Running Head: THE ECONOMIC EFFICIENCY FACTOR AT KELLER ARMY
COMMUNITY HOSPITAL, WEST POINT, NEW YORK

A Study of Efficiency of the Department of Primary Care at Keller Army Community Hospital

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Abstract

The survivability of any health care system is largely dependent upon its ability to use resources efficiently. In the Military Health System efficiency is especially important because of the implementation of TRICARE, and the eventual, but uncertain form, of enrollment based capitation. This capitated managed care model will force Military Treatment Facility (MTF) leaders to make tough decisions regarding the health care services provided based on the limited resources available. Therefore, it is critical that MTF leaders are able to measure and track how efficiently they are able to deliver health care service. **Purpose:** The purpose of this study is to evaluate the efficiency of the Department of Primary Care at Keller Army Community Hospital (ACH) using the Economic Efficiency Factor (EEF) and compare those levels with that of the Departments of Primary Care in homogeneous and like-sized MTFs within the United States Army Medical Command (MEDCOM). **Methods:** This quantitative study of the efficiency of the Department of Primary Care is longitudinally designed and descriptive in nature. The EEF was computed by using data downloaded from various Department of Defense data systems. **Results:** According to the EEF metric, the Department of Primary Care at Keller ACH is operating very efficiently. Furthermore, Keller ACH ranks high in efficiency compared to homogeneous and like-sized facilities within the MEDCOM. **Conclusions:** This study demonstrates how the EEF metric can be used to evaluate the efficiency of specific service lines or overall hospital operations. The usefulness of the information yielded by performing this study is virtually unlimited. The Keller ACH leadership can make better management decisions by using the EEF study to identify trends, to compare Keller ACH to other MTFs, to establish goals and benchmarks, to identify possible outsourcing of services, and to educate staff. Ultimately, by using the EEF metric, MTFs will be better prepared for the capitated managed care environment.

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Introduction

This research project is designed to produce a methodology to evaluate and improve the efficiency of the Department of Primary Care at Keller Army Community Hospital (ACH), West Point, New York. This study first determines the level of financial, operational, and clinical efficiency of the Department of Primary Care at Keller ACH; then compares the results with the efficiency of similar sized Medical Treatment Facilities (MTF) in the United States Army Medical Command (MEDCOM). Although vast amounts of research on health care efficiency in civilian managed care organizations has been conducted throughout the past decade, very little has been done within Army MTFs or even the Military Health System (MHS). There is no record of this type of research having been performed at Keller ACH.

In today's environment of dwindling resources and increased pressure to stem the rising costs of healthcare, the MHS is faced with unprecedented challenges in accomplishing its mission. The survivability of the MHS largely depends on its ability to provide quality care in the most efficient manner possible. For the purposes of this paper, efficiency is defined as the "maximization of the quality of a comparable unit of health care delivered for a given unit of health resources used" (Griffith, 1995). In other words, efficiency is using the smallest number of units of input possible per unit of output produced, without sacrificing the quality of the output. In order to reduce costs and operate more efficiently, the MHS implemented a managed care model entitled TRICARE.

TRICARE is forcing healthcare executives within the MHS to focus on providing quality healthcare in an efficient manner. The leaders of the MHS are in the process of deciding whether to implement enrollment based capitation (EBC). The intent of EBC is to force MTFs to "provide high quality, appropriate, and cost effective healthcare to their beneficiaries" (EBC

Home Page, 1999). As a result of TRICARE and probable implementation of EBC, MTF leaders

are searching for methods to measure levels of efficiency so goals and benchmarks can be

established to reduce costs while maintaining high quality and access.

The aim of this study is to determine a method to measure efficiency of the Department

of Primary Care. This metric will enable the Keller ACH commander and staff (administrative

and clinical) to make decisions to better manage costs while maintaining a high level of quality

care for the beneficiaries. The information provided by this research will enable the hospital's

leadership to identify, establish and measure goals and benchmarks as well as aid them making

day to day management decisions or when formulating future hospital policies. Additionally, this

study will aid the staff in preparing for EBC.

Conditions which prompted the study

John R. Griffith, the highly regarded author of The Well-Managed Health Care

Organization (1995), writes that:

> "The ideal health care organization will provide access to all, sound,
> comprehensive, and appropriate quality of care, please all its patients, and be
> affordable to its community."

This "ideal healthcare organization" has long eluded health care professionals due to the inherent

problems of the "iron triangle" of cost, quality and access. In an attempt to reduce costs, quality

suffers and access decreases. On the other hand, in an attempt to improve quality, costs skyrocket

and access decreases. Almost any attempt to improve one corner of the iron triangle always

seems to have detrimental affect on the other two corners. So what is the solution?

The MHS implemented managed care in order to address and resolve issues of the "iron

triangle". This program, entitled TRICARE, is the military's attempt to meet the goals of an

effectively managed health care system. The MHS not only learned that the implementation of

managed care was necessary, it also learned that some form of capitation would be necessary in light of shrinking resources and pressures to cut costs. The TRICARE program included plans to institute EBC. Under EBC, MTFs will be budgeted based on the number of TRICARE Prime beneficiaries enrolled at their site. Enrollment based capitation forces the MTF commanders and staffs to "improve resource utilization by changing attitudes where everyone, including health care providers, pursues or provides cost-effective care" (Braendel, 1993).

The MEDCOM conducted a capitation rate study in September 1999 to ascertain how to implement EBC. The purpose of the study was to determine the current costs per beneficiary (member) per month. Under EBC, MEDCOM will determine the per member per month (PMPM) capitation rate based on these costs. Keller ACH was grouped with nine like-sized remote MTFs. The results of the study revealed the PMPM costs range from $1,451 to $2,489 with a mean of $1,602 (See Appendix 1). Keller ACH had the highest cost at $2,489 PMPM, which is 2.39 standard deviations above the mean compared to other MTFs in its category. Based on these figures, it certainly appears that Keller ACH is operating inefficiently.

As stated above, the MHS is faced with unprecedented challenges in accomplishing its mission under TRICARE and EBC. Although the implementation of EBC has been delayed and its final variation is unclear, it is safe to assume that EBC in some form will greatly influence resource allocation in the future (McGibony, 1999). The survivability of Keller ACH, and the MHS, partly depends on its ability to provide quality care in the most efficiently manner possible. The healthcare executives at Keller ACH are searching for an accurate financial efficiency metric that allows the comparison of MTFs in a capitated managed care environment. This will also enable them to determine the accuracy of MEDCOM's capitation rate study.

Under managed care, or more specifically TRICARE, primary care physicians are responsible for controlling a large portion of the resources - especially in a capitated environment. Primary care physicians control access to expensive treatments and specialists. As a result, primary care physicians are essential in enabling managed care organizations to reduce costs and operate efficiently. For this reason, this study will focus on efficiency in primary care.

Statement of the problem

This study asks the question; how operationally, clinically, and financially efficient is the Department of Primary Care at Keller ACH in performing their mission? After determining the answer to this question, this study then examines how Keller ACH's Department of Primary Care compares to the Departments of Primary Care in like sized MTFs within the MEDCOM. By evaluating the Department of Primary Care's efficiency in performing their mission, Keller ACH's senior leaders can potentially improve efficiencies by identifying, establishing, and measuring goals and benchmarks. This will enable Keller ACH's leadership to be better prepared for the eventual impact of EBC.

Literature review

Background Information: Civilian Sector Shifts to Managed Care: Over the course of the past decade, America's health care system has undergone dramatic change. The traditional fee-for-service environment was marked by delivery of healthcare that was procedure/test oriented, had high utilization incentives, was biased toward primary care, maintained poor budgeting vehicles, and had extremely high costs and inefficiencies. In fact, costs were so high that they represented one-seventh of the nation's economy (Kongstvedt, 1997). The health care stakeholders (American public, providers, employers, hospitals, and the government) demanded solutions to resolve skyrocketing costs, limited access, and inadequate quality. The response by

the civilian marketplace, as well as the federal government, was to shift toward a proven cost containment mechanism - managed care (Stapleton, 1994).

Managed care is a term that is used to describe many types of health care organizations and modalities of health care delivery. Kongstvedt (1997), MD, FACP, widely considered an expert in managed care, defines managed care as a system of health care delivery that attempts to minimize or manage the cost of health care, while ensuring quality and access. Managed care reverses the economic incentives of traditional fee for service health care, and requires physicians, or their organizations, to assume some of the financial risk of their decisions.

In the managed care environment, physicians are usually compensated on one of many forms of capitation (Kongstvedt, 1997). A basic definition of capitation is the prepayment for services on a per member per month (PMPM) basis that may be varied based on factors such as age or gender of the enrolled population (Wehrwein, 1997). Capitation is intended to eliminate the fee-for-service incentive to see many patients and instead, aligns the financial incentives of the physicians with the financial incentives of the managed care plan.

In a capitated environment, physicians are responsible for providing all of the health care needs to their beneficiaries for a pre-established PMPM capitated rate. The physicians are paid the PMPM rate regardless of the level or cost of services provided. Kongstvedt (1997) states that physicians are caught between pressures to reduce costs on the one hand and the need to satisfy the desires of patients on the other. Patients may question whether the physicians have their best interest at heart in light of the financial incentives to limit resource consumption.

The are many ardent supporters of capitation and just as many critics. Supporters believe that capitation rewards physicians for concentrating on less expensive preventive medicine as opposed to high-cost curative care. Furthermore, physicians are rewarded financially for

managing the total health of each patient instead of providing episodic care. Critics argue that capitation creates an incentive for the physicians to enroll as many beneficiaries as possible in order to maximize their profits. This mentality may create inordinate physician-to-patient ratios and has the potential to cause quality and access problems. Critics also argue that physicians are rewarded for not providing diagnostic tests or treatments that a patient might truly need because the services are costly and ultimately minimize profits.

Managed care has definitely changed the face of health care within the United States. The implementation of capitated physicians has changed the focus to cutting costs, while maintaining quality. There are many different types of capitation. As Alan Hillman, MD, MBA, Director of the Center for Health Policy at Pennsylvania University's Leonard Davis Institute of Health Economics stated, "there is just no generalizing about capitated payment schemes these days: if you have seen one of them, you have seen one of them" (Wehrwein, 1997). But it is important to note that "there are more positives than negatives with capitation and that, when executed properly, capitation is a win-win situation for patients, doctors, and [managed care plans]" (Sheehan, 1997).

Background Information: MHS Shifts to Managed Care: The MHS was not immune to cost, quality, and access problems occurring in the civilian sector. An early attempt to reduce healthcare costs and improve access and quality in the MHS started when the United States Congress initiated the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS). In 1963, Congress implemented CHAMPUS to ease the burden on the military health care system. Under the original structure, dependents of active duty military personnel, and military retirees and their families, could use civilian medical services. Beneficiaries of this system paid an annual deductible as well as a percentage of the actual medical bills. The

government covered the remaining costs. Covering these costs became unmanageable because the MTFs were not financially responsible for referring patients to other MTFs or civilian health care facilities.

As a result of escalating military health care expenditures, the Department of Defense (DoD) established the CHAMPUS Reform Initiative (CRI) as a five-year demonstration project in 1988. The primary goals of CRI were to improve beneficiary access to care, increase satisfaction with military health benefits, maintain the quality of care provided, and contain health care costs (TRICARE Southwest, 1998). Under this initiative, the Congress mandated that individual services be responsible for their own CHAMPUS expenditures and CHAMPUS payments made to hospitals were changed from billed charges to diagnostic related groups (Braendel, 1990). As a result, the military Surgeons General, and their respective medical departments, had to become more aware of and accountable for their use of resources. This was the beginning of the shift to managed care.

TRICARE evolved from the DoD CRI managed care demonstration programs (TRICARE Southwest, 1998). TRICARE is the military's attempt to meet the goals of an effectively managed health care system. The program relies heavily on a commercial contractor to develop and manage private sector health care provider networks and services. Beneficiaries use this network when care is not readily available in an MTF. TRICARE is a triple option program, which includes Prime, Extra, and Standard. A description of each option is contained in Appendix 2.

Enrollment Based Capitation (EBC): The MHS not only learned that the implementation of managed care was necessary, it also learned that some form of capitation would be necessary in light of shrinking resources and pressures to cut costs. The TRICARE program included plans

to institute capitation in order to force the MTF commanders and staffs to "improve resource utilization by changing attitudes where everyone, including health care providers, pursues or provides cost-effective care" (Braendel, 1993).

TRICARE's capitation program is enrollment based capitation (EBC). Enrollment based capitation is the system that could potentially drive the distribution of Defense Health Program dollars to the military services based on the number of TRICARE Prime enrollees at the specific MTF. Enrollment based capitation has three primary features: funding, purchasing, and selling (Campbell, 1998).

Funding refers to the budget or the exact amount of dollars given to an MTF to conduct its mission of providing health care services. These funds are allocated based on the number of TRICARE Prime enrollees - the more TRICARE Prime enrollees, the bigger the budget allocated to the MTF to provide health care services. This is one reason it is critically important for the MTFs to encourage their patients to enroll in TRICARE Prime instead of using TRICARE Standard or Extra.

Funding is adjusted if the MTF purchases or sells health care services to or from another health care organization. For instance, an MTF may not have the staff or equipment to provide a specific procedure, so they refer the patient to another MTF or civilian health care organization. The cost of the referral is paid for directly out of the referring MTF's budget. On the other hand, selling of health care services refers to any services provided by the MTF to external customers. External customers include other MTF TRICARE Prime enrollees, individuals in TRICARE Standard or Extra, Medicare patients, and various other categories that are not the MTFs TRICARE Prime enrollees (EBC Home Page, 1999). The MTF can earn revenue by providing care to these external customers as long as the TRICARE access standards are being met for the

Prime enrollees. The prices charged are based on the Medical Expense Performance and

Reporting System-based incremental costs of providing the care (EBC Home Page, 1999).

   Measuring Efficiency: Reinhardt Priester (1997), MD, and Associate for Health Policy at

the Health Center at the Minnesota Center for Health Care Ethics, submits that one of the five

essential goals used as benchmarks for evaluating managed care is the promotion of efficiency.

He further suggests that promotion of efficiency has two dimensions: minimizing the cost of

whatever services are provided and choosing the set of services that lead to the maximization of

benefits over costs. This literature review first reviews the tools and systems that organizations

must have in place to promote efficiency, and then investigates how these organizations use the

tools and systems to measure efficiency.

   Much of the existing literature discusses various tools and systems that organizations

must have in place or can implement in order to measure efficiency. Ruffin (1994) argues

integrated information systems enable an organization to become more efficient because these

systems can identify the exact costs of care, unnecessary costs variations in those costs, and

identify new processes of care to reduce unnecessary administrative and clinical costs. Integrated

information system enable healthcare organizations to reduce expenses and inefficiencies by

providing the ability to monitor and document care being delivered and ultimately improve

decision support (Rosenstein, 1999). Information systems aid an organization in conducting

Activity-based costing (ABC).

   Activity-based costing assesses the costs associated with specific activities and resources

and links those costs to specific internal and external customers of the healthcare organization in

order to determine the exact costs associated with each patient (Player, 1998). Non-health care

industries have been using ABC techniques for decades. Activity-based costing facilitates

planning, benchmarking, reimbursement rates, service line costs, and business process reengineering. By using ABC, organizations can evaluate efficiency, eliminate unnecessary costs, and plan for change.

Udpa (1996) conducted a study at a hospital comparing conventional costing with ABC in determining the cost of conducting DRG 1 and DRG 2. Udpa found that using this hospital's conventional methods the total cost of conducting DRG 1 and DRG 2 was $9,439 and $3,409 respectively. On the other hand, using ABC Udpa found that the total cost for DRG 1 and DRG 2 was $11,531 and $3,256 respectively. St. Joseph's costs undercosted DRG 1 by 22.16% and overcosted DRG 2 by 4.47%. By using the ABC costing method, Udpa was able to "trace the overhead costs to each DRG/patient based on consumption of activity resources and thus obtain more accurate cost data" (Udpa, 1996). As can be seen, ABC provides more accurate product cost information than does the conventional costing method. The ABC approach is especially important in the healthcare industry in which planning and controlling the costs of services directly impact the ability to provide quality healthcare efficiently (Chan, 1993).

The Government, and more specifically the MHS, has long had difficulty in effectively measuring efficiency because they are using antiquated accounting procedures (Vann, 1997). Even managed care organizations "that are able to measure critical costs still enroll below the marginal cost because of poor communication and mistrust of the numbers" (Grazier, 1999). For this reason, it is critically important that healthcare organizations have a multidisciplinary team to make decisions based on data.

Studies have indicated that a multidisciplinary approach is essential to making management decisions to provide cost-efficient high quality care. In 1997, MedSpan, a rapidly growing Physician Hospital Organization (PHO) in Connecticut, implemented a Medical

Management/Quality Management Committee (MM/QMC) to make policy decisions to improve and promote high quality care in the most cost-effective manner. The MM/QMC committee includes MedSpan board members, administrative staff, patients, and providers. The MM/QMC also has nine subcommittees (cardiology, mental health, substance abuse, obstetrics/gynecology, general medicine, pediatrics, surgery, credentialing, and pharmaceutical/therapeutics) that make recommendations regarding their area of specificity. (Cook and Wetstone, 1997).

The results of using this multidisciplinary approach to make policy decisions enabled MedSpan to maximize quality and improve efficiency. For instance, based on recommendations of the MM/QMC, some examples of what MedSpan has achieved are as follows: the average length of stay (ALOS) for vaginal deliveries was reduced from 2.3 to 1.7 days; the ALOS for mental health/substance abuse patients was reduced from 11.3 to 9.1 days and days per 1000 plan members was reduce from 75 to 43; general medicine guidelines have been developed and distributed reduce costs while maintaining quality; cardiology practice guidelines for cardiac stress testing resulted in a reduction of improper utilization as well as a reduction in overall costs (Cook and Wetstone, 1997).

In 1995, Horn conducted a study of the implementation of Clinical Practice Improvement (CPI) that involved a multidisciplinary team approach in designing studies, analyzing data, and developing more efficient forms of treatment. Specifically, Horn found that by using the CPI multidisciplinary approach pharmaceutical costs decreased from $585 to $288 for low severity illnesses, $883 to $477 for medium severity illnesses, and $1,376 to $713 for high severity illnesses. This multidisciplinary approach has "proven to be effective in reducing cost and improving outcomes" (Horn, 1995).

Once an organization has integrated information systems in place to capture data and multidisciplinary teams to analyze and make decisions based these data, it is then able to establish performance measurements that can be used to establish goals or benchmarks. The current literature revealed two techniques that have been widely employed to measure efficiency. These techniques include break-even analysis and data envelopment analysis (DEA).

Break-even analysis is normally used for making investment decisions and estimating profitability. This type of analysis shows the relationship between an organization's production function (which determines costs) and the price charged for the product (which determines revenues). The break-even point is where the revenues are equal to the total expenses. (Gapenski, 1992).

Van der Wall and Smithwick (1997) conducted an economic break-even analysis of dental care delivery. The model they developed used break-even analysis to determine the maximum level of care provided for the limited funds available. By analyzing the total revenues and total costs they were able to determine the number of treatments they must provide to break-even as well as how to maximize their profits (total revenues minus total costs). This break-even analysis could be easily translated for use in the primary care arena. However, it is based on a fee for service payment mechanism. (Van der Wall and Smithwick, 1997).

Boles and Fleming (1996) conducted a break-even analysis under the managed care capitation environment. They had to slightly modify the traditional model of break-even analysis to conform to the capitated environment. The model Boles and Fleming developed assumed total revenue to be constant because of the fixed number of enrollees, while the total costs are assumed to increase as utilization of services is increased. This model may be useful to measure and track efficiency by enabling leaders within the organization to "anticipate how growth in

enrollments is likely to effect profitability at various levels of utilization" (Boles and Fleming, 1996).

Another tool used to measure efficiency is data envelopment analysis (DEA). Data envelopment analysis is a "tool that uses linear programming techniques to search for optimal combinations of inputs and outputs based on the actual performance" (Lynch and Ozcan, 1994). The DEA program identifies a group of optimally performing individual services that are defined as efficient and assigns them a score of one. These efficient services are then used to develop an efficiency frontier or data envelope against which all other services are compared. It is important to note that the DEA technique can be used to identify and compare both individual services and the overall performance of a hospital (Lynch and Ozcan, 1994).

Bannick and Ozcan (1995) conducted an efficiency analysis comparing the Department of Defense (DoD) and Veterans Affairs (VA) hospitals using DEA. They used two measures of performance output (inpatient days and outpatient visits) and six measures of resource input (capital investment in operational beds, service mix intensity, supplies, and three components of labor - providers, nurses and support staff). The results indicated that the DoD hospitals, on average, operated more efficiently than the VA hospitals. Bannick and Ozcan also found that there was no significant difference in levels of efficiency among service components within the DoD. However, they did find that Army hospitals were more efficient in using service mix and provider labor.

Dittman et al. (1991) used DEA to measure efficiency in acute care hospitals. While they did find the technique useful in comparing levels of efficiency between hospitals, they did find some limitations. The biggest limitation was the fact that "efficiency scores are relative and are based on the performance of the other hospitals being compared" (Dittman et al., 1991).

Furthermore, the efficiency rating "assumes a causal impact of the inputs and outputs…and inclusion of additional inputs and outputs could modify the relative efficiency scores and/or help explain the differences" (Dittman et al., 1991). Nevertheless, the DEA methodology can be used to measure and compare efficiencies of service lines between hospitals. Healthcare executives can influence and manipulate the levels of inputs and outputs to achieve greater levels of efficiency.

A review of the literature specific to the MHS yielded a study performed by Goodman et al. (1998). Goodman et al. developed the economic efficiency factor (EEF) to evaluate and compare service line management and to provide a financial tool to identify the Medicare level of effort (LOE) by service line to show the LOE contribution to business practices. The EEF is a financial tool that measures the value of patients seen and treated in an MTF in dollars versus the cost of providing the health care services (Goodman et al., 1998). The EEF is calculated by using data from various information systems internal to the MHS. This tool can aid the commanders and staffs within the MHS in evaluating efficiency and determining where cost saving can be realized.

There are two studies in particular where Goodman et al. used the EEF to evaluate efficiency. The first study evaluated the efficiency of several product lines at six MTFs. In this study the authors demonstrated how these six MTFs differed cost-wise in their ability to provide the specific product lines (Goodman et al., 1998). This allowed the six MTFs to communicate with one another in order to change policies and procedures to achieve improved efficiencies. The second study used a slightly modified version of the EEF to analyze staffing and staffing ratios in the United States Army Dental Command (DENCOM). Through the use of the EFF, the

DENCOM was able to identify a more efficient method in assigning enlisted soldiers and assistants per dentist (Goodman et al., 1998).

The EEF provides a method to measure efficiency in product lines and compare the efficiency between MTFs. By using the EEF, "MTF leaders can achieve significant improvement in their facilities' overall financial efficiency" (Goodman et el., 1998). By using the EEF, commanders and their staff may identify the least efficient services and focus efforts toward making changes to policies and/or procedures to obtain the greatest "bang for the buck".

Statement of Purpose

The primary purpose of this study is to evaluate the operational, clinical, and financial efficiency of the Department of Primary Care at Keller ACH using the EEF. The dependent variable for this study is efficiency. Efficiency is define as the "maximization of the quality of a comparable unit of health care delivered for a given unit of health resources used" (Griffith, 1995). Simply put, efficiency can be defined as getting the biggest "bang for the buck" - providing the highest amount quality healthcare services for every single dollar that Keller ACH spends. There are four independent variables for this study: 1) the number of outpatient visits; 2) ambulatory weighted units; 3) CHAMPUS Maximum Allowable Charges (CMAC); and 4) total costs for each service line. The data for this study will be drawn from Medical Expense Performance Reporting System (MEPRS), the TRICARE CMAC Homepage, and the Ambulatory Data System (ADS).

Once the levels of efficiency in Keller ACH's Department of Primary Care are determined, the supporting objective and secondary purpose of this study is to compare those levels with that of the Departments of Primary Care in like-sized MTFs within the MEDCOM. This will enable the Keller ACH leadership to recognize which areas within the Department of

Primary Care are not operationally, clinically, or financially efficient. As a result, they can identify, establish and measure benchmarks and goals to maximize efficiency as well as to be better prepared for EBC.

Methods and Procedure

Study Design: This quantitative study of the efficiency of the Department of Primary Care is descriptive in nature - it is designed to determine the who, what, when, where, and how much of a particular variable exists (Cooper and Schindler, 1998). In this study, the variable of interest is efficiency. This study is longitudinally designed by virtue of the fact that the EEF is calculated for each month in fiscal year 1998 and 1999. Using the longitudinal design provides the ability to view the efficiency of the clinics within the Department of Primary Care over an extended period of time. This enables the identification of the current efficiency as well as trends over the past two fiscal years.

Assumptions: There are two assumptions that are relevant for the EEF study:

1) The standard CMAC reimbursement rate is sufficient for calculating the estimated cost avoidance (outpatient revenue) for the hospital and clinical care. Because the rate is standardized, it will allow comparisons across all MTFs within Keller ACH's category (Goodman et al., 1998).

2) Outpatient revenue generated in the EEF formula is truly cost avoidance. MTFs are obviously not in the business of generating revenue. Instead, by performing the clinical services in-house, the MTF is avoiding the cost of having to pay a civilian provider for performing these services.

Data Sources: The data sources used for this study include:

Medical Expense Performance Reporting System (MEPRS): The MEPRS is a congressionally mandated tri-service cost accounting system. This system collects expenses, manpower, and workload performed by MTFs. The MEPRS is the basis for establishing a uniform reporting methodology that provides consistent financial and operating performance data to assist managers who are responsible for healthcare delivery. Health care managers use the MEPRS for financial and operating performance data for overall hospital operations or for individual clinics (MEPRS, 1999). Data used from the MEPRS to compute the EEF includes: Total Expenses, Clinician Salaries, Total Number of Outpatient Visits, and Ambulatory Weighted Units (AWU).

1) Total Expenses: The total expenses include all costs incurred by the specific cost center including clinician salaries, non-physician salaries, other direct expenses, ancillary services, and support costs (MERPS, 1999).

2) Clinician Salaries: The salaries included are the clinicians, direct care professionals, registered nurses, direct care paraprofessionals, administrative staff, clerical staff, and logistics personnel (MEPRS, 1999).

3) Total Number of Outpatient Visits: The total number of outpatient visits includes regularly scheduled patients, inpatient visits to outpatient clinics and all ambulatory visits (MEPRS, 1999).

4) Ambulatory Weighted Units (AWU): The ambulatory weighted unit is the standardized resource intensity factor for each different outpatient clinical service (Palmieri, 1999).

Ambulatory Data System (ADS): The ADS is a healthcare data collection and reporting system that provides ambulatory data as a by-product of the healthcare delivery process. This system reports patient specific encounter data, diagnosis, and treatment data (CEIS, 1997). The ADS system is also the source for data on ambulatory visits and Current Procedural Terminology (CPT) codes. The CPT coding system is a systematic listing and coding of procedures and services performed by physicians (Kirschner et al., 1999). The purpose of CPT coding is "to provide a uniform language that will accurately describe medical, surgical, and diagnostic services, and will thereby provide an effective means for reliable nationwide communication among physicians, patients, third-party patients, and administrative management " (Kirschner et al., 1999). The ADS system was specifically used to determine the CPT procedures codes performed by each clinic at each MTF in this study.

CHAMPUS Maximum Allowable Charges (CMAC): The CMAC is the standard reimbursement rate paid to a civilian provider for performing health services. Specifically, the CMAC reimbursement rate is based on the CPT code for the procedure performed.

Detailed Methodology: The EEF is derived using the data downloaded from MEPRS, CMAC, and ADS. The EEF is computed as follows (actual EEF computations are in Appendix 3):

       1) Total Number of Outpatient Clinic Visits x AWU = Outpatient Relative Weighted Product (RWP).

       2) Outpatient RWP x CMAC rate = Outpatient Revenue (cost avoidance).

       3) Outpatient Revenue - (Total MEPRS Costs-Clinician Salaries)= Profit or Loss.

       4) Outpatient Revenue / (Total MEPRS Costs-Clinician Salaries) = EEF.

Goodman et al. (1998) found that clinician salaries should not be included in order to more accurately compare a military MTF to a civilian hospital. This is due to the fact that physicians are not normally employed by civilian hospitals, but are paid instead through billing Medicare or other insurers for professional fees.

The EEF was computed for the following clinics at Keller ACH: Family Medicine, Internal Medicine, Mologne Cadet Health Clinic, Community Mental Health, Acute Care Clinic/Emergency Room, and the Immunization/Allergy Clinic. Additionally, data were collected from the Departments of Primary Care for five MTFs (MTF A, B, C, D, E), which MEDCOM considers to be in the same category as Keller ACH. These MTFs are placed in the same category as Keller ACH because they are considered to be homogenous and like-sized.

Validity & Reliability: In performing any study, it is critical that reliability and validity be addressed. Reliability accounts for the accuracy or precision of the measure procedure, while validity determines whether the test actually measures what is attempting to be measured (Cooper and Schindler, 1998). The procedure to calculate the EEF is actually simple mathematics and uses data that are generated by integrated information systems inherent in the MHS. In 1998, MEDCOM approved the EEF as a reliable and valid tool in measuring efficiency. Furthermore, Goodman et al. were presented the Researchers of the Year Award by the American Society of Military Comptrollers in 1998 for the development of the EEF.

Confidentiality: All MTFs providing data for this study were assured that their information would be held in the strictest confidence. The EEF results for the various MTFs included in this study will remain confidential.

Results

Keller ACH's Results: Table 1 depicts the consolidated results of the computations for the

Department of Primary Care at Keller ACH:

Table 1
Monthly average number of patients, cost avoidance, profit/loss, and EEF for fiscal years 1998 and 1999.

Clinic	Average Number Patients per Month	Cost Avoidance	Profit/Loss	EEF
ACC/ER	111.9	$15,089	$2,200	1.17
Allergy	103.4	$5,003	$753	1.18
Dermatology	352.6	$27,183	$1,365	1.05
Family Practice	2985.6	$269,294	$39,071	1.17
Internal Medicine	1569.6	$228,278	$19,606	1.09
Pediatrics	498.5	$35,473	$8,162	1.30
Primary Care	3292.5	$299,028	$4,773	1.02
Total	**8914.1**	**$879,349**	**$75,930**	**1.14**

Keller ACH is operating efficiently in each of the Primary Care clinics - an EEF greater than 1.0

indicates the clinic is operating efficiently, while an EFF less than 1.0 indicates inefficiency. The

average monthly cost avoidance is $879,349. This is the amount of money Keller ACH is saving

by performing the procedures in-house as opposed to sending patients to a civilian hospital for

care. If Keller ACH were a for-profit hospital, it would be earning an average monthly profit of

$75,930 for the care rendered to the monthly average of 8914.1 patients.

In looking at the EEF metric over the course of fiscal years 1998 and 1999, it is apparent

that the efficiency is increasing in some clinics and decreasing in others. The trends are shown in

Table 2 and are graphically depicted in Appendix 4.

Table 2
Keller ACH's trend of the EEF metric for fiscal year 1998 and 1999.

Clinic	Current Trend
ACC/ER	Downward
Allergy	Downward
Dermatology	Slightly Upward
Family Practice	Slightly Upward
Internal Medicine	Slightly Downward
Pediatrics	Upward
Primary Care	Downward

Comparison of Keller ACH with Homogeneous Like-Sized MTFs: As can be seen in Table 3, Keller ACH is operating at a level of efficiency above the average EEF in all clinics with the exception of the Dermatology Clinic. Keller ACH is not the leader in efficiency in any of the clinics; however, Keller ACH is the second most efficient in the ACC/ER, Allergy, Family Practice, Internal Medicine, and the Pediatrics clinics.

Table 3
Comparison of the computed EEF metric for fiscal years 1998 and 1999. Not applicable (N/A) indicates that the MTF does not provide service.

MTF	ACC/ER	Allergy	Dermatology	Family Practice	Internal Medicine	Pediatrics	Primary Care
Keller ACH	1.17	1.18	1.05	1.17	1.09	1.30	1.02
MTF A	0.84	N/A	0.73	0.92	1.00	0.77	0.85
MTF B	2.60	0.79	1.50	1.23	0.91	0.66	0.73
MTF C	0.21	N/A	N/A	1.00	0.97	0.79	0.52
MTF D	0.94	1.05	1.15	0.95	0.84	1.21	1.20
MTF E	0.71	1.23	1.06	1.11	1.23	1.45	1.31
Average	**1.08**	**1.06**	**1.10**	**1.06**	**1.01**	**1.03**	**0.94**

As can be seen in Table 4, Keller ACH is below the monthly average cost avoidance in all clinics except for the Internal Medicine Clinic. On average, many of the MTFs are saving more money than Keller ACH by providing the services in-house as opposed to sending the patients to a civilian hospital for care.

Table 4
Comparison of the average monthly cost avoidance for fiscal years 1998 and 1999. Not applicable (N/A) indicates that the MTF does not provide service.

MTF	ACC/ER	Allergy	Dermatology	Family Practice	Internal Medicine	Pediatrics	Primary Care
Keller ACH	$15,089	$5,003	$27,183	$269,294	$228,278	$35,473	$299,028
MTF A	$295,215	N/A	$23,056	$556,256	$163,115	$41,453	$72,524
MTF B	$75,189	$5,999	$7,600	$90,539	$146,638	$51,641	$217,305
MTF C	$18,168	N/A	N/A	$114,228	$58,909	$44,136	$158,642
MTF D	$304,535	$22,843	$31,815	$189,654	$101,643	$94,647	$479,278
MTF E	$343,910	$53,364	$54,287	$813,189	$374,585	$133,639	$914,402
Average	**$175,351**	**$21,802**	**$28,788**	**$338,860**	**$178,862**	**$66,831**	**$356,863**

As can be seen in Table 5, if Keller ACH were a for-profit hospital it's earnings would be greater than the average profit in the ACC/ER, Dermatology, Family Practice, Pediatric, and

Internal Medicine clinics. Conversely, Keller ACH would be earning a profit below that of the

average in the Primary Care and Allergy clinics.

Table 5
Comparison of the average monthly profit/loss for fiscal years 1998 and 1999. Numbers in parentheses indicate negative numbers. Not applicable (N/A) indicates that the MTF does not provide service.

MTF	ACC/ER	Allergy	Dermatology	Family Practice	Internal Medicine	Pediatrics	Primary Care
Keller ACH	$2,200	$753	$1,365	$39,071	$19,606	$8,162	$4,773
MTF A	($54,660)	N/A	($8,683)	($50,517)	$702	($12,394)	($12,924)
MTF B	$46,226	($1,562)	$2,518	$17,194	($13,787)	($26,134)	($78,366)
MTF C	($66,568)	N/A	N/A	($186)	($1,745)	($11,624)	($147,341)
MTF D	($17,848)	$1,086	$4,262	($10,023)	($18,667)	$16,467	$79,125
MTF E	($137,228)	$10,103	$3,179	$79,891	$71,129	$41,458	$214,163
Average	($37,980)	$2,595	$528	$12,572	$9,540	$2,656	$9,905

Table 6 details the average number of patients seen per month in each clinic at each

MTF. The MTF E dramatically affects the average and standard deviation in each clinic due to

the fact that they see a much larger number of patients than the rest of the facilities. The

difference is so large that it is questionable as to why MEDCOM places them in the same

category as Keller ACH.

Table 6
Comparison of the average number of patients per clinic, for fiscal years 1998 and 1999. Not applicable (N/A) indicates that the MTF does not provide service.

MTF	ACC/ER	Allergy	Dermatology	Family Practice	Internal Medicine	Pediatrics	Primary Care	Total
Keller ACH	111.9	103.4	352.6	2985.6	1569.6	498.5	3292.5	8914.1
MTF A	2189.6	N/A	299.1	6167.1	1121.5	582.5	798.5	8968.7
MTF B	557.7	124.0	98.6	1003.8	1008.3	725.7	2392.7	5910.8
MTF C	134.8	N/A	N/A	1266.4	405.0	620.3	1746.8	4038.5
MTF D	2258.7	472.2	412.7	2102.7	698.9	1330.1	5277.2	12552.5
MTF E	2550.8	1103.1	704.2	9015.7	2575.6	1878.0	10068.2	27895.6
Average	1114.8	525.1	372.3	3220.2	1054.1	805.0	3368.0	
Standard Deviation	1148.5	466.7	219.3	3180.5	768.1	548.2	3371.5	

Discussion

This study evaluated the overall efficiency of the Department of Primary Care at Keller ACH using the EEF. Additionally, the levels of efficiency in Keller ACH's Department of Primary Care were compared to those levels with that of the Departments of Primary Care in homogeneous and like-sized MTFs within the MEDCOM. The findings of this study are not congruent with findings of the capitation rate study performed by MEDCOM in September 1999. In general, the results show that Keller ACH's Department of Primary Care is operating efficiently according to the EEF metric. Although, the EEF metric is above 1.00 for each of Keller ACH's clinics, some clinics are operating more efficient than others.

The trend of the EEF metric over fiscal year 1998 and 1999 is increasing for some clinics and decreasing for others. The Keller ACH leadership should investigate why trends are decreasing in the ACC/ER, Allergy, Internal Medicine, and Primary Care clinics. It is important that they make this determination so as to avoid dipping below an EEF of 1.00. It is not only important to investigate decreasing EEF trends, but also the increasing EEF trends in the Dermatology, Family Practice, or Pediatrics clinics. Analysis of increasing trends might enable the staff to identify opportunities for improvement as well as adjustments that can be made in other clinics that are experiencing downward efficiency trends.

There are countless reasons that could have caused the positive or negative trends in the various clinics at Keller ACH. For example, a trend might have been caused by changes in policy, regulation, or law. In these instances the hospital leadership will most likely have difficulty affecting a change because laws and regulations can be difficult, if not impossible, to change. Conversely, the hospital leadership usually can easily make changes and improve

efficiency by influencing clinic leadership, staffing, utilization of civilian and military personnel, space utilization, number of available appointments, travel for training, supply ordering, etc.

The Keller ACH leadership may realize that despite any changes to improve efficiency, some services might always operate inefficiently or at an EEF level below that of other MTFs due to particular environmental, economic, or political conditions inherent at West Point. For example, providing obstetric services at Keller ACH might prove to be very inefficient. However, due to the climate, remote location, and historical practice, it has been decided to retain obstetric services at West Point. The Keller ACH commander may decide to provide a service for the good of the community, regardless of how expensive or inefficient that particular service might be. Alternatively, services continually operating inefficiently and well below EEF scores of other MTFs, despite all of the corrective actions taken by the staff, should at least be considered for outsourcing. Purchasing those services might be cheaper than providing them.

Keller ACH's efficiency ranks fairly high in comparison to the other MTFs. Each of Keller ACH's clinics operate at an EEF level well above the average EEF for all of the MTFs with the exception of the Dermatology Clinic. Even though the Dermatology Clinic operates at an EEF level of 1.05, which in theory is efficient, the hospital leadership should investigate how other MTFs are able to operate their Dermatology Clinic more efficiently. Furthermore, the staff should determine how the most efficient MTF clinics achieved high levels of efficiency and then adopt similar strategies to improve upon Keller ACH's efficiencies - this is the true value of comparing Keller ACH to the other MTFs. The hospital leadership can create benchmarks for each clinic to strive for and achieve. Doing so will potentially enable the hospital to get the biggest "bang for the buck" for each dollar they spend on healthcare for their beneficiaries. As a result, Keller ACH will also be better prepared for the eventual, but uncertain, form of EBC.

Data quality obviously directly impacts the results of this study. The accuracy of MEPRS data has been a historical problem. According to the MEDCOM MEPRS Basic Briefing (1999), a major problem in the past was that MTFs were focused exclusively on obligations, budget and authorizations rather than expenses and productivity. There was a perception that MEPRS was a low priority and that higher command levels were not using it to make management decisions. According to MEDCOM, these problems have resulted in the "Department of Defense being late in acquiring modern health care cost management capabilities and practices" (MEPRS Basic Brief, 1999).

Dr. James Sears (1999), Executive Director, TRICARE Management Activity, stated "MHS commanders at all levels will be directly responsible for ensuring that expense reporting activities under their command comply with DOD MEPRS procedures, policies, and requirements." Subsequently, in January 1999, Brigadier General Ogden Dewitt, Deputy Chief of Staff for Force Sustainment, chartered a Data Quality for Army Medical Department Success Team (DQFAST) to determine the best MTF level business processes to improve data quality for the AMEDD. The DQFAST mission is to "improve accurate data capture and workload reporting from the bottom up, resulting from direct medical care, and supporting processes within Army MTFs" (Dewitt, 1999). Brigadier General Dewitt (1999) stated that:

> "The quality of data created in MTFs Source Data Collection Systems determines the quality of information available for measurement and decision making. Missing or incorrect data impacts directly upon our success in monitoring patient care continuity, clinical outcome studies, Enrollment Based Capitation, Managed Care Support Contracts, Medicare Subvention Demonstrations and the creditability of the AMEDD".

In order to place even more emphasis on the importance of this issue, Brigadier General Dewitt charged MTF commanders with the responsibility of their quality of data.

Conclusions and Recommendations

This study determined the levels of efficiency of the Department of Primary Care at Keller ACH and compared those levels of efficiency to that of homogeneous like-sized MTF's using the EEF metric. This study demonstrates how the EEF metric can be used to periodically evaluate the efficiency of specific service lines or overall hospital operations. The usefulness of the information yielded by performing this study is virtually unlimited. The Keller ACH leadership can make better management decisions by using the EEF study to identify trends, to compare Keller ACH to other MTFs, to establish goals and benchmarks, to identify possible outsourcing of services, and to educate staff.

The future research using the EEF at Keller ACH should include all inpatient and outpatient service lines. This study focused on evaluating the efficiency only in the Department of Primary Care. In order to get a complete picture of the levels of efficiency at Keller ACH, all in and out patient services should be evaluated. It is also recommended that the EEF metric be used in conjunction with customer satisfaction metrics, such as the Department of Defense (Health Affairs) Patient Satisfaction Report. An attempt to improve efficiency by changing policies and/or procedures can inadvertently negatively affect patient satisfaction.

Since this study concentrated on the efficiency of the Department of Primary Care over the course of fiscal years 1998 and 1999, it represents a retrospective snapshot of that time period. In order for the metric to be used most effectively, the EEF needs to be monitored on a continual basis - monthly or quarterly. The results of this study can be established as an objective baseline measurement of efficiency upon which future studies can be compared.

This study has two limitations upon which future research can improve. First, the standardized CMAC rate of $3121 used by Goodman et at. (1998) as well as this study can

significantly over or understate the outpatient revenue (cost avoidance) and ultimately the EEF metric. Future studies should include a CMAC rate derived from the exact costs paid for services as per the CPT codes performed by each individual clinic instead of an average standardized rate. This will improve the accuracy of the EEF metric. Second, due to the concern over data quality, it is recommended that the data quality metrics developed by the DQFAST be used to determine the accuracy of the MEPRS and ADS data. In doing so, the EEF metric and comparisons between homogeneous and like-sized facilities will be more meaningful.

In conclusion, this study proves to be critically important in today's environment of dwindling resources and increased pressure to stem the rising costs of healthcare. The MHS is faced with unprecedented challenges in accomplishing its mission. The survivability of the MHS largely depends on its ability to provide quality care in the most efficient manner possible. The first step in moving the MHS toward an efficient and high-quality modality of health care delivery was the implementation of managed care. The second step, which is an attempt to improve the efficiency of the MHS, and more specifically the MTFs, is the implementation of enrollment based capitation. When MEDCOM determines the final form of EBC, commanders will be even more responsible for the survival of their MTF. The EEF is one metric that should be included as part of a portfolio of metrics that MTF leaders can use to achieve success in the capitated managed care environment.

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Appendix 1

Appendix 2

TRICARE Prime: This is an HMO-type plan that requires no enrollment fee for active duty soldiers and a small annual enrollment fee for retirees. In this option, enrollees receive health care at an MTF or at a supporting network of civilian providers. A Health Care Finder (HCF) at the TRICARE Service Center makes test/specialty appointments for Prime enrollees. All active duty service members are enrolled in Prime and receive most of their care from military medical personnel. Eligible retirees and their families may enroll in Prime. Each person who enrolls in Prime has a military or civilian Primary Care Manager (PCM) who provides non-emergency medical care. The PCM also authorizes referrals for specialty care. (TRICARE, 1999).

TRICARE Extra: This option is similar to a Preferred Provider Organization (PPO). Under this option, individuals do not enroll. Beneficiaries choose an authorized civilian network provider and receive a five-percent discount from the TRICARE Standard cost shares. Members pay a yearly deductible and co-payments to access this preferred provider option. The annual CHAMPUS deductible must be met before cost sharing begins. Other CHAMPUS rules also pertain. (TRICARE, 1999).

TRICARE Standard: This is a new name for the traditional CHAMPUS. In this option, individuals pay current CHAMPUS deductibles and cost shares and abide by current CHAMPUS rules. This option offers the broadest choice of providers and charges no enrollment fee, but beneficiaries pay co-payments, deductibles, and the balance of bills not covered by CHAMPUS. (TRICARE, 1999).

Appendix 3

Appendix 4