

Running head: PRIMARY CARE EVALUATION

A Comparative Evaluation of Structure, Process, and Outcomes
Pre- and Post-Implementation of Primary Care Teams

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Abstract

The Department of Veterans Affairs (DVA) is faced with the major challenge of converting the nation's largest integrated health system from one focused on "ill care" to one focused on "well care". When changes are made in structure and process elements of healthcare delivery, a system of measurement must be developed to demonstrate that outcomes have not been negatively impacted by these changes.

Although the concept of each patient being assigned to one Primary Care Provider (PCP) has been in place at the Cheyenne Veterans Affairs Medical Center (VAMC) for some time, inclusion of ancillary staff to complete a comprehensive primary care team has only recently been implemented (November 30, 1998). The purpose of this project was twofold: to assess whether sufficient reliable and valid data exist upon which to base a comparison of outcomes pre- and post-primary care team implementation; and if so, to make such a comparison.

A para-analysis following the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) Clinical Value Compass approach was chosen to assess whether the implementation of primary care teams added value to the healthcare provided by the Cheyenne VAMC.

Potential outcomes measurements were identified via review of the literature. A panel of persons involved in the local

collection and interpretation of data reviewed the list of identified measurements, assisted in determining which measures were readily available and interpretable, and ensured that only valid and practical measures were selected.

Data were extracted from customer satisfaction survey results, directors' performance measures, fiscal reports, and various ad hoc reports to compare outcomes during the pre- and post-implementation timeframes.

Reliable, valid outcomes measures were identified among currently collected information. Outcomes in all four of the cardinal points of the Clinical Value Compass were improved or unchanged. However, whether these changes in outcomes can be attributed to primary care team implementation may be questioned. Since the healthcare environment is far from static, other changes may have contributed to differences seen in selected outcomes measures.

Review of the valid, reliable measures identified in this project could be continued/expanded to measure success or lack thereof for other new programs, in addition to ongoing review of primary care. Results could be applied to VAMCs of similar size and scope, and the study could be replicated at other size and scope institutions for comparison/applicability. Replication of this study at an institution of similar scope, but lacking primary care teams, would lead to more definite conclusions.

A Comparative Evaluation of Structure, Process, and Outcomes
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Introduction

In recent years our nation's healthcare system has undergone a major transition, shifting from a focus of "ill care" to one of "well care". Spending for healthcare has risen at a rate far exceeding that attributable to inflation. Economic constraints on healthcare spending have ensued. System-wide changes in healthcare delivery are a result of both the shift in focus of care and the economic/political climate.

Effectiveness in healthcare provision is dependent upon wise stewardship of scarce healthcare resources. The administrator faces the challenge of acting business-like in order to maintain fiscal solvency, while never losing sight of the patient as the central mission focus. Clinicians and administrators may find themselves at loggerheads when trying to balance the iron triangle of cost, quality, and access.

The Department of Veterans Affairs (DVA) is faced with the major challenge of converting the nation's largest integrated health system from one focused on "ill care" to one focused on "well care". As healthcare's focus changes to one of wellness, the DVA is finding that current distribution of staffing and facilities frequently does not match the needs of the demographically changed population. Turf protectionism and political special interests make change difficult in the federal system. Against these odds, the DVA has undergone unprecedented change, reinventing itself to meet the changing needs of the population it serves.

When changes are made in structure and process elements of healthcare delivery, a system of measurement must be developed to demonstrate that outcomes have not been negatively impacted by these changes.

Conditions which Prompted the Study

Although the concept of each patient being assigned to one primary care provider (PCP) has been in place at the Cheyenne Veterans Affairs Medical Center (VAMC) for some time, inclusion of ancillary staff to complete a comprehensive primary care team has only recently been implemented (November 30, 1998). The primary care teams are multidisciplinary, including designated pharmacists, social workers, licensed practical nurses, and administrative support personnel, in addition to registered nurse case managers and primary care providers.

Data that may allow comparison of structure, process, and outcomes before and after the implementation of primary care teams are available through Decision Support Service (DSS), Director's Performance Measures, cost and staffing analyses, various ad hoc reports, and customer satisfaction surveys.

Statement of the Problem or Question

Extensive changes have been made in ambulatory care structure and process. It is important to define those changes, and to attempt to measure their impact on cost, access, and quality.

Literature Review

Structure, Process, Outcomes

In 1980, Avedis Donabedian identified and defined structure, process, and outcome as the three categories of variables within quality assessment (Hill, 1997). More recently, this time-honored structure-process-outcome framework has been incorporated into a dynamic model, recognizing feedback among clients, the system in which care is provided, and interventions (Mitchell et al, 1998).

Paul Ellwood, M.D., in his famous 1988 Shattuck Lecture, acknowledged that managed care has democratized the healthcare system. At the same time, he expressed his concern about the lack of a consistent methodology designed to measure effects of the choices made by patients, payors, and physicians. Dr. Ellwood proposed systematic outcomes management as a means to bring quality and order to the nation's chaotic healthcare system (Ellwood, 1988).

Early quality improvement (QI) efforts were focused predominantly on improving structure and process, assuming that improved outcomes would follow. As the healthcare world has evolved, QI has adapted. In the current competitive climate, outcomes are being used to compare multiple aspects of healthcare. Although it is clear that outcomes measurement is important, controversy exists with regard to selection of outcomes measures. The challenge is to select outcomes that are comprehensive, comparable, and meaningful (Kleinpell, 1997).

Concerns

There is demand for improved outcomes across the healthcare continuum. Clinicians and administrators want to have data quickly, but some program objectives cannot be measured in the short term. Events such as mortality may be too rare to track. Risk factors have been used as surrogate measures of mortality, and preventative health measures often serve as surrogate measures of population health. The pressure to demonstrate accountability through outcomes has led to development of a broad range of measurement initiatives (DeWolf & Giloth, 1998).

Confusion exists regarding the distinction between health outcomes and performance measures. Health outcomes measures are indicators of population health and have been defined as crude rates of adverse events within a population. Performance indicators, on the other hand, are specific to those aspects of care that can be altered by the staff whose performance is being monitored (Giuffrida, Gravelle, & Roland, 1999).

Performance measures have become key assessment factors reviewed by third party payors in the managed care environment. Interest in measuring outcomes has grown out of fears that performance measures emphasize cost containment without measuring quality. The routine assessment of outcomes is essential to demonstrate and ensure the quality of care provided (Reemtsma & Morgan, 1997).

The outcomes momentum of late has led to neglect of the use of process measures to assess the quality of care. Process

measures are amenable to direct measurement, are readily interpreted, and can identify deficiencies in care processes that need to be remedied. The disadvantage to using process measures is that there is often a lack of evidence linking processes of care to desired outcomes. Quality assessment must take a balanced approach, relying on measurement of both processes and outcomes (Crombie & Davies, 1998).

Outcomes measurement routinely relies on retrospective analysis of administrative databases. The usefulness of any data is limited by its quality and completeness. Adequate assessment of many aspects of care may not be possible with currently available data (Ray, 1997). It has been recommended that disease-specific, patient care-centered outcomes measures be included in administrative databases. However, the logistics of implementing this recommendation are formidable, and the benefits to patient care are questionable (Liang, & Shadick, 1997).

Data, in order to be useful, must be transformed into information. A decision support system can be a useful tool in this endeavor. Such a system goes beyond performance measurement in that it can help to identify causes of care process problems, potentiating improved outcomes (Brailer et al, 1996).

A study was undertaken in 1996 to validate the DVA's decision support system data. Study results showed a high correlation between the numbers of hospital stays reported in the patient treatment file and the data. Aggregate cost data were compared with Medicare relative resource weights for all

discharged patients in given diagnosis related groups (DRGs). A high correlation coefficient (0.853) was calculated. The majority of ambulatory care encounters reported in the ambulatory care database were also reported in the decision support system at all sites studied, but statistical power of the correlation varied. The authors concluded that the decision support system has great promise, but that its validity hinges on the accuracy of utilization data, which may currently be incompletely recorded. Problems were also noted with access to data and with the ability to distinguish long-term from acute hospital care (Barnett & Rodgers, 1999).

Primary Care/Case Management

The Institute of Medicine defines primary care as "the provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community" (National Academy of Sciences, 1999).

A nurse case manager is ordinarily a key member of an interdisciplinary primary care team. The nurse-coordinated case management model of care delivery is intended to promote accountability and cost-effectiveness. A study of nurse case-managed patients showed a 72% reduction in acute and skilled inpatient bed days of care and significant cost savings (Ford, 1999).

The pharmacist's role in primary care often includes monitoring of therapeutic outcomes in addition to provision of medication-related counseling to patients. Pharmacists can provide medical triage through appropriate patient referral upon detection of drug and disease-related adverse events. In a study of a program designed to ensure a consistent approach to diabetes management and education, health outcomes of older patients with diabetes were improved by pharmacist-conducted counseling. Involvement as counselors enabled pharmacists to detect progressing adverse events and intervene, averting more severe sequelae (Baran et al., 1999).

A 1995 study compared outcomes and costs of care for acute low back pain among patients seen by primary care practitioners, chiropractors, and orthopedic surgeons. Clinical outcomes did not differ significantly among the three groups. However, patient satisfaction was significantly higher among those cared for by chiropractors, and costs of care were lowest for patients of primary care practitioners (Carey et al, 1995).

Studies have indicated that income disparity is positively correlated with health disparity. However, access to primary care services reduces the adverse impact of poverty on health outcomes (Starfield, 1999). This is particularly germane to the DVA, as those who use the DVA healthcare system report lower average annual incomes and poorer health status than the general population (Topping & Ginter, 1998).

In a two-year clinical trial at the VAMC in Memphis, TN, 128 veterans were randomized to receive either interdisciplinary

primary care Geriatric Evaluation and Management or usual care. Outcome measures included health status, function, quality of life, and mortality. Researchers concluded that a comprehensive interdisciplinary approach to primary care may significantly improve outcomes for targeted older adults, and that these outcomes may continue to improve over time (Burns, Nicolas, Martindale-Adams, & Graney, 2000).

However, quite different conclusions were reached by researchers at the VAMC, Durham, NC, who conducted a multi-site randomized, controlled trial of enhanced access to primary care for patients with congestive heart failure. In this trial, enhanced access to primary care did not improve patients' self-reported health status, and was associated with more frequent hospitalizations (Oddone, Weinberger, Giobbie-Hurder, Landsman, & Henderson, 1999).

Selection of Outcomes Measures

Outcomes categories recommended for review include clinical and functional outcomes, charges, cost and effectiveness data, and complications of treatment, as well as health related quality of life and patient satisfaction (Reemtsma & Morgan, 1997). A more broad classification delineates three categories of outcomes analysis: clinical, humanistic, and economic (Generali, 1999).

A time-related concept of outcomes measurement has been suggested as potentially more applicable and acceptable to providers and patients in a primary care setting. The three

proposed time classifications and some recommended outcomes measures associated with each include: short-term/patient satisfaction; intermediate/compliance; and long-term/symptom resolution, health status, and quality of life (Stott, Kinnersley & Elwyn, 1997).

Health-adjusted life expectancy has been proposed as an aggregate outcome measure. A long-term strategy to increase health-adjusted life expectancy would include development of an operational definition of population health and alignment of financial incentives with the goal of population health improvement (Kindig, 1998).

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has copyrighted a Clinical Value Compass Worksheet. The compass has four cardinal points, corresponding to four categories of outcomes: (1) functional status, risk status, and well being; (2) costs; (3) satisfaction with healthcare and perceived benefit; and (4) clinical outcomes. Employing the Clinical Value Compass approach for improving the value of healthcare services includes measuring the value of care provided to similar patient populations, analyzing care delivery processes, testing of changed delivery processes, and determining whether changes led to better outcomes and/or lower costs (Nelson et al, 1996). Figure one displays the JCAHO Clinical Value Compass.

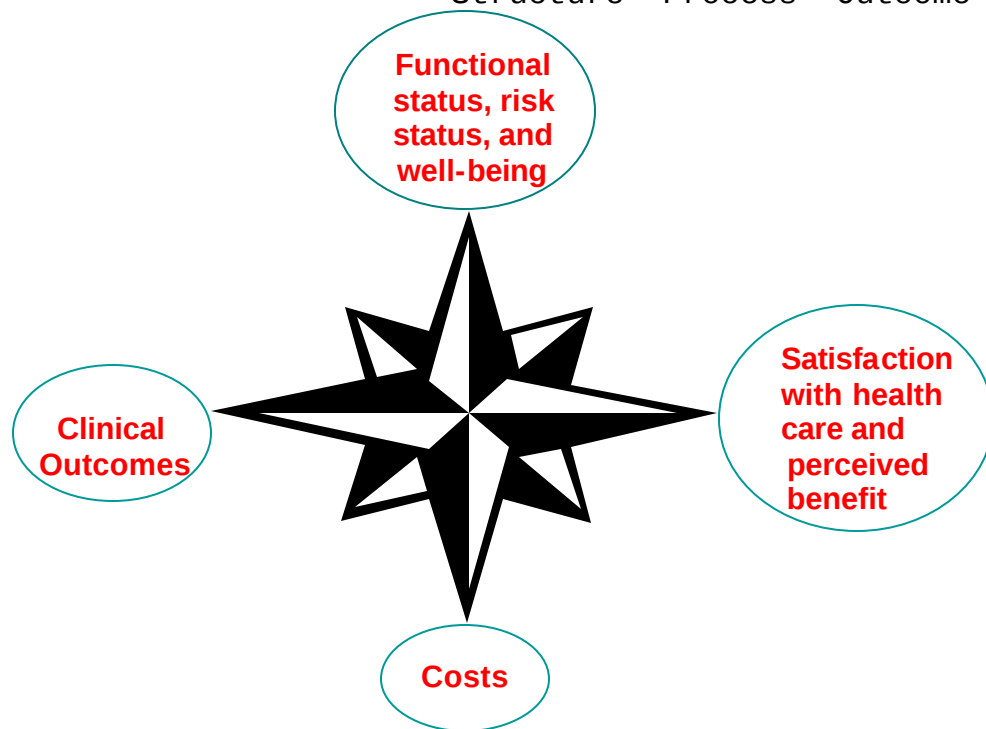


Figure 1. JCAHO Clinical Value Compass

Some of the variables routinely cited in the literature as potential indicators of healthcare outcomes include:

- Percentage of patients seen by designated primary care provider
- Length of stay
- Total discharges per patient population
- Unscheduled admissions
- ICU admissions
- Re-admission within x days of discharge
- Total ambulatory visits per patient
- Unscheduled ambulatory or emergency room visits
- Patient satisfaction/perception of health status
- Length of office visit

- Staff satisfaction
- Number of patients seen per unit of time or per number of full time employee equivalents assigned
- Cost of care--total and its components
- Percentages of target populations immunized
- Inhaler teaching documentation
- Waiting time--for appointments and at appointments
- Blood pressure control
- Hyperlipidemia--percentage with cholesterol check
- Rates of Pap smear, mammogram, sigmoidoscopy and fecal occult blood testing
- Counseling--nutrition/alcohol/tobacco
- Specialty consults
- Mortality--risk-adjusted death rates from stroke, myocardial infarction, diabetes, suicide, flu or pneumonia
- Morbidity
- Preventable adverse drug reaction rate
- Admissions for asthma/diabetes (preventable by aggressive management)
- Wound infection rates
- Telephone access/on-hold time/interruptions to providers or team members
- Appointment cancellations--patient-generated vs. clinic-generated vs. no-shows

Locally Available Data

The DVA employs numerous data collection tools on a national level to monitor and improve performance and outcomes. The validity and reliability of these tools is monitored at the national level. National customer satisfaction surveys, a DVA-specific modification of the SF-36 Health Survey, and the Network Directors' Performance Measures are among national quality initiatives. Workload, staffing, and cost data are also collected and reported throughout the system.

The customer satisfaction survey is administered annually. The validity and reliability of this survey instrument are ensured on a national basis. It is a standardized multiple-choice questionnaire designed to permit analysis of trends over time and comparison with DVA and external benchmarks. The external benchmarking tool used is a database compiled by the non-profit Picker Institute for Patient-Centered Care, which surveys academic medical facilities, using the same survey approach and questionnaire used by the DVA (Office of Performance and Quality, 1999). Risk-adjustment for age, sex, and health status ensures validity of scores for comparison. The multiple-choice questions included in the customer satisfaction survey represent the DVA's Customer Service Standards. Questions are grouped into domains of background, demographics, overall satisfaction, access, courtesy, patient education/information, preferences, emotional support, continuity of care, overall coordination of care, visit coordination of care, specialist provider access, and pharmacy access.

The SF-36 is a 36-item general health status assessment questionnaire developed as part of the Rand Corporation's Medical Outcomes Study (UCSD HOAP, 1999). Its reliability and validity have been substantiated. The Veterans SF-36 is an adaptation of the SF-36 designed specifically for use with veterans (Kazis et al, 1999). Data collected with the Veterans SF-36 are reported as the Preventative Disease Index, Chronic Disease Index, and Palliative Index components of the Network Directors' Performance Goals.

The National Performance Management Workgroup develops the Network Director's Performance Measures, with analyses by the Office of Performance and Quality. These performance measures have been designed to describe and measure the Network Directors' mastery of executive core competencies, utilization of a comprehensive framework for assurance of quality health care, and ability to deliver healthcare value, as well as performance in areas of organizational special emphasis.

An Executive Statistical Report is prepared at the Cheyenne VAMC on a monthly basis, detailing workload and revenue. It includes a host of nationally and locally generated data including, but not limited to: numbers of inpatients treated; discharges; deaths; outpatient visits; and total unique, i.e. individual, patients treated. The source of data for this report is VISTA (Veterans Health Administration Information Systems Technology Architecture).

Fiscal service tracks and trends total station operating costs and the components that contribute to that total. Major

contributors to total cost include salaries of employees, pharmacy, prosthetics, utilities, and laboratory.

Purpose (Variables/Working Hypothesis)

The purpose of this project is twofold: to assess whether sufficient reliable and valid data exist upon which to base a comparison of outcomes before and after the implementation of primary care teams; and if so, to make such a comparison.

First Null Hypothesis: Reliable and valid data are readily available for comparison of outcomes pre- and post-primary care team implementation.

First Alternate Hypothesis: Reliable and valid data are not readily available for comparison of outcomes pre- and post-primary care team implementation.

Second Null Hypothesis: Structure and process changes resulting from primary care team implementation have not significantly impacted outcomes.

Second Alternate Hypothesis: Structure and process changes resulting from primary care team implementation have significantly impacted outcomes.

Methods and Procedures

Three methods have been employed in outcomes research, including prospective, observational studies in natural clinical settings; para-analyses of information from databases; and meta-analysis, or literature review (Generali, 1999).

A para-analysis following the JCAHO Clinical Value Compass approach was chosen to assess whether the implementation of primary care teams added value to the healthcare provided by the Cheyenne VAMC.

A measurement tool should be evaluated using three major criteria: validity, reliability, and practicality. Validity refers to the extent to which a test measures what the researcher sets out to measure. It may be determined by a review panel. Reliability refers to the accuracy of the measuring procedure. Practicality refers to convenience, economy, and interpretability (Cooper & Schindler, 1998).

Potential outcomes measurements were identified via review of the literature. A panel of persons involved in the local collection and interpretation of data reviewed the list of identified measurements. As the list was extensive, the panel was asked to assist in determining which measures were readily available and interpretable. Panel review has insured that only valid and practical measures were selected.

Further refinements reduced the selected measures to a manageable number, in alignment with the Clinical Value Compass and representing each of its four cardinal outcomes categories. Table one summarizes the measures chosen for each category.

Table 1

JCAHO Clinical Values Compass-Outcomes Selection

O u t c o m e s M e a s u r e s	Cardinal Points			
	Functional Status	Costs	Satisfaction	Clinical Outcomes
	Ambulatory Procedures	Total Station Cost/Patient	Continuity of Care	OP Visits/ Patient Treated
	Preventative Disease Index	Pharmacy Cost/ Patient	Coordination of Care	Pt Days of Care/ Patient Treated
	Chronic Disease Index		Courtesy	Inpatients Treated/ Patient
			Education	Patient Death Rate
			Emotional Support	
			Preferences	
			Timeliness/ Access	
			Customer Service Standards-- Average	

Note. Cardinal points correspond to four categories of outcomes.

The time period covering FY-96 through FY-00 was selected for data analysis. Since primary care team implementation occurred during the first quarter of FY-99, data from FY-99 through FY-00 were determined to best represent the post-implementation timeframe. FY-96 through FY-98 was selected as the pre-implementation control period. Paired t-tests were used to measure significance of differences, and the 95% confidence interval was chosen as appropriate ($p < .05$).

Data were extracted from customer satisfaction survey results, Network Directors' Performance Measures, fiscal reports, and statistical summaries for the pre- and post-primary care team implementation timeframes. Data analysis compared outcomes measures in an attempt to determine whether the change to primary care teams led to changed outcomes.

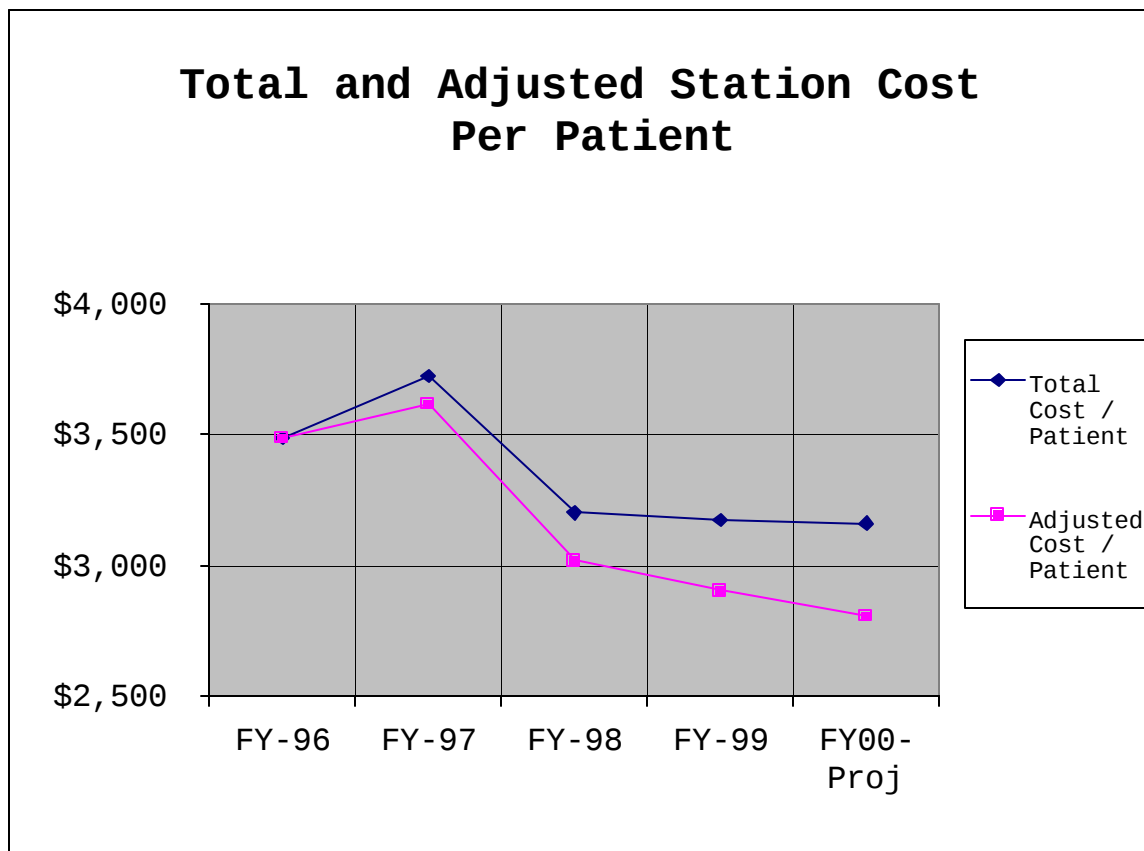
Results

Total station cost per patient was lower during the post-implementation timeframe than during the pre-implementation timeframe. The difference was statistically significant when adjusted for inflation based on the consumer price index (CPI). Table two provides this information, which is graphically illustrated in figure two.

Table 2

Total Station Cost per Patient

	FY-96	FY-97	FY-98	FY-99	FY00-Proj	p
Total Cost / Patient	\$ 3,487	\$ 3,725	\$ 3,204	\$ 3,175	\$ 3,161	0.0903
Adjusted Cost / Patient	\$ 3,487	\$ 3,617	\$ 3,020	\$ 2,906	\$ 2,808	0.0478

**Figure 2.** Total Station Cost per Patient

Pharmacy cost per patient increased post-implementation of primary care, as shown in table three and figure three. However, the increased cost was not statistically significant when adjusted for inflation based on the CPI.

Table 3

Pharmacy Cost per Patient

	FY-96	FY-97	FY-98	FY-99	FY00-Proj	p
Pharmacy Cost/ Patient	\$ 233	\$ 362	\$ 387	\$ 475	\$ 486	0.0414
Adjusted Cost/ Patient	\$ 233	\$ 352	\$ 365	\$ 434	\$ 432	0.0541

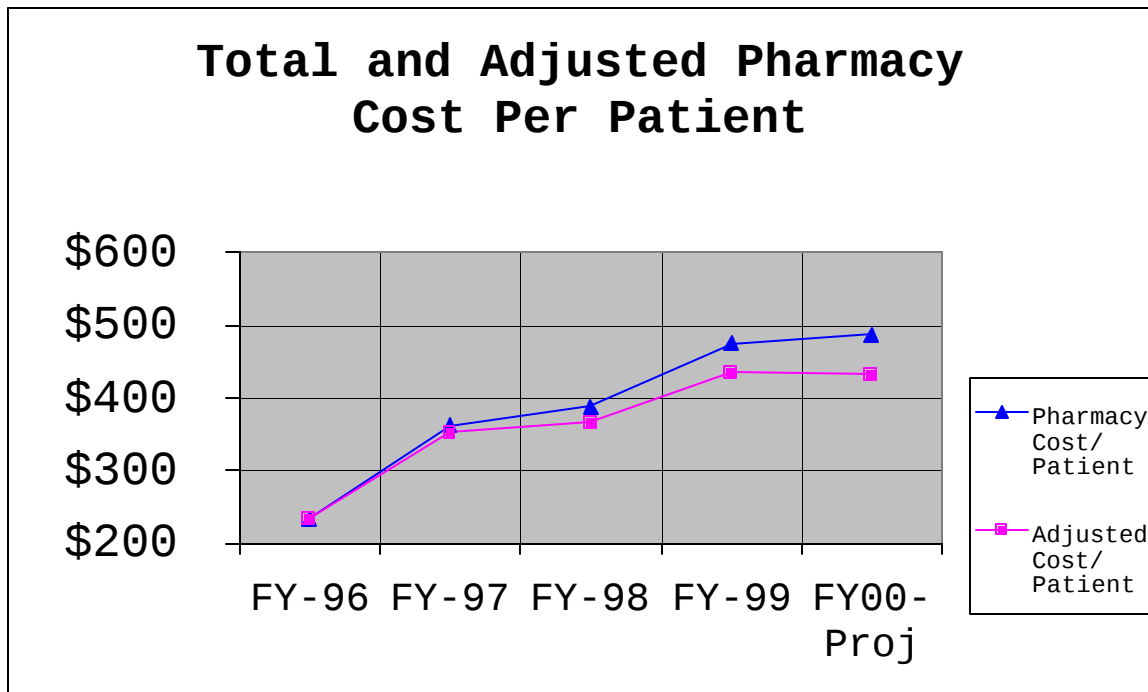


Figure 3. Pharmacy Cost per Patient

Customer satisfaction results were mixed, as shown in table four and figure four. It should be noted, for interpretation of these figures and tables, that a lower number indicates a more desirable outcome. Values shown are percentages of customers reporting problems in each domain of satisfaction. Emotional support, continuity, education, and preference were essentially unchanged. Courtesy, timeliness/access, and overall customer satisfaction survey average showed trends indicating improvement, but the changes were not statistically significant. Improved coordination of care was the only change of a statistically significant magnitude.

Table 4

Customer Satisfaction Survey Results

	FY-96	FY-97	FY-98	FY-99	p
Continuity	30.00%	19.00%	32.20%	28.24%	0.4004
Coordination of Care	33.00%	29.00%	19.00%	12.00%	0.0346
Courtesy	15.00%	7.00%	8.90%	7.27%	0.1680
Education	27.00%	23.00%	28.70%	24.74%	0.2350
Emotional Support	18.00%	13.00%	18.60%	12.51%	0.0758
Preferences	18.00%	17.00%	23.80%	18.55%	0.3347
Timeliness/ Access	19.00%	12.00%	10.80%	8.94%	0.0950
Customer Service Standards-- Average	22.86%	17.14%	20.29%	16.04%	0.0667

Note. Lower number is desirable

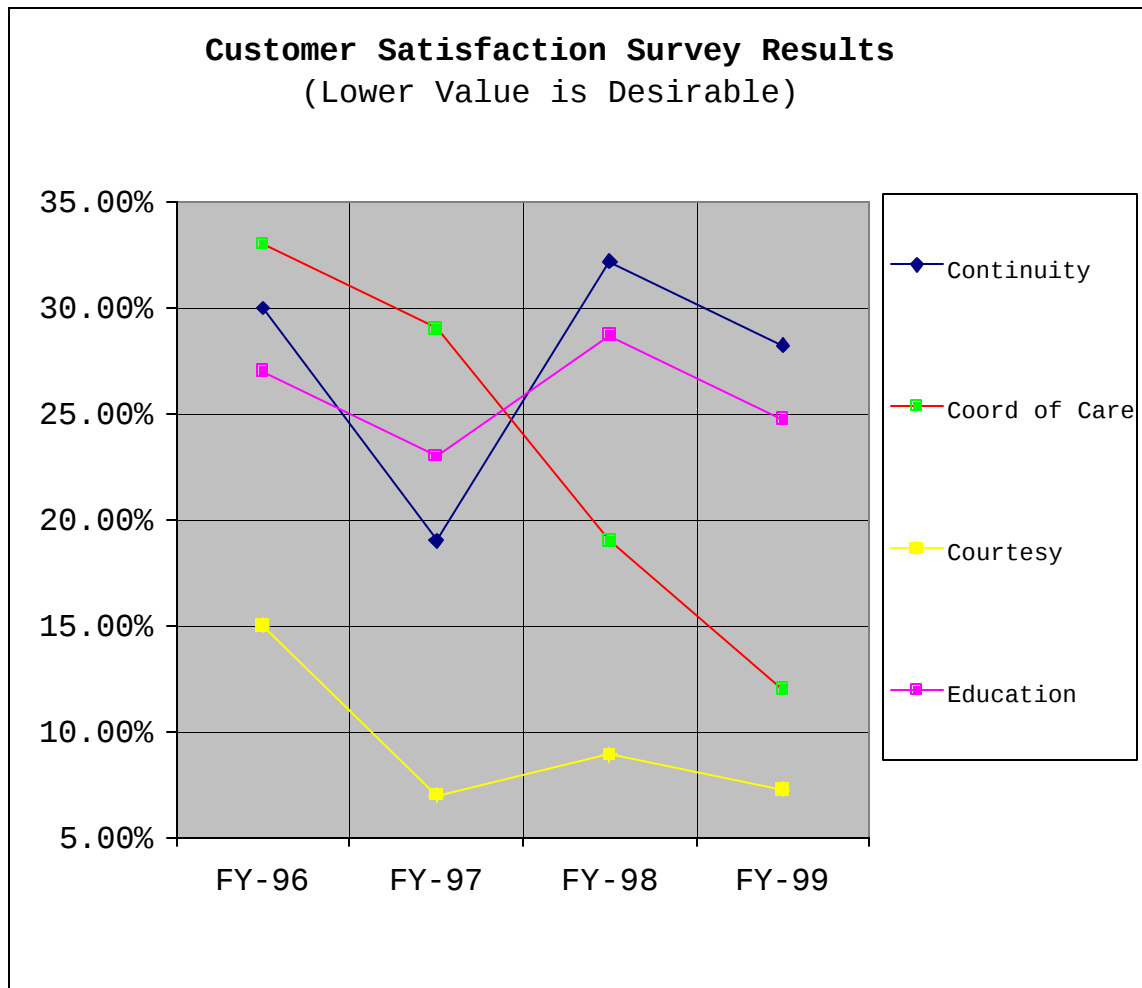


Figure 4 a. Customer Satisfaction Survey Results

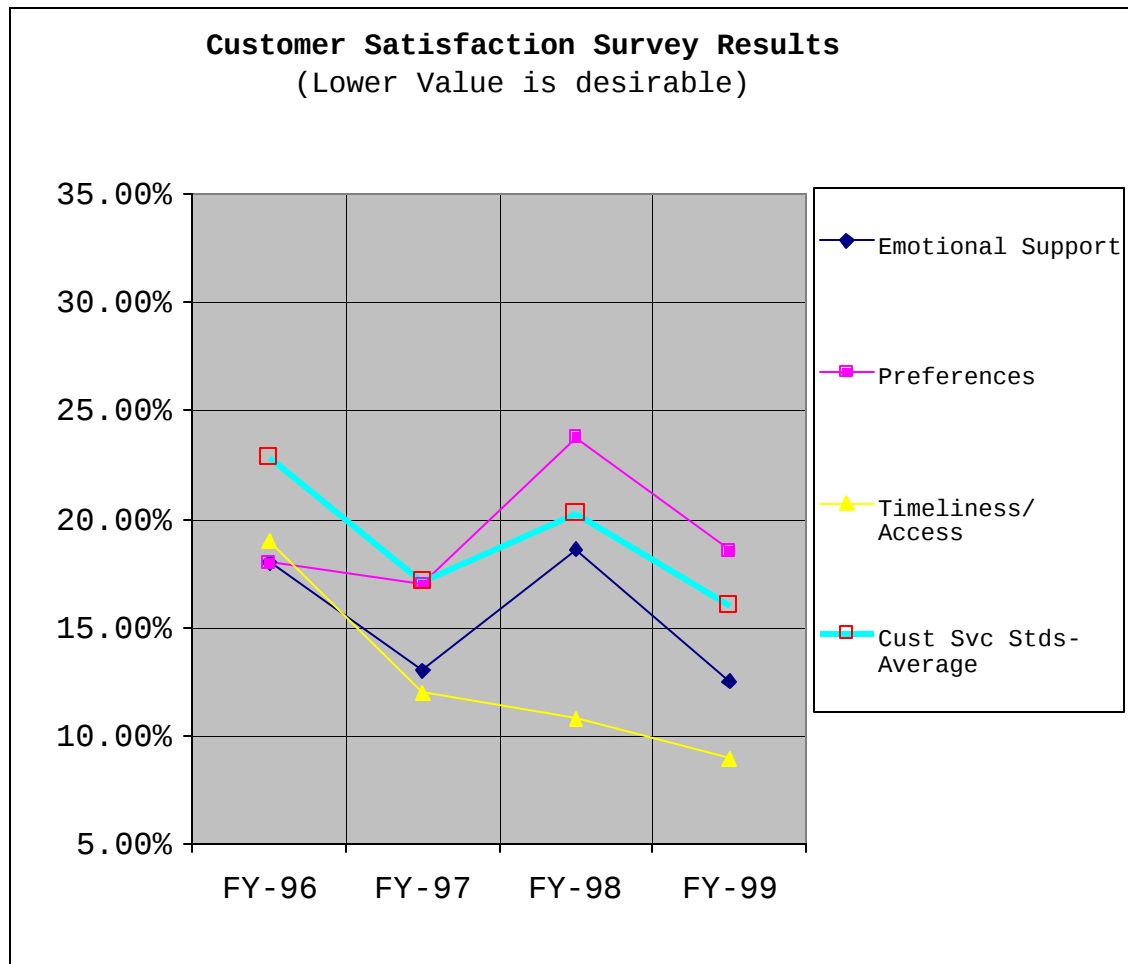


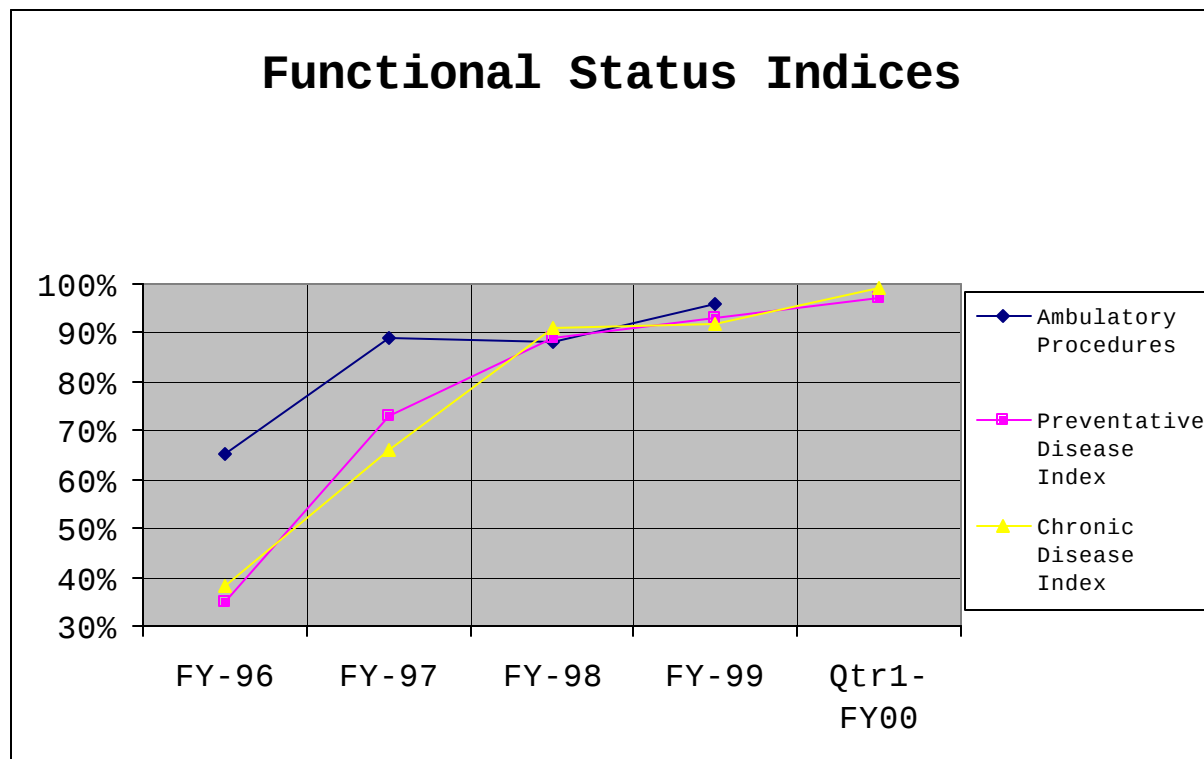
Figure 4 b. Customer Satisfaction Survey Results

Functional status measures improved post-implementation of primary care, as displayed in table five and figure five. However, none of the changes were statistically significant.

Table 5

Functional Status Indices

	FY-96	FY-97	FY-98	FY-99	Qtr1- FY00	p
Ambulatory Procedures	65%	89%	88%	96%		0.0948
Preventative Disease Index	35%	73%	89%	93%	97%	0.1035
Chronic Disease Index	38%	66%	91%	92%	99%	0.0899

**Figure 5. Functional Status Indices**

Clinical outcomes also showed a trend indicating improvement coincident with primary care implementation. Tables six through nine and figures six through nine illustrate clinical outcomes measures. Although there was a statistically

significant increase in outpatient visits per patient, the number and length of hospitalizations and the number of deaths per 1000 patients treated all decreased to a somewhat less than statistically significant magnitude.

Table 6

Outpatient Visits per Patient Treated

	FY-96	FY-97	FY-98	FY-99	FY-00 Proj	p
OP Visits/ Patient Treated	7.84	8.19	8.16	8.91	9.00	0.0045
Total Patients Treated	6,589	6,653	8,002	9,116	10,000	
Total OP Visits	51,651	54,491	65,290	81,262	90,000	

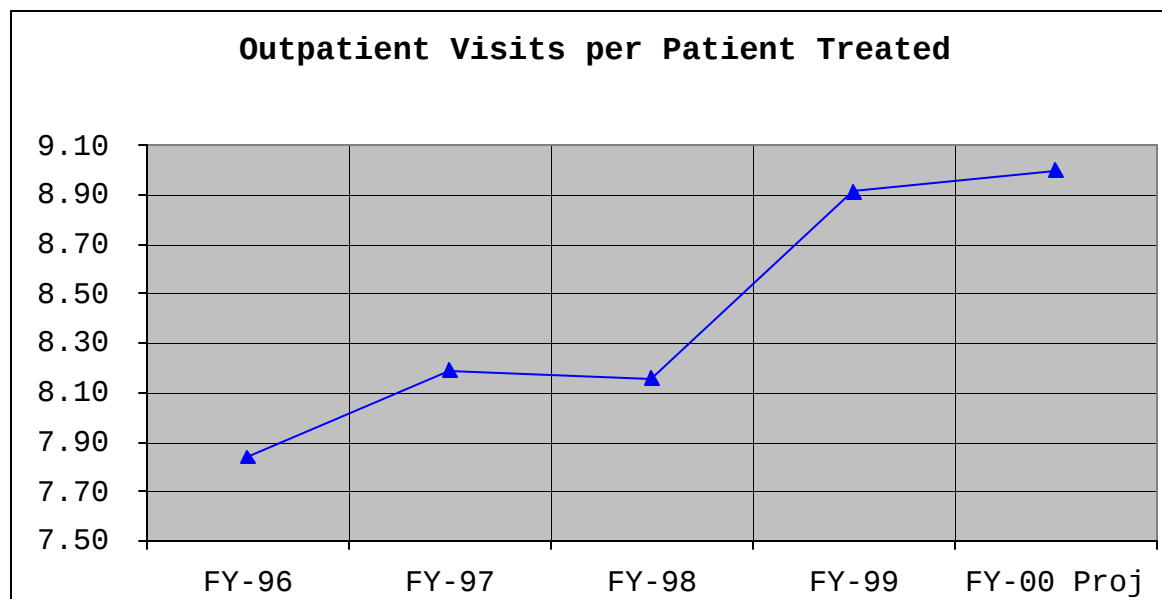


Figure 6. Outpatient Visits per Patient Treated

Table 7

Patient Days of Care per Patient Treated

	FY-96	FY-97	FY-98	FY-99	FY-00 Proj	p
PDOC/Patient Treated	1.65	0.90	0.67	0.59	0.49	0.1041
Total Patients Treated	6,589	6,653	8,002	9,116	10,000	
Total PDOC	10,892	6,009	5,371	5,342	4,884	

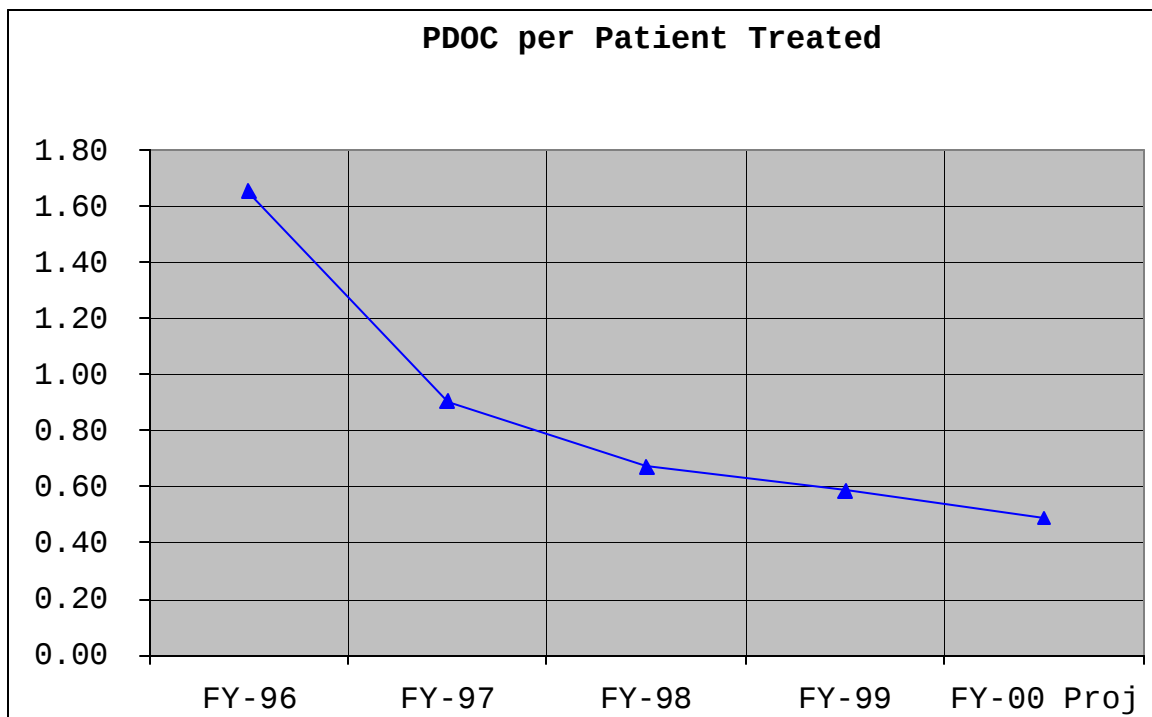
**Figure 7.** Patient Days of Care per Patient Treated

Table 8

Inpatients treated per Patient

	FY-96	FY-97	FY-98	FY-99	FY-00 Proj	p
Inpatients Treated /Patient	0.23	0.13	0.11	0.10	0.10	0.1304
Total Patients Treated	6,589	6,653	8,002	9,116	10,000	
Inpatients Treated	1,513	885	906	923	1,044	

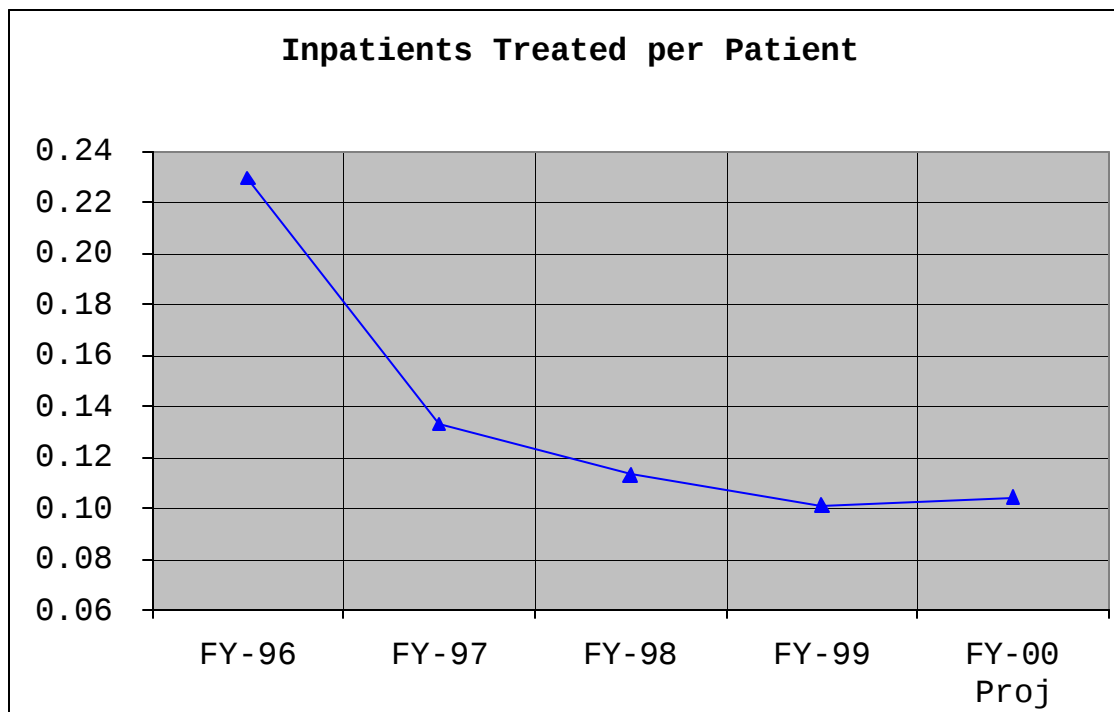
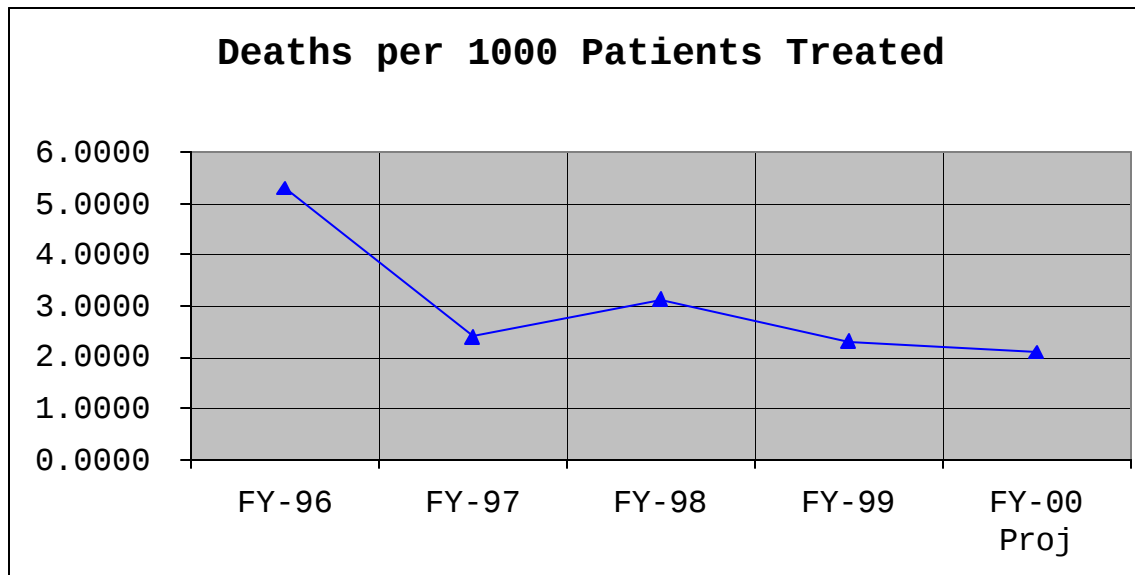
**Figure 8.** Inpatients Treated per Patient

Table 9

Patient Death Rate

	FY-96	FY-97	FY-98	FY-99	FY-00 Proj	p
Deaths/ 1000 Patients Treated	5.3119	2.4049	3.1242	2.3036	2.1000	0.1233
Patients Treated	6,589	6,653	8,002	9,116	10,000	
Total Deaths	35	16	25	21	21	

**Figure 9.** Patient Death Rate

Discussion

For the JCAHO Clinical Value Compass cardinal point corresponding to cost, total station cost per patient treated was selected as the most meaningful indicator of direct healthcare costs. Indirect costs of care such as patient time lost from work could not be quantified. Total station cost per patient treated, adjusted for inflation, decreased significantly after primary care team implementation. Costs were expressed in terms of 1996 dollars in order to make a valid comparison over time. The CPI was used as an adjustment factor. Health care cost inflation has historically exceeded CPI inflation, but figures on health care inflation were not consistent among sources, and disparity existed between values reported for the private and public sector. Had reliable healthcare inflation rate information been available for use, the decrease in costs would probably appear more highly significant than the values presented.

To demonstrate that cost changes in a given area are not always directly related to change in total station cost, pharmacy cost was included in this study. The pharmacy cost per patient treated increased, but the increase was not statistically significant when adjusted for inflation. The increase in pharmacy cost coupled with decreased total station cost per patient treated lends credence to the concept that intensive appropriate pharmaceutical intervention can save healthcare funds by keeping patients out of the hospital.

The cardinal compass point of satisfaction was readily reviewable based on annual customer satisfaction survey results. Seven domains of satisfaction have been consistently surveyed throughout the FY96-00 timeframe. These include continuity of care, coordination of care, courtesy, education, emotional support, preferences, and timeliness/access. An average of these seven measures was calculated to show trends from a more global perspective. Coordination of care was significantly improved after primary care team implementation, and all other survey results were either unchanged or improved, but not to a statistically significant degree.

One would expect continuity of care to be higher with primary care than without. However, it remained essentially unchanged when pre- and post-implementation timeframes were compared. Subject matter experts at the medical center indicated that continuity of care decreased in FY-98 due to "growing pains" associated with the opening of community-based outpatient clinics in northern Colorado. Shifting of permanent staff to the additional clinics was a slow process. Now that permanent staff is in place, continuity of care scores are dropping, indicating increased customer satisfaction with this aspect of care.

Functional status measures consistently available for the study timeframe included the SF-36 based Preventive Disease Index and Chronic Disease Index, and the percentage of procedures done in the ambulatory care setting. Trends toward improvement were evident for each measure, but did not reach statistically significant levels.

Change in the traditional clinical outcomes of morbidity and mortality are difficult to measure in the short-term. Therefore, surrogate measures of morbidity were used in this study. Outpatient visits per patient treated increased significantly post-implementation, which may be indicative of either an increase in morbidity or newly increased emphasis on preventative healthcare. Decreased utilization of inpatient hospital care may indicate decreased morbidity. This is also a desirable trend from a resource management point of view, as it represents a shift from more resource-intensive/expensive inpatient care to less expensive, less intensive care delivered in the outpatient setting. Due to this shift in care delivery, the Cheyenne VAMC has been able to treat an appreciably greater number of patients without hiring additional staff, as illustrated by Appendix B.

Deaths per 1000 patients treated also decreased pre- to post-primary care team implementation. However, it should be noted that this figure includes only deaths that occurred in the VAMC, so is not a true measure of total population mortality. This indicator should be viewed with this understanding.

Conclusion and Recommendations

Reliable, valid outcomes measures were identified among currently collected information. Outcomes in all four of the cardinal points of the Clinical Value Compass were improved or unchanged. An association was demonstrated between outcomes

changes and primary care team implementation. However, the validity of this association may be questioned. According to the concept of maturation, changes within a population studied may be attributable to passage of time rather than to a specific change. This can be a threat to experimental validity (Cooper & Schindler, 1998). Since the healthcare environment is far from static, other changes such as improved technology may be considered as confounding variables in this study, and multiple variables may have contributed to changes in selected outcomes measures.

The first null hypothesis, that reliable and valid data are readily available for comparison of outcomes pre- and post-primary care team implementation, was not rejected. The first alternate hypothesis, that reliable and valid data are not readily available for comparison of outcomes pre- and post-primary care team implementation, was rejected. Reliable and valid data were identified upon which to base outcomes comparisons. A decision to reject or fail to reject was not reached for either the second null hypothesis (structure and process changes resulting from primary care team implementation have not significantly impacted outcomes) or the second alternate hypothesis (structure and process changes resulting from primary care team implementation have significantly impacted outcomes). A positive association has been identified between outcomes and primary care team implementation, but attributing the changed outcomes to primary care team implementation cannot be done with any degree of certainty.

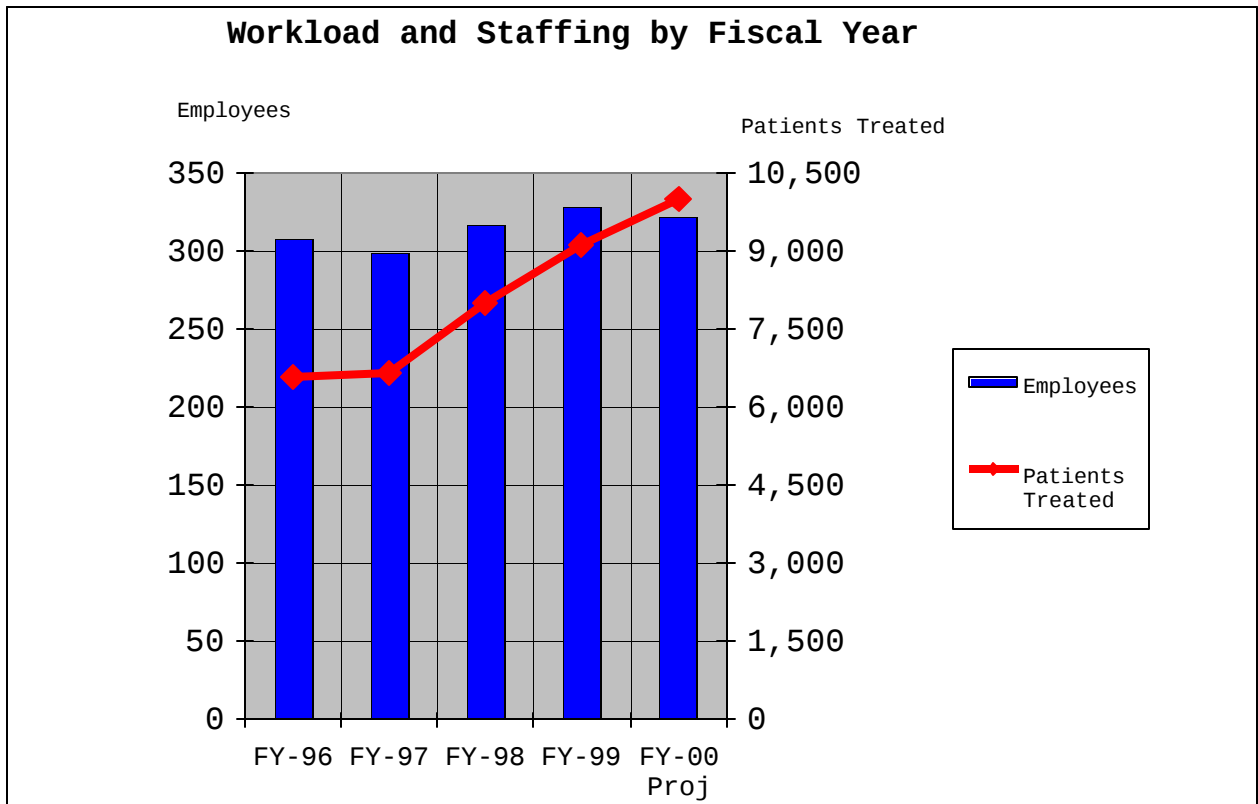
Review of the valid, reliable measures identified in this project could be continued/updated to measure success or lack thereof for other new programs, in addition to ongoing review of primary care. Results could be applied to VAMCs of similar size and scope, and the study could be replicated at other size and scope institutions for comparison/applicability. If the study were replicated at an institution of similar size and scope, but lacking primary care teams, perhaps a comparison would lead to more definitive conclusions.

Appendix A

Definitions of Acronyms and Terms

CBOC	Community-Based Outpatient Clinic
CDI	Chronic Disease Index
CHF	Congestive Heart Failure
CPI	Consumer Price Index
CSS	Customer Satisfaction Survey
DRG	Diagnosis Related Group
DSS	Decision Support Service/System
DVA	Department of Veterans Affairs
FTEE	Full Time Employee Equivalent
FY	Fiscal Year (DVA's is October 1- September 30)
GEM	Geriatric Evaluation and Management
HALE	Health-adjusted Life Expectancy
HRQOL	Health Related Quality of Life
JCAHO	Joint Commission on Accreditation of Healthcare Organizations
OP	Outpatient
Outcomes measures	Indicators of population health
PCP	Primary Care Provider
PDOC	Patient Days of Care
PDI	Preventative Disease Index
QI	Quality Improvement
SF-36	Short Form 36, Rand Corporation's 36-item general health status assessment questionnaire

Unique Patient	Individual patient being treated at the medical center during a given fiscal year
VAMC	Veterans Affairs Medical Center
VISTA	Veterans Health Administration Information Systems Technology

Appendix B

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