of the statistical analysis. This is accomplished to assess the functional relationship of the per unit change of the dependent variable as a function of the per unit change of the independent variable. This assessment is reported in terms of the magnitude and direction of the effects. The probability that the test statistic is due to chance alone decreases as the t-value increases in magnitude. A decrease in patient workload would be indicated by a positive test statistic. An increase in patient workload

would result in a negative test statistic. The null hypothesis must either be accepted or rejected based on the results of the statistical analysis.

The acceptance or rejection of a null hypothesis carries with it a probability of committing one of two types of errors. If the null hypothesis is indeed true, then the probability of committing a Type I error (see appendix A) is reduced by using the more strict alpha level (i.e., $\alpha = .05$). The probability of committing a Type I error is equivalent to the alpha level. However, if the null hypothesis is indeed false, then the probability of committing a Type II error (see appendix A) is increased by using a strict alpha level. The concurrent risk of committing a Type II error is unknown, but it is greater than the established alpha level (Daniels 1983, 164). The probability of accepting a false null hypothesis is decreased by using a more lenient alpha level (i.e., $\alpha = .10$). If the null hypothesis is indeed false, then the power of rejecting the null hypothesis is increased by using the more lenient alpha level.

The null hypothesis that the PRIMUS clinics did not have a significant impact on the workload of the general outpatient clinic, pediatric clinic, and emergency room was tested individually for each clinic area. The confidence interval was established at the .05 level of significance. A t-distribution was used to test the significance between the means of the two sample populations. Due to the small size of the samples

(i.e., n < 20) the following test statistic formula was used (Broyles and Lay 1979, 345):

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \cdot \frac{1}{n_1} + \frac{1}{n_2}}}$$

where:

$n_1$ = Number of months in sample before the PRIMUS clinics were opened.

$\bar{x}_1$ = Average number of primary care visits to clinic in sample before PRIMUS.

$s_1$ = Standard deviation from the mean of the sample before PRIMUS.

$n_2$ = Number of months in sample after the PRIMUS clinics were opened.

$\bar{x}_2$ = Average number of primary care visits to clinic after PRIMUS.

$s_2$ = Standard deviation from the mean of the sample after PRIMUS.

## Analysis of Impact of the PRIMUS Clinics on the General Outpatient Clinic

Using the nine-step model for hypothesis testing the following results were obtained:

1. The population was defined as all health care beneficiaries in the Fort Hood community who have used the military direct health care system.

2. The dependent variable, Y, was identified as the number of primary care visits reported by the general

outpatient clinic. The independent variable, X, was identified as the months in the calendar year.

3. The functional relationship between the variables was that the number of primary care visits was reported on a monthly basis.

4. The null hypothesis ($H_{\emptyset}$) was that the average number of primary care visits to the general outpatient clinic was the same before and after the PRIMUS clinics opened. The alternate hypothesis ($H_a$) was that the average number of primary care visits to the general outpatient clinic was not the same before and after the PRIMUS clinics opened.

$H_{\emptyset}$: $\bar{x}_1 = \bar{x}_2$ or $\bar{x}_1 - \bar{x}_2 = 0$

$H_a$: $\bar{x}_1 \neq \bar{x}_2$ or $\bar{x}_1 - \bar{x}_2 \neq 0$

5. A 95% confidence interval was established to test for statistical significance (i.e., $\alpha = .05$).

6. The test statistic formula was:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \cdot \frac{1}{n_1} + \frac{1}{n_2}}}$$

The values for the sample size, mean, and standard deviation from the mean of the sample were obtained from the information in Tables 1 and 2.

$$t = \frac{5695 - 4451}{\sqrt{\frac{(12 - 1)\ 13822 + (12 - 1)\ 6962}{12 + 12 - 2} \cdot \frac{1}{12} + \frac{1}{12}}}$$

$$t = 2.785$$

7. The degrees of freedom = 12 + 12 - 2 = 22.

8. The critical value for 22 degrees of freedom at an alpha level equal to .05 is 2.074 (Daniels 1983, 494).

9. The null hypothesis is rejected since the computed t-value was greater than the critical value at the .05 alpha level. This result may be written in the standard form for hypothesis testing:

$$t_{(22)} = 2.785,\ p < .05$$

This statistical analysis indicates that the opening of the PRIMUS clinics may have had a significant impact on the patient workload in the general outpatient clinic using a 95% confidence interval. The decrease in the workload of the general outpatient clinic could be directly attributed to the opening of the PRIMUS clinics. However, there is another possible explanation for the dramatic decrease in the workload experienced by the general outpatient clinic. It was noted previously that the number of physicians assigned to the general outpatient clinic also decreased during the period of the study (see Appendix B). The average number of primary care providers available to see patients in the clinic was 9.2 physicians during the first year of the study period. During the second year of the study, this number decreased to 8.3 physicians available. Each primary care physician assigned to the general outpatient clinic can reasonably be expected to treat up to 640 patients per month as noted previously. This workload measure assumes that a full time physician works

twenty days per month and sees 32 patients each day. Therefore, the workload in the GOC could have decreased by approximately 0.9 x 640 = 576 patients/month due to the decrease in the number of physicians available. This expected decrease in patient workload was subtracted from the mean of the pre-PRIMUS year to control for the decrease in physician availability and rule out any possible influence by the PRIMUS clinics. Recalculating the test statistic with this adjustment resulted in a lower t-value ($t_{22} = 1.495$, $p > .05$) and the acceptance of the null hypothesis. Thus, the PRIMUS clinics may not have had a significant impact on the workload of the general outpatient clinic. Although the PRIMUS clinics may not have significantly decreased the workload in this clinic, they have increased patient access to care by acting as an extension of the direct health care delivery system.

The importance of this extension of Darnall's primary care system will become even more evident this summer. The number of physicians available to provide care in the general outpatient clinic will decrease dramatically during the summer months. Five of the nine physicians available will depart in June 1989. There are only three replacement physicians identified to arrive during the latter part of the summer. The number of available appointments in the general outpatient clinic will decrease by more than fifty percent. The PRIMUS clinics will provide health care to those patients who would normally receive treatment in the general outpatient clinic.

Health care beneficiaries in the Fort Hood community would experience a significant decrease in their accessibility to health care if the PRIMUS clinics were not available. The PRIMUS clinics have become a very important extension of the direct health care delivery system in the Fort Hood community.



## Analysis of Impact of the PRIMUS Clinics on the Pediatric Clinic

The nine-step model for hypothesis testing was used for this analysis as noted previously. The following results were obtained:

1. The population was once again defined as all health care beneficiaries in the Fort Hood community who have used the military direct health care system.

2. The dependent variable, Y, was identified as the number of primary care visits reported by the pediatric clinic. The independent variable, X, was identified as the months in the calendar year.

3. The functional relationship between the variables was that the number of primary care visits was reported on a monthly basis.

4. The null hypothesis ($H_{\emptyset}$) was that the average number of primary care visits to the pediatric clinic was the same before and after the PRIMUS clinics opened. The alternate hypothesis ($H_a$) was that the average number of primary care visits to the pediatric clinic was not the same before and after the PRIMUS clinics opened.

$H_{\not 0}$: $\bar{x}_1 = \bar{x}_2$ or $\bar{x}_1 - \bar{x}_2 = 0$

$H_a$: $\bar{x}_1 \neq \bar{x}_2$ or $\bar{x}_1 - \bar{x}_2 \neq 0$

5. A 95% confidence interval was used to test for statistical significance ($\alpha = .05$). The test statistic was also evaluated using a 90% confidence interval ($\alpha = .10$).

6. The test statistic formula was:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \cdot \frac{1}{n_1} + \frac{1}{n_2}}}$$

The values for the sample size, mean, and standard deviation from the mean of the sample were obtained from the information in Tables 1 and 2.

$$t = \frac{5292 - 4864}{\sqrt{\frac{(12 - 1)\ 4062 + (12 - 1)\ 7192}{12 + 12 - 2} \cdot \frac{1}{12} + \frac{1}{12}}}$$

$t = 1.796$

7. The degrees of freedom = 12 + 12 - 2 = 22.

8. The critical value for 22 degrees of freedom at an alpha level equal to .05 is 2.074. The critical value for an alpha level of .10 is 1.717 (Daniels 1983, 494).

9. The null hypothesis is accepted at the .05 alpha level since the computed t-value is less than the critical value. This result may be annotated using the standard form for hypothesis testing:

$$t_{(22)} = 1.796,\ p > .05$$

This statistical analysis indicates that the opening of

the PRIMUS clinics may not have significantly decreased the patient workload in the pediatric clinic using a 95% confidence interval. The slight decrease in the workload of the pediatric clinic may not be directly attributed to the opening of the PRIMUS clinics. The average number of primary care visits to the pediatric clinic was the same before and after the PRIMUS clinics opened based upon the established criterion for this study. However, the null hypothesis is rejected at the .10 alpha level since the computed t-value is greater than the critical value.

$$t_{(22)} = 1.796,\ p < .10$$

The opening of the PRIMUS clinic may have significantly decreased the patient workload using a 90% confidence interval. The alternate hypothesis that the average number of primary care visits was not the same before and after the PRIMUS clinics opened is accepted at the .10 alpha level.

It was noted previously that the number of physicians assigned to the Department of Pediatrics increased during the period of the study (see Appendix D). The average number of primary care providers available to see patients in this department was 11.8 physicians during the first year of the study period. During the second year of the study, this number increased to 12.7 physicians available. Each assigned pediatrician can reasonably be expected to treat 510 patients per month (Callahan, 1988). Therefore, the workload in the pediatric clinic could have increased by approximately 0.9 x

510 = 459 patients/month due to the increase in the number of physicians available. This expected value was added to the mean of the pre-PRIMUS year to control for the increase in physician availability and rule out any possible influence by the PRIMUS clinics. Recalculating the test statistic with this adjustment resulted in a higher t-value ($t_{(22)} = 3.866$, $p < .05$) and the rejection of the null hypothesis using the established criterion. This adjustment to control for physician availability indicates that the null hypothesis may indeed by false. To decrease the possibility of committing a type II error, it is prudent to reject the null hypothesis. Therefore, the alternate hypothesis is accepted. The average number of primary care visits to the pediatric clinic was not the same before and after the PRIMUS clinics opened.



## Analysis of Impact of the PRIMUS Clinics on the Emergency Room

The nine-step model for hypothesis testing was used for this analysis as noted previously. The following results were obtained:

1. The population was defined as noted previously.

2. The dependent variable, Y, was identified as the number of primary care visits reported by the emergency room. The independent variable, X, was identified as the months in the calendar year.

3. The functional relationship between the variables was the same as in the previous analyses.

4. The null hypothesis ($H_\emptyset$) was that the average number of primary care visits to the emergency room was the same before and after the PRIMUS clinics opened. The alternate hypothesis ($H_a$) was that the average number of primary care visits to the emergency room was not the same before and after the PRIMUS clinics opened.

$H_\emptyset$: $\bar{x}_1 = \bar{x}_2$ or $\bar{x}_1 - \bar{x}_2 = 0$

$H_a$: $\bar{x}_1 \neq \bar{x}_2$ or $\bar{x}_1 - \bar{x}_2 \neq 0$

5. A 95% confidence interval was established to test for statistical significance (i.e., $\alpha = .05$).

6. The test statistic formula was:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \cdot \frac{1}{n_1} + \frac{1}{n_2}}}$$

The values for the sample size, mean, and standard deviation from the mean of the sample were obtained from the information in Tables 1 and 2.

$$t = \frac{5953 - 4794}{\sqrt{\frac{(12 - 1)\ 5492 + (12 - 1)\ 4162}{12 + 12 - 2} \cdot \frac{1}{12} + \frac{1}{12}}}$$

$$t = 5.829$$

7. The degrees of freedom = 12 + 12 - 2 = 22.

8. The critical value for 22 degrees of freedom at an alpha level equal to .05 is 2.074 (Daniels 1983, 494).

9. The null hypothesis is rejected since the computed

t-value was greater than the critical value at the .05 alpha level. Written in standard form:

$$t_{(22)} = 5.829, p < .05$$

This statistical analysis indicates that the opening of the PRIMUS clinics may have had a significant impact on the patient workload in the emergency room using a 95% confidence interval. The magnitude of the t-value indicates that the probability that this result is due to chance alone is significantly less than five percent.

The decrease in the workload of the emergency room may be directly attributed to the opening of the PRIMUS clinics. The Automated Quality of Care Evaluation Support System (AQCESS) provided valuable information to support this theory. An ad hoc report generated from AQCESS identified the number of patients placed in each triage category by the physicians in the emergency room. The average number of emergent and urgent patients remained relatively stable after the opening of the PRIMUS clinics. However, the average number of nonurgent patients decreased significantly during the past year. The report generated from AQCESS further identified that this decrease occurred during the hours the PRIMUS clinics were open. The majority of the nonurgent patients seen in the emergency room presented for treatment after normal duty hours. It is apparent that many of the patients who previously sought health care treatment for minor illnesses and injuries in the emergency room now go to one of the PRIMUS clinics to receive

their primary care. This has had the desirable effect of decreasing the number of nonurgent patients waiting to receive primary health care in the emergency room. The overall acuity level of patients treated in the emergency room changed after the PRIMUS clinics opened.

## PRIMUS Workload Data

The Patient Administration Division (PAD) provided the workload data for the two PRIMUS clinics during the past twelve months. A review of the Medical Summary Report (MSR) Worksheet and Feeder Reports (HSC Form 464) submitted by the PRIMUS clinics to the PAD provided the data recorded in Table 3. The information presented in this table indicates the number of patient visits to the PRIMUS clinics in Killeen and Copperas Cove from June 1988 through May 1989. The total number of visits, mean, and standard deviation for each clinic were computed using the same formulas as before. A substantial difference was noted in the number of patient visits to both clinics during the first two months of operation. This expected finding may be attributed to the PRIMUS clinics "ramping-up" to full potential. Another possible explanation for this rise in productivity may be the result of increasing publicity concerning the availability of the PRIMUS clinics to eligible health care beneficiaries. A more accurate depiction of the true average monthly workload for the PRIMUS clinics may be obtained by discounting the initial two months of data. Recalculating the mean and standard deviation without the data

from June and July provides a better representation of the current workload maintained by the PRIMUS clinics. The total number of clinic visits will exceed the 96,000 visits funded for fiscal year 1989. Adjustments to the PRIMUS contract have been made to budget for this level of patient workload. The PRIMUS clinics are operating at optimum capacity given the funding and space available.

Table 3

PRIMUS Workload Data: June 1988 - May 1989

| | Jun | Jul | Aug | Sep | Oct | Nov |
|---|---|---|---|---|---|---|
| Killeen Clinic | 3495 | 4618 | 5272 | 5896 | 5696 | 6220 |
| Copperas Cove Clinic | 3220 | 3857 | 4731 | 4790 | 4457 | 4626 |
| Total PRIMUS | 6715 | 8475 | 10003 | 10686 | 10153 | 10846 |

| | Dec | Jan | Feb | Mar | Apr | May |
|---|---|---|---|---|---|---|
| Killeen Clinic | 6900 | 8294 | 6910 | 6401 | 5339 | 5793 |
| Copperas Cove Clinic | 4507 | 5187 | 4409 | 4691 | 4238 | 4636 |
| Total PRIMUS | 11407 | 13481 | 11319 | 11092 | 9577 | 10429 |

| | Total Visits | Mean | Standard Dev |
|---|---|---|---|
| Killeen Clinic | 70,834 | 5903 | 1217 |
| Copperas Cove Clinic | 53,349 | 4446 | 502 |
| Total PRIMUS | 124,183 | 10349 | 1659 |
| (less June and July 1988) | | | |
| Killeen Clinic | 62,721 | 6272 | 912 |
| Copperas Cove Clinic | 46,272 | 4627 | 258 |
| Total PRIMUS | 108,993 | 10899 | 1081 |

The PRIMUS program manager reports the number of patient visits to the PRIMUS clinics by clinical service category to

the Patient Administration Division. This individual utilizes the Medical Summary Report-Section II (DA Form 2789-1-R) to report this information. Table 4 reflects the number of patient visits by beneficiary category for the first year of PRIMUS clinic operations. This information identifies the actual number of patient visits for pediatrics, primary care, optometry, and women's health examinations.

The hospital commander permitted the PRIMUS clinics to conduct women's health examinations for six months in an attempt to decrease the backlog of these exams at Darnall Army Community Hospital. This short term effort was highly successful in decreasing the number of women on the waiting list from approximately 2000 to less than 300. The PRIMUS clinics are again conducting these examinations due to an increase in available funds and an increase in the number of women waiting to obtain an appointment for a women's health examination. The PRIMUS clinics can provide up to 640 appointments per month for women's health examinations. Approximately 1500 women are now on a waiting list for these appointments with an additional 275-300 women added to the list each month. Health care beneficiaries may obtain an appointment for these examinations through the central appointment system at Darnall Army Community Hospital.

The availability of optometry appointments at the PRIMUS clinics has greatly improved the access to this care for military beneficiaries. Due to an extreme shortage of

Table 4

Summary of the Total Patient Visits per Month to the PRIMUS Clinics by Clinical Service Category

| | Jun | Jul | Aug | Sep | Oct | Nov |
|---|---|---|---|---|---|---|
| Killeen | | | | | | |
| Pediatrics | 1159 | 1545 | 1838 | 2112 | 2280 | 2597 |
| Primary Care | 2027 | 2738 | 3100 | 3287 | 2673 | 2524 |
| Optometry | 309 | 335 | 334 | 497 | 401 | 669 |
| Gynecology (well women) | | | | | 342 | 430 |
| Total | 3495 | 4618 | 5272 | 5896 | 5696 | 6220 |
| Copperas Cove | | | | | | |
| Pediatrics | 1187 | 1293 | 1605 | 1504 | 1643 | 1964 |
| Primary Care | 1768 | 2243 | 2756 | 2789 | 2413 | 2176 |
| Optometry | 265 | 321 | 370 | 497 | 401 | 486 |
| Total | 3220 | 3857 | 4731 | 4790 | 4457 | 4626 |
| Total PRIMUS | | | | | | |
| Pediatrics | 2346 | 2838 | 3443 | 3616 | 3923 | 4561 |
| Primary Care | 3795 | 4981 | 5856 | 6076 | 5086 | 4700 |
| Optometry | 574 | 656 | 704 | 994 | 802 | 1155 |
| Gynecology (well women) | | | | | 342 | 430 |
| Grand Total | 6715 | 8475 | 10003 | 10686 | 10153 | 10846 |

| | Dec | Jan | Feb | Mar | Apr | May |
|---|---|---|---|---|---|---|
| Killeen | | | | | | |
| Pediatrics | 3126 | 3930 | 3111 | 2956 | 2484 | 2609 |
| Primary Care | 2652 | 3207 | 2745 | 2972 | 2574 | 2848 |
| Optometry | 740 | 680 | 594 | 322 | 281 | 336 |
| Gynecology (well women) | 382 | 477 | 460 | 151 | | |
| Total | 6900 | 8294 | 6910 | 6401 | 5339 | 5793 |
| Copperas Cove | | | | | | |
| Pediatrics | 2020 | 2375 | 2066 | 2065 | 1838 | 2009 |
| Primary Care | 2026 | 2285 | 1927 | 2242 | 2150 | 2283 |
| Optometry | 461 | 527 | 416 | 384 | 250 | 344 |
| Total | 4507 | 5187 | 4409 | 4691 | 4238 | 4636 |
| Total PRIMUS | | | | | | |
| Pediatrics | 5146 | 6305 | 5177 | 5021 | 4322 | 4618 |
| Primary Care | 4678 | 5492 | 4672 | 5214 | 4724 | 5131 |
| Optometry | 1201 | 1207 | 1010 | 706 | 531 | 680 |
| Gynecology (well women) | 382 | 477 | 460 | 151 | | |
| Grand Total | 11407 | 13481 | 11319 | 11092 | 9577 | 10429 |

optometrists at Fort Hood, only active duty personnel may obtain an optometry appointment at Darnall. All other health care beneficiaries receive their optometric care at the PRIMUS clinics or through the CHAMPUS program. The enormous demand for optometry care in the Fort Hood community has been partially satisfied with the opening of the PRIMUS clinics. The availability of optometry appointments through the PRIMUS clinics has been an overwhelming success.

## Comparison of Primary Care Visits by Beneficiary Category

A direct comparison by beneficiary category was conducted to determine if a significant impact had occurred in the utilization of the general outpatient clinic, pediatric clinic, and emergency room by various groups of health care beneficiaries. The PAD provided the monthly workload data for these areas using the Medical Summary Report Worksheet and Feeder Reports (HSC Form 464) submitted by the clinical areas. The HSC Forms 464 for the 1987 calendar year were unavailable because they were purged from the files by personnel in the PAD. Therefore, the beneficiary categories for that year were not discernible. The reports for the first five months of calendar year 1988 provide the only workload data available to identify beneficiary categories prior to the opening of the PRIMUS clinics.

Patient workload data was segregated into one of five beneficiary categories: active duty (AD), AD family members,

retirees, retiree family members, and others. The "others" category included civilian employees of the Federal Government authorized health care in federal facilities, foreign military personnel, and civilian emergencies. The information in Table 5 indicates the number of primary care visits by beneficiary category from January 1988 to May 1988. The total number of patient visits, the mean, and the standard deviation for each clinic were computed using the same formulas as before. Table 6 presents the same information for the period January 1989 to May 1989. The number of physicians available in the GOC during these time periods decreased from 8.8 in 1988 to 8.4 in 1989 (Appendix B). The number of pediatricians available during the first five calendar months of each year increased from 11.8 in 1988 to 14.4 in 1989 (Appendix D).

I conducted a statistical analysis of the workload data in Tables 5 and 6 to determine if the opening of the PRIMUS clinics may have had a significant impact in the utilization of these three clinic areas by the beneficiary categories identified. The null hypothesis was that the opening of the PRIMUS clinics in Killeen and Copperas Cove did not have a significant impact on the workload by beneficiary category of the GOC, pediatric clinic, and emergency room. The alternate hypothesis was that the opening of the two PRIMUS clinics may have had a significant impact on the workload by beneficiary category of these three primary care areas. The null hypothesis was tested using the three primary assumptions and

Table 5

Total Number of Primary Care Visits to the General Outpatient Clinic, Pediatric Clinic, and Emergency Room by Beneficiary Category (January 1988 - May 1988)

| | Jan | Feb | Mar | Apr | May |
|---|---|---|---|---|---|
| General Outpatient Clinic | | | | | |
| Active Duty (AD) | 1153 | 1074 | 1055 | 954 | 1246 |
| AD Family Member | 4311 | 4564 | 3860 | 4375 | 5249 |
| Retiree (Ret) | 508 | 554 | 507 | 494 | 565 |
| Ret Family Member | 886 | 927 | 934 | 1096 | 1181 |
| Others | 8 | 7 | 18 | 6 | 21 |
| Total | 6866 | 7126 | 6374 | 6925 | 8262 |
| Pediatric Clinic | | | | | |
| AD Family Member | 5400 | 5657 | 5156 | 4983 | 5105 |
| Ret Family Member | 150 | 146 | 143 | 101 | 163 |
| Total | 5550 | 5803 | 5299 | 5084 | 5268 |
| Emergency Room | | | | | |
| Active Duty (AD) | 1523 | 1285 | 1223 | 1438 | 1632 |
| AD Family Member | 5076 | 5275 | 3552 | 3973 | 3888 |
| Retiree (Ret) | 237 | 195 | 196 | 231 | 203 |
| Ret Family Member | 180 | 143 | 279 | 271 | 357 |
| Others | 32 | 25 | 39 | 42 | 37 |
| Total | 7048 | 6923 | 5289 | 5955 | 6117 |

| | Total Visits | Mean | Standard Dev |
|---|---|---|---|
| General Outpatient Clinic | | | |
| Active Duty (AD) | 5,482 | 1096 | 110 |
| AD Family Member | 22,359 | 4472 | 505 |
| Retiree (Ret) | 2,628 | 526 | 32 |
| Ret Family Member | 5,024 | 1005 | 127 |
| Others | 60 | 12 | 7 |
| Pediatric Clinic | | | |
| AD Family Member | 26,301 | 5260 | 269 |
| Ret Family Member | 703 | 141 | 23 |
| Emergency Room | | | |
| Active Duty (AD) | 7,101 | 1420 | 168 |
| AD Family Member | 21,764 | 4353 | 771 |
| Retiree (Ret) | 1,062 | 212 | 20 |
| Ret Family Member | 1,230 | 246 | 85 |
| Others | 175 | 35 | 7 |

Table 6

Total Number of Primary Care Visits to the General Outpatient Clinic, Pediatric Clinic, and Emergency Room by Beneficiary Category (January 1989 - May 1989)

| | Jan | Feb | Mar | Apr | May |
|---|---|---|---|---|---|
| General Outpatient Clinic | | | | | |
| Active Duty (AD) | 832 | 636 | 708 | 583 | 751 |
| AD Family Member | 2918 | 2215 | 2384 | 1869 | 2263 |
| Retiree (Ret) | 489 | 371 | 422 | 323 | 471 |
| Ret Family Member | 933 | 753 | 819 | 648 | 803 |
| Others | 10 | 7 | 6 | 2 | 6 |
| Total | 5182 | 3982 | 4339 | 3425 | 4294 |
| Pediatric Clinic | | | | | |
| AD Family Member | 5080 | 5407 | 5706 | 4549 | 4819 |
| Ret Family Member | 132 | 165 | 166 | 125 | 109 |
| Total | 5212 | 5572 | 5872 | 4674 | 4928 |
| Emergency Room | | | | | |
| Active Duty (AD) | 1411 | 1225 | 1575 | 1808 | 2077 |
| AD Family Member | 3267 | 2509 | 2728 | 2875 | 2831 |
| Retiree (Ret) | 179 | 144 | 172 | 185 | 207 |
| Ret Family Member | 260 | 208 | 310 | 313 | 315 |
| Others | 25 | 28 | 36 | 39 | 37 |
| Total | 5142 | 4114 | 4821 | 5220 | 5467 |

| | Total Visits | Mean | Standard Dev |
|---|---|---|---|
| General Outpatient Clinic | | | |
| Active Duty (AD) | 3,510 | 702 | 97 |
| AD Family Member | 11,649 | 2330 | 380 |
| Retiree (Ret) | 2,076 | 415 | 69 |
| Ret Family Member | 3,956 | 791 | 104 |
| Others | 31 | 6 | 3 |
| Pediatric Clinic | | | |
| AD Family Member | 25,561 | 5112 | 459 |
| Ret Family Member | 697 | 139 | 25 |
| Emergency Room | | | |
| Active Duty (AD) | 8,096 | 1619 | 334 |
| AD Family Member | 14,210 | 2842 | 276 |
| Retiree (Ret) | 887 | 177 | 23 |
| Ret Family Member | 1,406 | 281 | 47 |
| Others | 165 | 33 | 6 |

the nine-step procedure for hypothesis testing noted previously. A direct comparison between the first five calendar months of 1988 and 1989 provided some measure of control over external variables such as seasonal influences and physician turnover rates.

The statistical analysis conducted by this researcher tested the null hypothesis for each beneficiary category in these clinical areas. A t-distribution tested the significance between the means of the two sample populations. I used a 95% confidence interval to assess the level of significance. The test statistic formula calculated the t-value for a small sample (i.e., $n < 20$). The computed degrees of freedom for this statistical analysis was eight ($5 + 5 - 2 = 8$). The critical value for eight degrees of freedom for an alpha level of .05 was 2.306 (Daniels 1983, 494). The null hypothesis was rejected if the computed t-value was greater or less than the critical value (Table 7).

This statistical analysis indicated that the opening of the PRIMUS clinics may have had a significant impact on the workload of the general outpatient clinic and emergency room for some beneficiary categories. The decrease in the number of primary care physicians in the GOC was not significant in this analysis. There was no significant impact in the number of primary care visits for either beneficiary category in the pediatric clinic due to PRIMUS clinic operations.

Table 7

Results of the Statistical Analysis for Primary Care Visits by Beneficiary Category (January - May 1988 and January - May 1989

| | T-Value | Critical Value | Reject Null Hypothesis? |
|---|---|---|---|
| General Outpatient Clinic | | | |
| Active Duty (AD) | 6.007 | 2.306 | Yes |
| AD Family Member | 7.579 | 2.306 | Yes |
| Retiree (Ret) | 3.263 | 2.306 | Yes |
| Ret Family Member | 2.915 | 2.306 | Yes |
| Others | 1.762 | 2.306 | No |
| Pediatric Clinic | | | |
| AD Family Member | 0.622 | 2.306 | No |
| Ret Family Member | 0.132 | 2.306 | No |
| Emergency Room | | | |
| Active Duty (AD) | -1.190 | 2.306 | No |
| AD Family Member | 4.126 | 2.306 | Yes |
| Retiree (Ret) | 2.568 | 2.306 | Yes |
| Ret Family Member | -0.806 | 2.306 | No |
| Others | 0.485 | 2.306 | No |

## General Outpatient Clinic Results

There was a significant decrease in patient workload for the general outpatient clinic in four out of five beneficiary categories. There was no significant impact on the number of patients treated from the "others" category in either the GOC or the emergency room. The statistical analysis for this category may be discarded due to the small number of patients in this health care beneficiary group. Additionally, the PRIMUS clinics do not provide health care treatment to individuals in this health care beneficiary category. It would have been an unexpected finding to observe a decrease in patient workload at Darnall Army Community Hospital for this

beneficiary category.

There was one unexpected finding in the statistical analysis of the general outpatient clinic workload by beneficiary category. There was a significant decrease in the number of active duty soldiers who received health care treatment in the general outpatient clinic. This decrease cannot be attributed to the opening of the PRIMUS clinics because they do not provide primary care to active duty soldiers. Therefore, there should not have been a noticeable decrease in the number of active duty patients seen in this clinic. This decrease may be linked, however, to the concomitant rise in the number of active duty patients treated in the emergency room. The number of active duty soldiers treated in the general outpatient clinic decreased an average of 394 patients per month. The number of active duty soldiers treated in the emergency room increased an average of 199 patients per month during the same time period. Many of these active duty soldiers may have sought treatment in the emergency room when they should have received their medical care in the GOC. However, this theory would account for only part of the decrease in the active duty workload in the general outpatient clinic.

The number of retirees and family members receiving care in the general outpatient clinic also decreased significantly as a result of the opening of the PRIMUS clinics. The PRIMUS clinics provide an attractive alternative to these patients to

access the military health care delivery system. Many of these patients now seek medical care at the PRIMUS clinics for their minor injuries and illnesses. This is evident by the number of visits to the PRIMUS clinics by these health care beneficiary groups. The information in Table 8 identifies the number of PRIMUS visits by beneficiary category to each of the PRIMUS clinics during the first five months of 1989. The decrease in patient workload in the GOC for these health care beneficiary groups can be directly correlated to the number of patients seen in the two PRIMUS clinics. The magnitude of the t-value for active duty family members (Table 7) is directly reflected in the high volume of patients from this category seeking care in the PRIMUS clinics (Table 8). This health care beneficiary group utilizes the PRIMUS clinics five times more frequently than any other beneficiary category. This is not surprising given the number of active duty soldiers assigned to Fort Hood. The PRIMUS clinics have quickly filled the gap between the substantial demand for primary care by family members and retirees and the services available to meet this demand.



## Pediatric Clinic Results

There was no significant impact on the workload of the pediatric clinic by beneficiary category due to PRIMUS clinic operations. This was an expected finding based on the statistical analysis conducted previously. The PRIMUS clinics did not have a significant impact on the number of patients treated in the pediatric clinic during this study period.

However, the workload in the pediatric clinic could have increased by more than 1300 patients each month given the increase of 2.6 pediatricians available during the first five months of 1989 (Appendix D). The Department of Pediatrics has



Table 8

Total Number of Primary Care Visits to the PRIMUS Clinics by Beneficiary Category (January 1989 - May 1989)

| | Jan | Feb | Mar | Apr | May |
|---|---|---|---|---|---|
| Killeen Clinic | | | | | |
| AD Family Member | 6576 | 5515 | 5055 | 4210 | 4550 |
| Retiree (Ret) | 469 | 390 | 374 | 328 | 348 |
| Ret Family Member | 1249 | 1005 | 972 | 801 | 895 |
| Copperas Cove Clinic | | | | | |
| AD Family Member | 3992 | 3414 | 3534 | 3194 | 3597 |
| Retiree (Ret) | 326 | 253 | 327 | 276 | 301 |
| Ret Family Member | 869 | 742 | 830 | 768 | 738 |
| Total PRIMUS | | | | | |
| AD Family Member | 10568 | 8929 | 8589 | 7404 | 8147 |
| Retiree (Ret) | 795 | 643 | 701 | 604 | 649 |
| Ret Family Member | 2118 | 1747 | 1802 | 1569 | 1633 |

| | Total Visits | Mean | Standard Dev |
|---|---|---|---|
| Killeen Clinic | | | |
| AD Family Member | 25,906 | 5181 | 924 |
| Retiree (Ret) | 1,909 | 382 | 54 |
| Ret Family Member | 4,922 | 984 | 167 |
| Copperas Cove Clinic | | | |
| AD Family Member | 17,731 | 3546 | 293 |
| Retiree (Ret) | 1,483 | 297 | 32 |
| Ret Family Member | 3,947 | 789 | 58 |
| Total PRIMUS | | | |
| AD Family Member | 43,637 | 8727 | 1176 |
| Retiree (Ret) | 3,392 | 678 | 74 |
| Ret Family Member | 8,869 | 1774 | 213 |

the resources available to further increase access to patient care for this large beneficiary category.

Emergency Room Results

The statistical analysis by beneficiary category indicates that the PRIMUS clinics may have had an impact on the patient workload in the emergency room. There has been a significant decrease in the number of retirees and active duty family members who receive health care treatment in the emergency room. Therefore, the null hypothesis is rejected. The PRIMUS clinics have had a significant impact on the number of retirees and active duty family members who seek health care treatment in the emergency room.

The number of active duty soldiers and retiree family members treated in the emergency room has actually increased slightly. Therefore, the null hypothesis must be accepted for the active duty soldiers and retiree family members. The PRIMUS clinics have not had a significant impact on the number of active duty soldiers and retiree family members who seek health care treatment in the emergency room.

# CHAPTER III

# CONCLUSIONS AND RECOMMENDATIONS

## Conclusions

The purpose of this study was to determine the impact of the recently established PRIMUS clinics on the patient workload in the pediatric clinic, general outpatient clinic, and emergency room at Darnall Army Community Hospital.

The statistical analysis of the patient workload data from the past two years determined that the workload in each of these clinical areas has decreased since the PRIMUS clinics opened in June 1988. Therefore, the PRIMUS clinics have had some impact on the patient workload in the pediatric clinic, general outpatient clinic, and the emergency room.

The observed decrease in workload of the general outpatient clinic was statistically significant. However, the opening of the PRIMUS clinics alone did not cause this decrease. The fact that there were fewer physicians available in the clinic also contributed to the decrease in patient workload. This decrease was not significant when the test statistic was recalculated while controlling for the decrease in physician availability. It was particularly interesting to take the analysis one step further to assess the impact of the PRIMUS clinics on the patient workload by beneficiary category for a five month period. There was a significant decrease in the number of patients treated in four out of five beneficiary categories in the GOC. A slight decrease in physician

availability between the first five months of each calendar year did not have a significant effect on the statistical analyses conducted. It is evident that the PRIMUS clinics did help alleviate some of the overcrowding in the GOC during this time period. Particularly noteworthy was the dramatic decrease in the patient workload for the active duty family members. The PRIMUS clinics have indeed increased accessibility for this health care beneficiary group.

The average number of primary care visits to the pediatric clinic decreased after the PRIMUS clinics opened. Although this decrease was not statistically significant during the initial analysis, it was important to note that the number of pediatricians available increased during the study period. Therefore, the outpatient workload could have actually increased after the PRIMUS clinics opened. A recalculation of the test statistic indicated that the observed decrease in patient workload was statistically significant while controlling for the increase in physician availability.

The demand for pediatric outpatient care remains very high in the Fort Hood community. More than 4600 pediatric patients are treated in the PRIMUS clinics every month (Table 4). This was a significant finding since there has not been a concomitant decrease of this magnitude in the number of patients treated in the pediatric clinic. These pediatric patients may represent a portion of the "ghost population" that did not receive outpatient treatment in any health care

delivery system prior to the implementation of the PRIMUS program at Fort Hood. The PRIMUS clinics have significantly increased the access to primary care for this large health care beneficiary group. However, the PRIMUS clinics cannot expand their operations to meet the demand for pediatric outpatient care given the current resource constraints for this program. This expansion of services must occur at Darnall.

There was a significant decrease of patient workload in the emergency room during the study period. The statistical analysis indicated that this decrease may be directly attributed to the opening of the PRIMUS clinics. The magnitude of the test statistic represents a small probability that the decrease was due to chance alone. Many patients who previously sought health care treatment in the emergency room now go to one of the PRIMUS clinics to receive their primary care. This has had the desirable effect of decreasing the number of nonurgent patients waiting to receive primary health care in the emergency room. This effect is evident during duty hours when the PRIMUS clinics, pediatric clinic, and GOC are all open. Most of the nonurgent patients treated in the emergency room are now seen in the evening hours after these clinics have closed. This time period is also the peak time for urgent and emergent patients. These patients require more immediate, manpower intensive health care treatment than nonurgent patients. The combination of these factors results in longer

waiting times, frustration for all involved personnel (staff and patients), and discontent with the primary care system.

The Residency Review Committee noted that the overall acuity level of patients treated in the emergency room changed as a result of the decrease in the number of nonurgent patients presenting for treatment. The number of patients admitted per total number of patients seen increased as a result of this change in acuity level. The increase in this proportion indicates that the emergency room is accomplishing its mission to provide health care treatment to acutely ill patients. This was an interesting finding by the Residency Review Committee during its accreditation review of the Emergency Medicine Residency Program. Thus, the PRIMUS clinics may have had a favorable impact on the accreditation review. However, a final determination of this possibility cannot be ascertained until the formal results of the accreditation review have been received.

The demand for health care in the Fort Hood community continues to be greater than the services available to meet this demand. The PRIMUS clinics are operating at full capacity to help alleviate this problem, but the overwhelming demand for primary care has not yet been met. Patient satisfaction surveys conducted by the PRIMUS clinics indicate that these clinics are highly regarded for their convenience, efficiency, and quality of health care provided. Patients have found the

PRIMUS clinics to be an attractive alternative to the crowded primary care clinics at Darnall.

The PRIMUS clinics have become a very important extension of the military direct health care system of Darnall Army Community Hospital. They have improved access, convenience, and patient satisfaction. The outpatient workload in the general outpatient clinic, pediatric clinic, and emergency room decreased after the opening of the PRIMUS clinics. The PRIMUS clinics in the Fort Hood community are meeting the original goals of the PRIMUS program.

## Recommendations

Fort Hood's portion of the PRIMUS program has rapidly grown to an annual funding level in excess of $5.4 million for fiscal year 1989. Proper management of this valuable program is essential to maximize the efficient delivery of primary health care services to eligible beneficiaries in the Fort Hood community. Health Services Command directed that commanders of MTFs with PRIMUS clinics in their catchment areas will be responsible for the integration of PRIMUS into their overall health services (U.S. Department of the Army, HSC 1988). The Commander, Darnall Army Community Hospital, has made several changes to clinic operations to ensure the optimal integration of PRIMUS into the total health care delivery system at Fort Hood. This researcher recommended two additional changes to clinic operations during the Executive Program Budget Advisory Committee (PBAC) Meeting on 31 May 1989:

1. Establish a walk-in clinic during the evening hours for the pediatric clinic. Parents could bring their children to the pediatric clinic for minor illnesses or injuries. This would have the effect of increasing the patient workload for this clinic while decreasing the number of nonurgent pediatric patients presenting to the emergency room for treatment. The Department of Pediatrics has the resources available to extend their hours of operation. This expansion of services would have minimal impact on other departments in the hospital. The laboratory and radiology already provide 24-hour services. The pharmacy is open until 2100 hours every day. Therefore, the pharmacy may need to extend their services to match the hours of the clinics. The Pharmacy Service currently has the resources available to meet this requirement.

2. Establish a walk-in clinic in the general outpatient clinic during the evening hours. This recommendation is contingent upon a fully staffed general outpatient clinic. As noted previously, the number of health care providers available in the GOC decreased dramatically in June 1989. The hiring action for three physicians assistants is now in progress to help alleviate the shortfall of health care providers in the GOC. Three general medical officers are also due to arrive later this summer. These physicians will be assigned to the general outpatient clinic. The Commander, Darnall Army Community Hospital, could implement this recommended course of action when these resources become available in the GOC.

The adoption of this recommendation would increase the access to primary care for military health care beneficiaries. Adult patients could receive prompt treatment in the GOC for their minor injuries and illnesses. This would decrease the long waiting times that many nonurgent patients experience when they present for treatment in the emergency room. This expansion of services would also have minimal impact on other departments in the hospital. It would increase the outpatient workload in the GOC and decrease the number of nonurgent patients presenting to the emergency room for treatment. The staff physicians and residents in the emergency room could then concentrate their efforts on patients with acute medical conditions. Staff physicians assigned to the emergency room would also have more time to provide training for the residents in the Emergency Medicine Residency Program.

This writer recommends further research to determine the possible impact the PRIMUS clinics may have had on the number of patients seeking care through CHAMPUS. One of the original goals of the PRIMUS program was to recapture health care beneficiaries who use CHAMPUS to obtain their primary care. An assessment of the impact of PRIMUS on the utilization of CHAMPUS would be appropriate given the high cost of these two programs.

Further research could also determine the impact the PRIMUS clinics have had on the demand for specialty care at Darnall Army Community Hospital. The PRIMUS clinics have

become an active extension of the primary health care delivery system at Fort Hood. As a result, the number of patient referrals to secondary care increased with this addition to the primary care network. The concern of health care beneficiaries and providers is shifting from access to primary care to the shortage of specialty care.

# APPENDIX A

# DEFINITIONS

DEFINITIONS

Catchment Area - The Department of Defense specifically defined catchment areas by zip codes. However, it can generally be described as that area within a 40-mile radius of a military medical treatment facility. Health care beneficiaries can determine if they are in a military catchment area by calling their local CHAMPUS Health Benefits Advisor (CHAMPUS Handbook 1986, 41-42).

Emergent - An acute medical condition which requires the immediate resources of an emergency medical services system to save the patient's life, limb, or eyesight. Any delay in treatment would be harmful to the patient.

Ghost Population - The large number of health care beneficiaries who, for a variety of reasons, are not being seen in any health care delivery system. These patients seek medical care when free and convenient means of meeting their health care needs become available in the health care market.

Level Two Emergency Health Services - The level of care provided by an emergency department/service that offers emergency care 24 hours a day, with at least one physician experienced in emergency care on duty in the emergency care area. Specialty consultation must be available within approximately 30 minutes by members of the medical staff or by senior-level residents (Accreditation Manual for Hospitals 1989, 32).

Homogeneity - The state of having identical distribution functions or values between statistical samples.

Nonurgent - A condition which does not require the immediate resources of an emergency medical services system. Patients in this category suffer from minor injuries or illnesses.

Triage - The sorting or classification of patients in accordance with the nature or degree of injury or illness.

Type I errors - In hypothesis testing, the erroneous rejection of a true null hypothesis (Daniels 1983, 164).

Type II errors - In hypothesis testing, the erroneous acceptance of a false null hypothesis (Daniels 1983, 164).

Urgent - A condition which requires medical attention within a few hours (further delay could be harmful to the patient). A patient in this category may have an acute medical condition, but it is not necessarily a severe illness or injury.

# APPENDIX B

## PHYSICIAN AVAILABILITY:

## GENERAL OUTPATIENT CLINIC

PHYSICIAN AVAILABILITY:
GENERAL OUTPATIENT CLINIC

| Month/Year | Number of Full Time Physicians Available | Total Physician Hours Available |
|---|---|---|
| June 1987 | 10 | 1735 |
| July | 10 | 1781 |
| August | 9 | 1667 |
| September | 9 | 1516 |
| October | 10 | 1639 |
| November | 9 | 1409 |
| December | 9 | 1736 |
| January 1988 | 9 | 1330 |
| February | 8 | 1295 |
| March | 8 | 1475 |
| April | 9 | 1544 |
| May 1988 | 10 | 1893 |

Average number of physicians available (Jun 87 - May 88) = 9.2
Average number of hours available = 1585

| | | |
|---|---|---|
| June 1988 | 8 | 1577 |
| July | 7 | 1152 |
| August | 8 | 1207 |
| September | 8 | 1178 |
| October | 9 | 1057 |
| November | 9 | 1201 |
| December | 9 | 1067 |
| January 1989 | 9 | 1292 |
| February | 8 | 1164 |
| March | 8 | 1251 |
| April | 8 | 1053 |
| May | 9 | 1214 |

Average number of physicians available (Jun 88 - May 89) = 8.3
Average number of hours available = 1201

The MEPRS Section obtained this information directly from the GOC. The data collection effort began with each physician recording their daily number of hours available in the clinic. These hours included administrative time during which they did not provide direct patient care. The clinic NCOIC collected this information at the end of every month and forwarded it to the MEPRS Section.

# APPENDIX C

## OUTPATIENT WORKLOAD BY HEALTH CARE PROVIDER: NUMBER OF PATIENTS SEEN IN THE GENERAL OUTPATIENT CLINIC

OUTPATIENT WORKLOAD BY HEALTH CARE PROVIDER:
NUMBER OF PATIENTS SEEN IN THE
GENERAL OUTPATIENT CLINIC
October 1988 - May 1989

| Provider | Oct88 | Nov88 | Dec88 | Jan89 | Feb89 | Mar89 | Apr89 | May89 |
|---|---|---|---|---|---|---|---|---|
| Phys A | 498 | 298 | 428 | 247 | 416 | 469 | 130 | - |
| Phys B | 288 | 457 | 357 | 402 | 538 | 516 | 443 | 400 |
| Phys C | 493 | 439 | 226 | 723 | 607 | 104 | 312 | 424 |
| Phys D | 276 | 325 | 210 | 313 | 351 | 450 | 287 | 372 |
| Phys E | 482 | 519 | 466 | 693 | 423 | 562 | 457 | 546 |
| Phys F | 257 | 431 | 471 | 524 | 312 | 395 | 190 | 443 |
| Phys G | 358 | 346 | 332 | 451 | 156 | 375 | 207 | 287 |
| Phys H | 371 | 416 | 503 | 706 | 338 | 67 | 30 | 364 |
| Phys I | - | 13 | 410 | 200 | 27 | - | 282 | 425 |
| Phys J | - | - | - | - | - | 602 | 502 | 262 |
| MOD[a] | 536 | 574 | 552 | 671 | 576 | 575 | 424 | 567 |
| PA | 615 | 371 | - | - | - | - | - | - |
| Others | 504 | 343 | 205 | 252 | 238 | 224 | 161 | 204 |
| Total | 4678 | 4532 | 4160 | 5182 | 3982 | 4339 | 3425 | 4294 |

a. The Medical Officer of the Day is a duty which is rotated among the health care providers in the GOC. The workload accomplished by the MOD is credited to this position rather than to the health care providers assigned to this duty. The workload of the MOD represents a good estimation of the workload that a general medical officer can reasonably be expected to accomplish in any given month since he provides direct patient care only.

The average monthly workload for the MOD is 559 patients.

The average number of patients seen by physicians A through J was 395.

# APPENDIX D

## PHYSICIAN AVAILABILITY:

## PEDIATRIC CLINIC

PHYSICIAN AVAILABILITY:
PEDIATRIC CLINIC

| Month/Year | Number of Full Time Physicians Available[a] | Total Physician Hours Available |
|---|---|---|
| June 1987 | 11 | 2064 |
| July | 12 | 2208 |
| August | 11 | 2212 |
| September | 11 | 1802 |
| October | 13 | 2584 |
| November | 13 | 2299 |
| December | 12 | 2151 |
| January 1988 | 11 | 2013 |
| February | 12 | 2040 |
| March | 12 | 2089 |
| April | 12 | 1823 |
| May | 12 | 2054 |

Average number of physicians available (Jun 87 - May 88) = 11.8
Average number of hours available = 2112

| | | |
|---|---|---|
| June 1988 | 10 | 1853 |
| July | 8 | 1719 |
| August | 10 | 1816 |
| September | 13 | 2640 |
| October | 13 | 2795 |
| November | 13 | 2588 |
| December | 13 | 2477 |
| January 1989 | 13 | 2658 |
| February | 14 | 2772 |
| March | 15 | 3088 |
| April | 15 | 3017 |
| May | 15 | 2828 |

Average number of physicians available (Jun 88 - May 89) = 12.7
Average number of hours available = 2521

[a] - Does not include the neonatologists assigned to the Department of Pediatrics. These physicians spend most of their time in the neonatal intensive care unit and newborn nursery.

# APPENDIX E

## PEDIATRIC WORKLOAD BY HEALTH CARE PROVIDER: NUMBER OF PATIENTS SEEN IN THE PEDIATRIC AND WELL BABY CLINICS

PEDIATRIC WORKLOAD BY HEALTH CARE PROVIDER:
NUMBER OF PATIENTS SEEN IN THE
PEDIATRIC AND WELL BABY CLINICS
October 1988 - May 1989

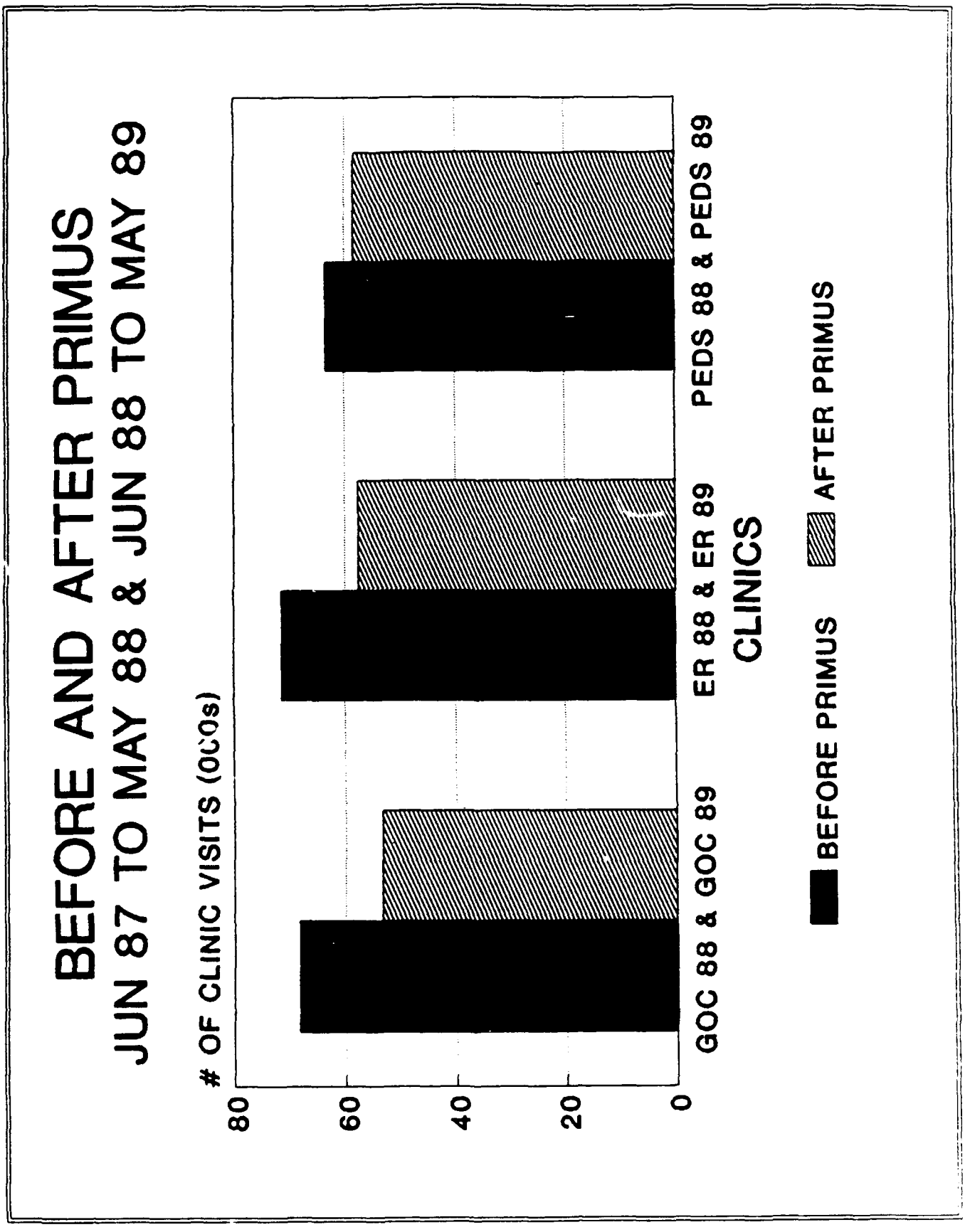
| Provider | Oct88 | Nov88 | Dec88 | Jan89 | Feb89 | Mar89 | Apr89 | May89 |
|---|---|---|---|---|---|---|---|---|
| Ped A | 96 | 121 | 88 | 140 | 156 | 157 | 206 | 290 |
| Ped B | 163 | 352 | 249 | 267 | 200 | 354 | 359 | 436 |
| Ped C | 386 | 360 | 336 | 193 | 308 | 409 | 319 | 264 |
| Ped D | 374 | 245 | 251 | 282 | 225 | 308 | 136 | 306 |
| Ped E | 524 | 484 | 554 | 702 | 623 | 543 | 456 | 599 |
| Ped F | 398 | 235 | 263 | 332 | 325 | 240 | 329 | 36 |
| Ped G | 381 | 323 | 369 | 360 | 435 | 379 | 429 | 409 |
| Ped H | 316 | 452 | 285 | 347 | 360 | 566 | 260 | 149 |
| Ped I | 375 | 326 | 358 | 305 | 524 | 362 | 346 | 190 |
| Ped J | 353 | 337 | 285 | 293 | 333 | 389 | 200 | 447 |
| Ped K | - | - | - | 2 | 225 | 532 | 302 | 224 |
| Ped L | 624 | 404 | 157 | 64 | 315 | 328 | 343 | 417 |
| Ped M | 845 | 735 | 900 | 1003 | 952 | 736 | 734 | 974 |
| Ped N | 642 | 675 | 610 | 809 | 579 | 411 | 566 | 582 |
| Ped O | 179 | 17 | 77 | 76 | 108 | 278 | 189 | 58 |
| Neo A | 78 | 53 | 36 | 30 | 36 | 49 | 19 | 72 |
| Neo B | 115 | 62 | 34 | 46 | 25 | 24 | 25 | 53 |
| RN A | 344 | 373 | 239 | 44 | 390 | 315 | 281 | 237 |
| RN B | 188 | 101 | - | - | - | - | - | - |
| RN C | - | - | - | - | 104 | 505 | 414 | 395 |
| Others | 43 | 237 | 234 | 284 | 137 | 114 | 81 | 64 |
| Total | 6424 | 5892 | 5325 | 5579 | 6360 | 6999 | 5994 | 6202 |

The average number of patients seen by the military pediatricians (Ped A through K) was 336.

The average number of patients seen by the civilian partnership physicians (Ped M through O) was 559.

# APPENDIX F

## TOTAL NUMBER OF PRIMARY CARE VISITS TO THE GENERAL OUTPATIENT CLINIC, PEDIATRIC CLINIC, AND EMERGENCY ROOM

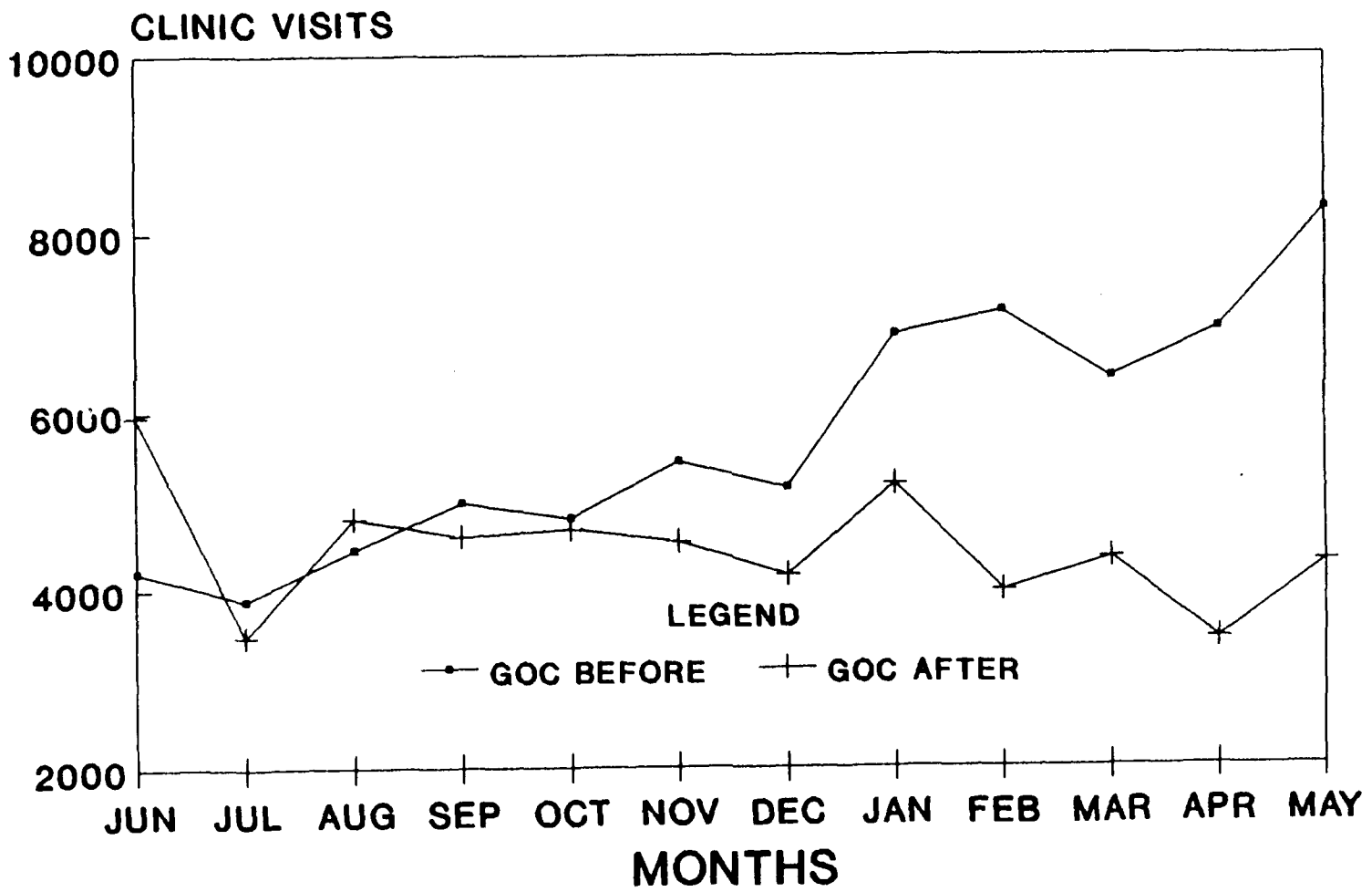


# APPENDIX G

## MONTHLY PRIMARY CARE VISITS

## TO THE GENERAL OUTPATIENT CLINIC

# GOC BEFORE AND AFTER PRIMUS
## JUN 87 TO MAY 88 AND JUN 88 TO MAY 89

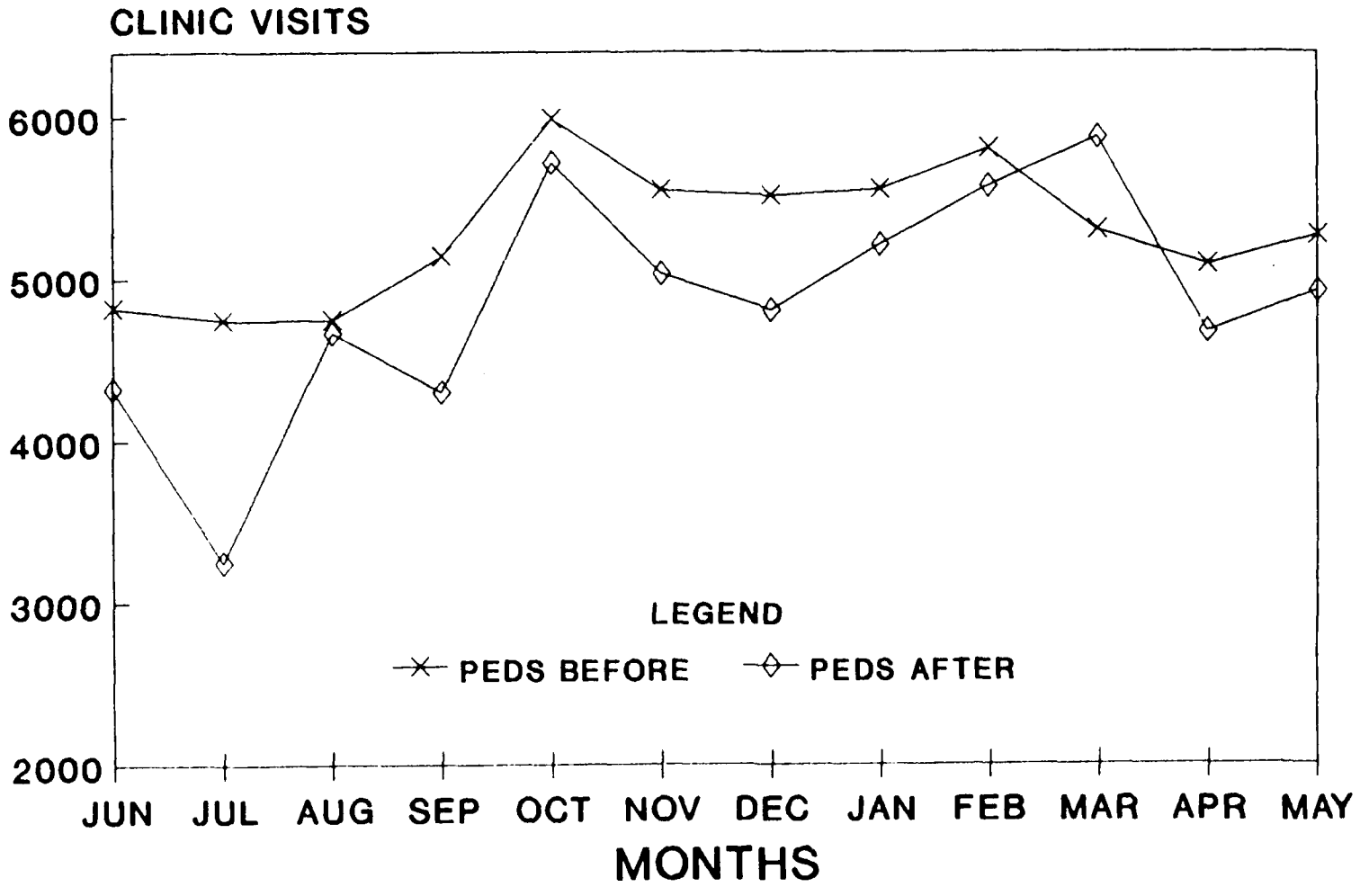


# APPENDIX H

## MONTHLY PRIMARY CARE VISITS

## TO THE PEDIATRIC CLINIC

# PEDIATRIC CLINIC BEFORE AND AFTER PRIMUS
## JUN 87 TO MAY 88 AND JUN 88 TO MAY 89

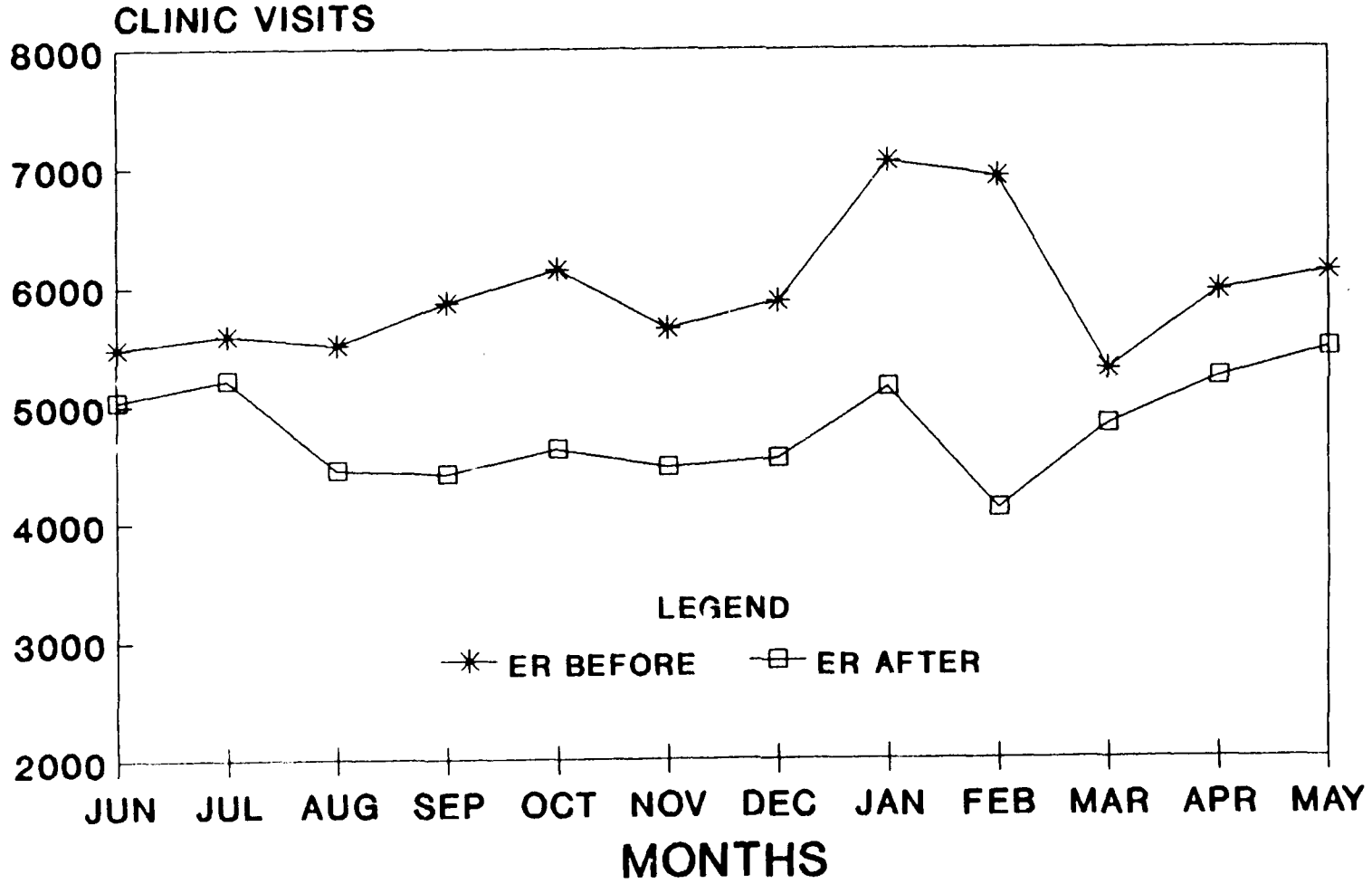


# APPENDIX I

## MONTHLY PRIMARY CARE VISITS

## TO THE EMERGENCY ROOM

# ER BEFORE AND AFTER PRIMUS
## JUN 87 TO MAY 88 AND JUN 88 TO MAY 89



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