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Evaluation of the CHAMPUS Reform Initiative

Volume 3, Health Care Utilization and Costs

Susan D. Hosek, Dana P. Goldman, Lloyd S. Dixon, Elizabeth M. Sloss

National Defense Research Institute

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PREFACE

In an attempt to improve health care delivery and contain cost growth, the Department of Defense (DoD) in 1987 proposed the CHAMPUS Reform Initiative (CRI). In February 1988, DoD awarded a contract to Foundation Health Corporation to conduct a CRI demonstration program in California and Hawaii. In authorizing this demonstration program, Congress mandated an independent evaluation of CRI, which RAND was asked to perform. This report presents final estimates from the evaluation of the effects of CRI on beneficiaries' sources of health care, their utilization of outpatient and inpatient services from these sources, and the costs of that care.

This is the third volume in a series of reports from the CRI evaluation. The other reports will include:

- Volume 1, Executive Summary,
- Volume 2, Beneficiary Access to Care and Satisfaction,
- Volume 4, Patterns of Medical, Surgical, and Obstetric Care,
- Volume 5, Patterns of Mental Health Care,
- Volume 6, Implementation and Operations.

The CRI evaluation project was conducted for the Assistant Secretary of Defense (Health Affairs) by RAND's Health Sciences Program and Defense Manpower Research Center; the latter is part of the National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense and the Joint Staff.

SUMMARY

The CHAMPUS Reform Initiative (CRI) demonstration program was implemented in August 1988 to test new approaches for delivering health care to military beneficiaries. CRI introduced a managed care program, operated by a civilian contractor who shared the financial risks of CHAMPUS, and programs to better integrate the management of CHAMPUS and military treatment facilities (MTFs). The goals of CRI were to improve the access to and quality of care provided to beneficiaries while controlling costs.

In authorizing the CRI demonstration project, Congress requested an evaluation of the outcomes. This report is one of a series that documents the results of the evaluation. It includes estimates of the effects of CRI on utilization levels and costs for CHAMPUS beneficiaries. It also explores differences within CRI between beneficiaries who elected to enroll in CHAMPUS Prime, an HMO option offered by CRI, and those who did not enroll.

The evaluation was designed to compare changes in outcomes at 11 catchment sites that implemented CRI with changes in outcomes at 11 matched control areas. To this end, we collected survey and claims data before the demonstration program began and two years later. These data are for a sample of 19,364 adult and 9,152 child beneficiaries, equally divided between the two sets of areas and the two time periods.

We analyzed these data to determine the effects of CRI on utilization and costs, controlling for beneficiary characteristics and any persistent differences between the CRI and control areas. The beneficiary characteristics for which we could control included age, sex, military grade, race, income, employment status, household size, length of time in area, distance from the MTF, and a number of self-reported measures of health status. Since we were interested in differences within CRI between Prime enrollees and nonenrollees, we also explored the factors that affect the decision to enroll. Although we focused on adult beneficiaries because of their larger sample size, we also analyzed the data for children to determine whether their experience in CRI differed. The results of the analyses are as follows:

Cost: For the average adult beneficiary in the 11 CRI areas we studied, we estimate that costs to the government were 9 percent higher with CRI. Compared to the non-CRI program, costs were 57 percent higher for Prime enrollees, whereas they were the same for nonenrollees. Included in the cost estimates are reimbursements for civilian health care services, operating costs for MTF services, and CRI or standard CHAMPUS administrative costs. If we also include payments by beneficiaries and other insurance for services provided through the MHSS, the cost differential disappears. Health care costs (CHAMPUS and MTF) for active-duty spouses were lower, but health care costs for retirees and their spouses were higher in CRI. Most of the increased costs were for outpatient care and for administration of the complex CRI program. The limited data we had for children showed similar CRI patterns, but an overall lower increase in costs of 6 percent. Combining our results for adults and children, we estimate that CRI costs were 8 percent higher than non-CRI costs.

Health Care Utilization: Prime enrollees' use of outpatient care accounted for almost all of the utilization increase in CRI. Active-duty spouses who enrolled did not change their MTF use, but they were more likely to augment their MTF care with civilian care. Retired en-

rollees were more likely to use both MTF care and civilian care. CHAMPUS inpatient utilization was lower in CRI, as is often the case in managed-care programs, whereas use of MTF inpatient services did not change significantly.

Characteristics of Enrollees: The major factors determining whether a beneficiary enrolled in CHAMPUS Prime were geographic area and economic circumstances. Those with low incomes, large households, and no civilian employment were more likely to enroll. Enrollees also tended to come from the group of MTF users, but many then switched to the civilian sector for routine care because they were assigned a civilian primary care physician. We looked for evidence that enrollees were less healthy, but none of the observed health status measures affected enrollment.

These findings suggest that CRI was able to increase access, especially to civilian care, with an accompanying increase in costs. The evidence points to high utilization among Prime enrollees, especially for retired beneficiaries. First-dollar coverage in Prime increased the costs of care that would have been used even without CRI, thereby adding to the amount of care demanded. The cost containment features in CRI, such as utilization review, were not able to counteract the added costs in Prime and the higher administrative overhead for the program.

ACKNOWLEDGMENTS

This report required the efforts of a large number of people at RAND and elsewhere. The survey that provided most of the data we used was conducted under the overall direction of Jennifer Hawes-Dawson. The survey instrument was developed with the assistance of Barbara Simon, and field operations were supervised by Alec Cuddeback. Deborah Wesley edited the survey files and prepared our research files. Sue Polich and Darlene Blake extracted the claims records for the survey respondents so that they could be merged with their survey information, and Sue selected the survey samples. Ellyn Bloomfield extracted data from on-line DoD systems. Carole Oken, the project administrator, assisted us in many ways and was especially helpful as a liaison to our military contacts.

During the course of this project, we received considerable assistance from the staff of the Assistant Secretary of Defense for Health Affairs. We are especially grateful to John Casciotti and Martin Kappert, former and present Deputy Assistant Secretaries of Defense for Health Services Financing, as well as Colonel (Ret.) Fred Vago, Barbara Cooper, Colonel Ronald Hudak, Colonel (Ret.) Paul DeBree, Lieutenant Colonel (Ret.) Kenneth Kurowski, Lieutenant Colonel (Ret.) Denny Clement, Lieutenant Commander Domenic Baldini, and Gunther Zimmerman. Robert Hamilton at the Defense Manpower Data Center provided us with the data we needed to select the survey samples, and Richard Barnett provided CHAMPUS claims records. Others in Health Affairs and in the military services, too numerous to name, helped us to overcome the difficulties of surveying this mobile population and to obtain information needed to supplement the survey data.

The report incorporates the excellent suggestions made by Lieutenant Colonel Tom Daula of the U.S. Military Academy, and our RAND colleagues Glenn Gotz, Karyn Model, Jacob Klerman, Joan Buchanan, Naihua Duan, and Jim Chiesa. Finally, we would like to thank Irene Sanchez for her patience and careful work in preparing the manuscript.

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prior to CRI. Since this report relies on data from the beneficiary survey, we cannot compare

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1. INTRODUCTION

Health care for military beneficiaries—primarily active-duty and retired personnel and their dependents—is provided through a dual system: The Army, Navy, and Air Force operate over 100 hospitals and numerous clinics in the United States. This "direct care" system is augmented by the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), a health insurance program that finances civilian care for active-duty dependents, retirees, and retirees' dependents below the age of 65.[1] Together, the direct care system and CHAMPUS are known as the Military Health Services System (MHSS). Most direct care services are free to the beneficiary, while CHAMPUS generally charges a deductible and copayments of 20 to 25 percent. Of the nine million military beneficiaries, about six million are eligible for CHAMPUS.

In its Cost of Medical Activities Report, the Department of Defense (DoD) estimated that its total health care expenditures were $14.6 billion in fiscal year 1991. This figure includes expenditures for deployable medical equipment, combat training, and other activities not required for peacetime health care delivery. CHAMPUS costs have been rising rapidly in recent years and reached $3.5 billion in fiscal year 1991. Since 1970, the rate of increase in CHAMPUS costs has averaged 12.5 percent, just above the 11.5 percent rate for civilian health care costs. To contain these cost increases and improve beneficiary satisfaction, DoD has been looking for ways to better integrate the military and civilian health care systems and to introduce managed-care programs.

In February 1988, DoD awarded a contract to Foundation Health Corporation (FHC) to conduct a large-scale demonstration of the CHAMPUS Reform Initiative (CRI). CRI was designed to improve beneficiary access to care, improve coordination between military and civilian sources of care, and hold down the rate of cost increases. The CRI demonstration project was initiated in California and Hawaii in August 1988, to run through January 1993.[2] In authorizing the demonstration, Congress mandated an independent evaluation.

This report documents results from the evaluation of health care utilization, and the costs of the care, under CRI. To estimate the effect CRI had on utilization and costs, we compared health care data for a sample of beneficiaries from 11 CRI demonstration areas with data for a similar sample of beneficiaries from 11 matched non-CRI control areas. We measured the differential change under CRI in health care use and costs from the six months immediately preceding CRI—February through July 1988—to the evaluation period—May through October 1990. The analysis used data obtained from beneficiary surveys and CHAMPUS claims records. The cost and utilization measures are

- Government cost for inpatient services, outpatient services, and all services; the cost of all services provided by CHAMPUS; and the cost of all services provided in the military treatment facilities (MTFs).

[1]Active-duty personnel and beneficiaries age 65 or over are not eligible for CHAMPUS. Active-duty personnel receive all of their health care at or through military facilities, and Medicare replaces CHAMPUS at age 65.

[2]The contract has been extended to allow additional time to plan for a successor program.

- Number of outpatient visits in CHAMPUS and the MTFs.
- Number of hospital days in CHAMPUS and the MTFs.

Our estimates of the CRI effect on these measures are adjusted for differences in the beneficiary populations and the health care use between the CRI and control areas at baseline. Within the CRI areas, we also provide separate estimates where possible for those beneficiaries who enrolled in a health maintenance organization (HMO) option offered in CRI and those who did not enroll.

Our evaluation of health care use employs two complementary approaches: (1) analysis of the relative change in health care use under CRI by a *sample* of beneficiaries for whom we have relatively complete and accurate data, and (2) analysis of differential trends in aggregate health care use in the CRI areas. This report documents the results of the first approach, which offers the advantages of a clearly identified group of beneficiaries and exploits the more extensive information collected by survey to control for an extensive list of beneficiary characteristics, including health status. The disadvantage of this approach is the loss of measurement precision from studying a relatively small sample of the total beneficiary population. Despite this fact, however, we are able to identify some strong effects in the CRI program. The second approach is documented in other reports;[3] it provides an accurate measure of total CHAMPUS health care use. It too has shortcomings: we do not have an accurate count of the eligible beneficiaries who generated the use or an accurate measure of MTF outpatient use, and we cannot adjust as well for differences in the beneficiaries' characteristics.

Section 2 of this report provides an overview of the CRI program design. Section 3 summarizes the methods and data we used for this report; more detailed descriptions of our methods may be found in the report's appendixes. Section 4 describes the results of our evaluation of utilization of health care services and costs in CRI. Enrollment in the HMO option and the changes in source of care that we found for enrollees, which are important for interpreting our utilization and cost findings, are addressed in Section 5. The findings are summarized in Section 6.

[3]Kravitz et al. (forthcoming) and Sullivan et al. (forthcoming).

high use in the Prime program, but not as a result of the program itself. The adjustment we have for selective referral to Prime is from the health status measures.

2. THE CRI PROGRAM

CRI was designed to improve beneficiaries' access to health care services while containing the cost of those services. The most important features are the following:

- A set price paid by DoD for all civilian health care services provided to CHAMPUS beneficiaries residing in California and Hawaii, subject to limits on contractor losses and profits.
- Two alternatives to the current (standard) CHAMPUS program, based on a common network of selected civilian providers: CHAMPUS Prime, which offers improved coverage for preventive care, substantially less cost sharing, and simpler procedures for beneficiaries who enroll in a plan similar to a health maintenance organization (HMO); and CHAMPUS Extra, which offers smaller reductions in cost sharing for beneficiaries who wish to use an optional preferred provider organization (PPO).
- CHAMPUS Service Centers for beneficiary assistance, including a Health Care Finder for referrals to appropriate civilian providers when care is unavailable in military treatment facilities (MTFs). Referrals are made when possible to the provider network.
- Resource-sharing agreements under which the civilian contractor provides, at its cost, resources needed to increase capacity utilization in the MTFs and lower CHAMPUS costs.
- Quality assurance and utilization review programs to ensure provision of high-quality, cost-effective care.

The contract covers all CHAMPUS costs—in the standard, HMO, and PPO options—incurred by beneficiaries living in the two-state demonstration area. Thus, CRI differs from civilian health care plans in that the contractor carries the combined risk for the fee-for-service and managed-care options. The contractor seeks to redirect use from the standard option to either the HMO or PPO when it is cost-effective. Unlike its civilian counterparts, this HMO has no incentive to preferentially select healthy beneficiaries, because the contractor still is at risk for non-HMO beneficiaries. In fact, the contractor targeted high CHAMPUS users for HMO enrollment because the discounts and utilization review programs in that program were expected to be most effective for heavy users.

CHAMPUS Prime is the new health care option that resembles an HMO to the enrolled beneficiary. In return for obtaining health care only from the MTFs or network providers, the enrollee benefits from less cost sharing (e.g., a flat fee of $5 per visit) and added coverage (e.g., adult preventive care). The beneficiary's care is obtained through a primary care provider who acts as a "gatekeeper" to specialists, and when specialty care is authorized by the gatekeeper, it must be provided by the MTF if available there. The PPO, CHAMPUS Extra, decreases the standard copayment rate by five percentage points when beneficiaries use network instead of nonnetwork civilian providers. Care provided in both options is subject to utilization review, including prior authorization of inpatient and some outpatient care.

If CRI works as intended, the costs of the additional demand for care by beneficiaries, who can realize enhanced benefits through Prime and Extra, are more than offset by savings from several sources:

- Utilization review for Prime enrollees (including the gatekeeper function), for Extra users, and for all users of mental health services.
- Discounts granted by network physicians to Prime enrollees and Extra users.
- Maximum use of the MTFs for outpatient as well as inpatient care through Health Care Finder referrals and resource sharing.[1]

In the remainder of this section, we elaborate on the ways in which CRI may influence demand and cost.

EXPECTED EFFECTS OF CRI ON BENEFICIARY DEMAND

For beneficiaries, the most significant CRI programs are the two new options in CHAMPUS: the HMO (Prime) and PPO (Extra). Both offer better benefits in exchange for more restricted provider choice (Table 1). Those willing to commit in advance to exclusive use of the provider network for a year can enroll in Prime, and they pay only nominal fees and obtain coverage for comprehensive preventive care. Those not willing to commit can nevertheless reduce their out-of-pocket costs by using the Extra option, i.e., choosing network providers when they seek civilian care. Users of Extra retain the freedom to revert to standard CHAMPUS at any time they are willing to pay more for a nonnetwork provider. All beneficiaries retain their eligibility for MTF care, as before.

Better benefits are offered in Prime and Extra to attract beneficiaries to these options, where their care can be managed. However, the benefits also can be expected to increase the demand for care in the options and potentially attract beneficiaries to the MHSS from other sources of care, especially those reimbursed by private insurance.

The improvement in MHSS benefits provided in CRI risks some shift from private insurance to sole reliance on the MHSS. Most beneficiaries who have other insurance receive it through an employer and, increasingly, employers are requiring some contribution toward the premium—at least for dependent coverage.[2] As MHSS benefits become more attractive, we can expect that some beneficiaries will drop their employer's coverage and rely instead on the MHSS. Only one-half of military retiree family members had insurance other than CHAMPUS. Thus, even before CRI, the relatively low rates of other coverage suggest that many retirees were already declining employer insurance or disproportionately choosing jobs that did not provide coverage.[3] From the beginning, the CRI contractors were aware of the undesirability of further encouraging this behavior.

Improved MHSS benefits also can be expected to increase demand from beneficiaries who were already using the system. Research has shown that decreasing out-of-pocket costs, as Prime and Extra do, increases health care demand (Manning et al., 1987). For example, in

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[1]The appendixes to this report reproduce portions of our first report that describe in more detail the complex CRI program. A more detailed review of CRI implementation is documented in Anderson and Hosek (forthcoming).

[2]In 1989, 60 percent of all private-sector employees contributed toward their own coverage and 73 percent contributed for dependent coverage. The average monthly contributions were $36 and $103, respectively (Davis et al., forthcoming).

[3]Of the households headed by a part-time or full-time worker in the 1977 National Medical Care Expenditure Survey, 88 percent had private insurance.

Table 1

Benefits and Coverage for CRI Options

	Standard CHAMPUS	CHAMPUS Prime	CHAMPUS Extra
Annual deductible	Junior enlisted: $50 individual/$100 family Others: $150 individual/ $300 family	None	Same as standard
Physician services copayment			
Active-duty dependents	20% of CHAMPUS allowable	$5 per visit	15% of plan allowable
Retired and dependents	25% of CHAMPUS allowable	$5 per visit	20% of CHAMPUS allowable
Outpatient mental health copayment			
Active-duty dependents	20% of CHAMPUS allowable	$10 per individual visit $5 per group visit	15% of plan allowable
Retired and dependents	25% of CHAMPUS allowable	$10 per individual visit $5 for group visit	20% of plan allowable
Preventive services			
Active-duty dependents and retired and dependents	None except well baby care and routine eye exams	Routine physical exams, pap smears, and similar preventive care	Same as standard
Hospitalization copayment			
Active-duty dependents	Greater of $25 or $8.05/day	Same as standard	Same as standard
Retired and dependents	Lesser of $210/day or 25% of charges	$75/day to $750 maximum per admission	Lesser of $125/day or 25% of charges
Prescription copayment			
Active-duty dependents	20% of CHAMPUS allowable	$4 copay up to 30-day supply	15% of plan allowable
Retired and dependents	25% of plan allowable	$5 copay up to 30-day supply	20% of plan allowable
Providers covered	Free to use virtually any provider	Must use network providers while enrolled	Must use network providers for particular episode of care; no enrollment
Paperwork required	Beneficiary often files own claim	No beneficiary claims filing	No beneficiary claims filing

NOTE: No Prime copayment for primary care or preventive services for dependents of sponsors with pay grades of E-4 and below.

the RAND Health Insurance Study, adults paying 25 percent of costs initiated approximately 20 percent fewer episodes of care than adults paying nothing (at about the same cost per episode; see Keeler (1988) and Buchanan et al., (1991)). Prime enrollees have substantially better coverage of civilian health care (Table 1) and the same coverage they had before through the MTF. The added benefits in the Extra option are more modest. Extra lowers the

CHAMPUS copayment for outpatient care by five percentage points, and it further decreases out-of-pocket costs by precluding providers from billing more than CHAMPUS allows.

In addition, CRI expands benefits in other ways that might increase demand. CHAMPUS Prime covers adult preventive services—an important benefit for this largely healthy population. Since enrollees' access to civilian specialty services requires a referral from their primary care provider, some guarantee of access to primary care is required. If beneficiaries are not able to get care, they are told to contact the Health Care Finder for assistance.[4] Together, greater access through assignment to a primary care provider and dramatically lower outpatient fees could be expected to substantially increase demand, especially for outpatient care, among Prime enrollees. Nonenrollees may get referral assistance from the Health Care Finder, but no additional preventive coverage.

Beneficiaries in Extra and Prime can be expected not only to increase their overall demand for care, but also to change the shares they seek from the MTFs and the civilian sector. The shift results first from the change in the relative monetary and time costs beneficiaries face in the two systems. Both Prime and Extra lower the relative monetary cost of civilian care; Prime almost eliminates the out-of-pocket cost difference. This change in relative monetary cost should encourage more civilian use. However, CRI also may have decreased the time needed to access the MTF, thus making the MTF relatively more attractive. A priori, we cannot predict whether these changes in relative costs would shift patients into or out of the MTFs. Similarly, the assignment of Prime enrollees to primary care providers may result in a shift either into or away from the MTFs. The overall likely effect of CRI on beneficiaries' choices regarding source of care depends on whether Prime enrollees tend to be prior MTF or civilian users and on the strength of the various factors.

The effects of CRI are not limited to Prime enrollees or Extra users. Other beneficiaries can still choose to obtain care in the same way they did before CRI, through various combinations of their local MTF and what was termed "standard" CHAMPUS. Even for these beneficiaries, however, CRI may have improved their access to care. CRI's resource-sharing program expands MTF capabilities, the Health Care Finder facilitates appointments, and the contractor's beneficiary services personnel augment the information services previously available only through the MTFs' health benefits advisers. During the period we studied, our interviews indicated that these CRI programs were in the early stages of development (Anderson and Hosek, forthcoming) and beneficiaries who did not enroll in CHAMPUS Prime perceived little change in access (Sloss and Hosek, 1993). To the extent that MTF access is differentially better under CRI, we can expect the demand for MTF services to increase. The response to better access has been shown to be greater when, as in the MTFs, there is no cost-sharing to restrain demand (Acton, 1975).

CRI'S COST CONTAINMENT PROGRAMS

CRI's cost containment potential lies almost exclusively in those program aspects designed to affect provider behavior and the levels of resource use for beneficiaries after they enter the

[4]In fact, the Health Care Finder largely serves Prime enrollees. According to contractor reports, in the year ending January 31, 1992, 59 percent of the Health Care Finder encounters in catchment areas with Prime were for the 13 percent of beneficiaries who were enrolled.

MHSS. The cost containment programs are based on civilian HMO and PPO plans, and their effects generally should mirror the effects measured in the HMO and PPO literature. The literature consistently shows that HMO savings, if any, result from lower utilization of high-cost services such as inpatient care (Bradbury, Golec, and Stearns, 1991; Luft, 1981; Manning et al., 1984; Welch, 1985). Outpatient utilization is often higher in HMOs because of low copayments. The much smaller literature on PPOs reaches no consistent conclusion about savings (Hester, Wouters, and Wright, 1987; Hosek and Marquis, 1990; Hosek, Marquis, and Wells, 1990; Zwanziger and Auerbach, 1991).

The major cost containment program in CRI is utilization review (UR). The CRI contractors conduct prior and concurrent review for high-cost services, including medical/surgical inpatient care and mental health inpatient and outpatient care. The mental health review gram applies to all civilian providers, whereas the non-mental-health reviews apply pri ily to the provider network for Prime and Extra. For Prime enrollees only, all specialty c must be referred by the primary care provider—the "gatekeeper" to care for these beneficiaries.[5] The reviews are based on explicit criteria where possible, and concurrent review is conducted on site. Payment is denied for care that is not approved upon review. To the extent that the reviews are effective in changing patterns of care, they will lower hospitalization rates and, possibly, lengths of stay. Review of mental health and other outpatient services may decrease outpatient visits, but the review programs also may increase outpatient care as a substitute for more costly inpatient care.

The standard CHAMPUS program in operation in the control areas had a very limited UR program. Like Medicare, CHAMPUS pays for hospital services prospectively and uses state peer-review organizations to check on the appropriateness of hospital admissions. This peer-review program is far less stringent than the hospital review components of a UR program. In early 1990, DoD implemented an inpatient mental health UR program, designed to prevent inappropriate admissions and lengthy stays. This program was still in the implementation stage during the period we studied.

Since UR programs were developed relatively recently, the research on their effects is limited. Most of the studies to date do find that UR leads to a modest decrease in total costs of 4 to 8 percent (Feldstein, Wickizer, and Wheeler, 1988; Wickizer, Wheeler, and Feldstein, 1989; Khandker and Manning, 1992). The decrease appears relatively soon after the program is implemented (Wickizer, 1992), and UR does not appear to alter the rate of growth in costs (Wickizer, Wheeler, and Feldstein, 1989). Savings are larger in programs with relatively high costs before implementing UR (Feldstein, Wickizer, and Wheeler, 1988; Khandker and Manning, 1992).

Like civilian HMOs and PPOs, CRI employs fee negotiation with civilian providers and utilization review to control costs. Appendix E contains an analysis of the discounts in CRI, conducted early in the evaluation and measured from the average amount allowed on pre-CRI claims for a list of common procedures. The discounts vary substantially by specialty

[5]More comprehensive reviews of CRI's utilization review programs and analyses of changes in the clinical patterns of care under CRI will be published separately for medical/surgical care in Kravitz et al. (forthcoming) and for mental health care in Sullivan et al. (forthcoming).

and geographic area, but they usually fall in the range of 10 to 20 percent.[6] We note that this does not mean that the average cost per outpatient visit or hospital day will be less, because the changes in demand and practice patterns also resulting from CRI will alter the civilian providers' case mix. In addition, the behavioral response of providers to discounted fees is unknown. Providers may try to deliver more services to recover the lost income, or they may deliver fewer services because the time they spend with discounted patients is less well paid. The few studies that address this question are plagued by methodological problems and reach different conclusions.[7]

CRI was designed to improve efficiency in military hospitals and clinics as well as in CHAMPUS. Budget constraints and unresponsive procurement systems often lead to inefficient levels of MTF staff and equipment or the wrong mix of staff and equipment. Under a contract provision for "resource sharing," the CRI contractors are allowed to purchase additional resources for the MTFs to correct these inefficiencies. Since the contractors are not reimbursed for the costs of these resources, they will add to MTF resources only if they expect to save money by shifting patients from the civilian sector to the MTF. Although resource sharing has the potential to increase MTF capacity utilization and decrease CHAMPUS costs, initially it was delayed by contractual issues. Resource sharing began to augment MTF resources in June 1989; during our six-month study period, the additional resources totaled just over $5 million, or about 2 percent of total contractor payments.

Although resource sharing was a small factor early in the program, the Health Care Finder also was designed to increase effective MTF use and thereby contain overall costs. Specialty care referrals for Prime enrollees are arranged through the Health Care Finder, which places the patient at the MTF whenever possible. Other CHAMPUS beneficiaries may also obtain referrals through the Health Care Finder (to network physicians if possible), and they will be assisted in getting MTF care if available. However, during our study period, the contractors reported that only 4 percent of referrals were to the MTF; almost all others were to network physicians.

COMBINED EFFECTS

As with other managed-care programs, CRI includes incentives for beneficiaries to increase their health care use—a byproduct of the inducement to participate in the program's managed-care options—and also cost containment provisions largely aimed at the provider community. The beneficiary incentives are strongest for Prime enrollees, but so are the cost containment programs. Combining these competing features, we expected to find that CRI caused the following:

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[6]Because the amount allowed on a claim cannot exceed the lesser of billed charges and the CHAMPUS allowable ceilings, the discounts measured from the ceilings would be larger. It is not uncommon for providers to bill less than the amount allowed. Nevertheless, DoD often uses the latter metric because it is easy to apply.

[7]Garnick et al. (1990) studied episodes of care for selected chronic conditions that were provided by the same physicians to PPO patients and non-PPO patients. They found that more services were provided per episode to PPO patients. Wouters (1990) also studied episodes of care, but did not find differences in the level of services. Both studies focused on relatively routine types of care that were not usually subject to utilization review, and neither could separate demand effects in the PPO (from lower cost sharing) from supply effects.

- An increase in the fraction of beneficiaries who use the MHSS instead of other sources of care.
- An increase in the fraction of Prime and Extra beneficiaries who use at least some care.
- Either an increase or decrease in overall levels of health care use.
- A shift to outpatient care from inpatient care in Prime and Extra.
- A shift in the mix of MTF and civilian sources of care, of unknown direction.
- Either an increase or decrease in costs.

Thus, we expected to find that the number of MHSS users is higher in CRI, but we could say little about the direction of change in levels of use and health care costs. If, during the period we studied, the effects of discounting and utilization review were stronger than the effects of increased benefits, levels of use and costs would have been lower for inpatient care and overall. If the demand response was stronger, they could have been higher. Finally, we should point out here that the net savings on health care costs must also cover any increase in the overhead costs of operating the more complex CRI program.

3. METHODS AND DATA

CRI was implemented in an MHSS that was implementing other changes at the same time. Rapidly increasing CHAMPUS costs put pressure on the system to better use existing MTF capacity and allow as many beneficiaries as possible access to the free care provided in the MTFs. Two new programs designed to expand the direct care system were implemented at about the same time as CRI. In 1988, the Partnership program was developed to allow civilian physicians to practice in MTFs, with CHAMPUS reimbursing their fees. Several years earlier, the first Primus and NavCare primary care clinics were opened. These clinics, operated by civilian contractors but considered an extension of the direct care (MTF) system, provide care free of charge.[1] With the rest of the MHSS changing, the evaluation had to assume that health care use in California and Hawaii would have changed even without CRI. To estimate what these changes would have been, we measured change in a set of non-CRI control sites. Then, by comparing the actual changes under CRI with the changes we would have expected to occur, based on the control sites, we could estimate the effects of CRI.

As we described in Section 1, we took two approaches to evaluating utilization and costs in CRI. The two approaches serve complementary purposes, but each also serves as a check on the other. The first approach, which is documented in this volume of the CRI report series, was designed to provide an estimate of the effects of CRI on aggregate utilization measures and costs. We collected comprehensive data on MTF and CHAMPUS use in late 1990 for random samples of active-duty beneficiaries and retired beneficiaries. From these data, we estimated per-beneficiary health care utilization and government cost with CRI and without CRI. Utilization is measured by the number of visits and hospital days. Our estimates of what utilization and cost would have been without CRI were based on data from the control sites, but we corrected for preexisting utilization and cost differences between the demonstration sites and the control sites, and for differences in the populations served in the two areas. The results of this analysis are documented in this report.

The second approach, which is documented in two other volumes in the CRI report series,[2] was designed to determine whether CRI's utilization review program was effective in changing the patterns of care in CHAMPUS. Here, we used the CHAMPUS claims records for all services provided to beneficiaries between April 1989 and March 1990. The larger claims file covers civilian care only, but it provided medical diagnoses and procedures for enough patients to conduct a more specific assessment of utilization changes in the civilian sector. For example, we investigated changes in the use of civilian emergency rooms, certain discretionary and nondiscretionary procedures, and medical evaluations for mental health patients. The claims data, as we discussed earlier, are less suited to estimating overall rates of use and cost in the population.

The analytic methods we used for this report on overall utilization and cost were adapted from the health program evaluation literature. Adaptation was necessary because the MHSS's dual system of "employer provided" care in the MTFs and civilian insurance through

[1] A more detailed description of these changes is contained in Anderson and Hosek (forthcoming).

[2] The two volumes are Kravitz et al. and Sullivan et al., both forthcoming.

CHAMPUS is unusual. Our analysis focused on the propensity of the beneficiaries to access care at an MTF or through CHAMPUS, and the amount of care they receive once they enter each system. To provide beneficiary-level data, we fielded two beneficiary surveys: one just before CRI began and the second approximately two years later. We augmented the survey information with information from MHSS administrative records. The remainder of this section provides an overview of these methods and data in largely nontechnical terms. Readers interested in more technical detail should consult the indicated appendixes.

SELECTION OF DEMONSTRATION AND CONTROL SITES

The congressional authorization for the CRI demonstration limited DoD to any two states in any three of the six CHAMPUS regions. DoD chose states with large beneficiary populations and high CHAMPUS costs: California/Hawaii, Florida/Georgia, and North Carolina/South Carolina. Only one contractor was willing to operate this potentially risky program—in California and Hawaii. These two states are atypical of areas with large military populations. California, with its largely urban population and large military installations, is characterized by high unit costs for health care services and relatively short hospital stays. For example, the American Hospital Association survey for 1989 reported that California was second after Alaska in average cost per hospital day ($872 versus a U.S. average of $637) and ninth from the bottom in length of stay (6.3 versus 7.2 days). Hawaii had below-average costs and above-average lengths of stay (American Hospital Association, 1990). HMOs were established early in these states and cover 30 and 22 percent of the privately insured populations, respectively. California was a leader in the development of PPOs, with 152 operational plans in 1989. Hawaii lags behind with only two PPO plans; it is also physically isolated and has a health insurance market dominated by one HMO and one fee-for-service insurer.

The choice of California and Hawaii to demonstrate CRI made our efforts to find suitable control sites difficult. To facilitate the task of finding adequate control sites, we focused on 10 of the 18 CRI areas served by a military hospital and one area served by a large military outpatient clinic.[3] Each of these 11 areas was matched to a non-CRI area, using methods described below. The 11 demonstration areas and 11 control areas are listed in Table 2 together with the 8 CRI areas not studied.

Demonstration Sites

To select demonstration sites for fielding the survey, we first arrayed the 18 catchment areas by military service and MTF size, as shown in Table 2. Those we selected are listed in the table with a matched control site. We selected one medical center from each service,[4] all five

[3]DoD formally defines catchment areas for each of its hospitals. These areas, which are defined by zip code, extend approximately 40 miles from the hospital. Since DoD does not define catchment areas for its clinics, we designated areas extending approximately 20 miles. We chose 20 miles because in the past DoD considered establishing clinic areas of 20 miles.

[4]Health care for the Marine Corps is provided by the Navy, so we show only three services in Table 2. We considered matching the one Marine site we chose for study—Camp Pendleton—to another Marine site. However, no suitable match was found among other Marine sites.

of the community hospitals with over 50 beds, and two small Air Force hospitals (under 50 beds).

The medical centers were chosen by default after we dropped Letterman Army Medical Center and Oakland Naval Hospital from consideration. At the time, these two medical centers were to be consolidated under a single command, and we anticipated a series of changes that would be confounded with the effects of CRI. Subsequently, Letterman was identified for closure and its staffing reduced to a fraction of its pre-CRI levels.

We eliminated the three small Navy and Army hospitals (Lemoore, Fort Irwin, and Twenty Nine Palms) from our sample because they serve limited populations and are in isolated areas with few civilian health care providers. From the remaining five small Air Force hospitals, Beale and Vandenberg were chosen at random.

Finally, there are only two areas in California and Hawaii that are served by a large military outpatient clinic and are outside any hospital catchment area: China Lake and Port Hueneme, both belonging to the Navy. We randomly selected Port Hueneme.

The 11 demonstration areas from which we sampled accounted for three-quarters of the beneficiaries eligible for CHAMPUS and of CHAMPUS costs in California and Hawaii just

Table 2

CRI Demonstration and Control Sites

Service	CRI Site	Control Site (State)
Medical centers		
Army	Letterman	
	Tripler	Madigan (WA)
Navy	Oakland	
	San Diego	Portsmouth (VA)
Air Force	Travis	Keesler (MS)
Community hospitals over 50 beds		
Army	Fort Ord	Fort Hood (TX)
Navy	Camp Pendleton	Charleston (SC)
	Long Beach	Orlando (FL)
Air Force	March	Carswell (TX)
	Mather	Homestead (FL)
Community hospitals under 50 beds		
Army	Fort Irwin	
Navy	Lemoore	
	Twenty Nine Palms	
Air Force	Beale	Dover (DE)
	Castle	
	Edwards	
	George	
	Vandenberg	Shaw (SC)
Clinics		
Navy	China Lake	
	Port Hueneme	Quantico (VA)

prior to CRI. Since this report relies on data from the beneficiary survey, we cannot compare post-CRI costs in the 11 areas chosen for the survey with the remainder of the CRI demonstration areas. However, other reports from this evaluation will show evidence that the 11 areas accurately represent the CRI experience (Kravitz et al., forthcoming and Sullivan et al., forthcoming).

Control Sites

The matched control sites, chosen from those catchment areas from the same service that had an MTF of similar size, are listed in Table 2. Some candidate control sites were dropped from consideration because they differed from the demonstration sites in specific ways. For example, we dropped the military academies and the complex joint-service Washington, D.C. and San Antonio areas from consideration. After these deletions, we had 1–3 candidates for each medical center, 4–10 for each midsize hospital, and 21 for each small hospital. Some non-CRI sites qualified as possible matches for more than one CRI site.

For each of the 11 CRI sites, we selected from the list of candidates the one that was most similar based on FY 1986 data measuring: percent retired in population, percent over 65, number of MTF beds, MTF beds per thousand beneficiaries, combined MTF and CHAMPUS admissions per thousand, CHAMPUS share of admissions, CHAMPUS length of stay, and MTF length of stay. In almost all instances, the value for the selected control site was within 10 percent of the value for the demonstration site.

The MHSS does not maintain such data for areas served only by outpatient clinics. Therefore, we relied on discussions with Navy staff at the medical commands and demonstration MTFs to select Quantico as the control site for Port Hueneme.

We submitted the control site list for review to our points of contact in the services' Surgeon General offices and at a large meeting of military and contractor personnel involved in CRI. After discussions with Navy personnel, we changed the control sites for Long Beach and Camp Pendleton; the original controls were Charleston and Camp LeJeune, respectively. Our original choice of Camp LeJeune was based on the desirability of matching Camp Pendleton to another Marine site, but the advice we received from several Navy sources was to break that rule in this instance.

After the control sites were selected, several were included in other managed-care demonstration programs—a decision we were unable to change. Orlando and Homestead were included in a program that added a fiscal intermediary-operated PPO option to standard CHAMPUS in Florida and Georgia. However, participation in the PPO was only 15 percent by the end of 1989, and the PPO was under reorganization during our study period as a result of a change in fiscal intermediaries. Charleston was chosen by the Navy to be its first Catchment Area Management (CAM) site, but the program was not implemented until October 1990—just at the end of our study period. We do not believe that these other programs affected health care use and costs until after the period we study here.

Table A.14 in Appendix A provides comparison data for the two groups of demonstration sites and control sites in the 12 months just prior to CRI—the baseline period for this study.

ESTIMATION OF CRI EFFECTS

The methods we used to estimate CRI effects on health care use and costs are designed to adjust for baseline differences in use and costs between the CRI and control sites and differences in beneficiary characteristics between the groups of sites and over time. Appendix A provides a technical description of our methods. Here, we provide an overview of our approach for nontechnical readers.

Our methods are based on methods developed for previous evaluations of new health care programs and the RAND Health Insurance Experiment, the most extensive evaluation ever performed of the effects of cost sharing. We analyzed two aspects of utilization: (1) whether an individual had any outpatient or inpatient care (yes or no for each type of care); and (2) for users, the amount of each type of care.[5] Since we were interested both in quantities of care—visits and inpatient days—and costs, our analysis consisted of 16 components, one for each of the following:

- Whether an individual had any MTF outpatient visits.
- The number of MTF outpatient visits, only for individuals with some visits.
- Whether an individual had any CHAMPUS outpatient visits.
- The number of CHAMPUS visits, only for individuals with outpatient visits.
- Whether an individual had any CHAMPUS outpatient costs.
- The total government paid for outpatient care, only for individuals with outpatient costs.
- Whether an individual had an MTF admission.
- The number of MTF inpatient days, only for individuals with an admission.
- Whether an individual had a CHAMPUS admission.
- The number of CHAMPUS inpatient days, only for individuals with an admission.
- Whether an individual had any MTF use.
- The costs of MTF use, only for those with MTF use.
- Whether an individual had any CHAMPUS inpatient costs.
- The total government paid for inpatient care, only for individuals with inpatient costs.
- Whether an individual had any MHSS use, either MTF or CHAMPUS.
- The costs of MHSS use, only for those with MHSS use.

Beneficiaries for whom there were CHAMPUS expenditures need not have had visits or days. Some beneficiaries only filed claims for outpatient ancillary services during our study period, and some had expenditures for inpatient services but no overnight hospital stay. Most of the inpatient claims not associated with a stay, at least in these sites during these time periods, were for partial episodes of obstetrical care.

We conducted the analysis separately for adults—active-duty spouses, retirees and their spouses—and children. We estimated multivariate regressions that modeled each component of use and cost as a function of the following: age, sex, race, military service of sponsor,

[5]This is similar to the model used in the Health Insurance Experiment (Duan et al., 1982).

military rank of sponsor, education, employment status, household income, household size, distance from home to MTF, length of residency in area, several measures of health status, catchment area, and time period interacted with whether the area was in CRI.[6] We included an indicator for each MTF area to control for persistent differences across these areas; these indicators allowed us to correct our estimates of utilization at follow-up for the differences between the CRI and control sites at baseline. Controlling for these factors, the time period indicators measured the change in use and cost over time at the control sites, and the differential change in the CRI sites. This differential change we attributed to CRI. For outpatient care and for total costs, we were able to estimate separate CRI effects for active-duty dependents enrolled in Prime, active-duty dependents not enrolled, retirees and retired spouses enrolled in Prime, and retirees and retired spouses not enrolled. For inpatient care, the less frequent use and more variable levels of care preclude estimating separate effects for enrollees and nonenrollees. However, we were able to estimate an overall CRI effect.[7] We also had to limit our analysis of children's utilization and costs because of sample size considerations. Our purpose was to determine whether the effects on children appeared to differ from the effects on adults.

This analysis allows us to compare, *for the same group of beneficiaries*, their estimated health care use and costs in CRI with the estimated use and costs they would have had without CRI. The "with CRI" estimates are based on the change from baseline to follow-up in the CRI areas, and the "without CRI" estimates are based on the change in the control areas. The estimates therefore reflect the *difference in the changes* in use and costs at the two sets of sites. We used the CHAMPUS-eligible beneficiary population in the 11 matched CRI areas during the demonstration period for the estimates.

Structuring our analysis to allow for different effects for Prime enrollees and nonenrollees allowed us to compare outcomes in Prime with outcomes in the standard and Extra options, which together constitute a point-of-service PPO.[8] This comparison would be misleading if the beneficiaries who enrolled in Prime were healthier or sicker—i.e., used more or less health care, all other things equal. In that case, we need to control for any differences in those who enrolled. Therefore, using measures of health status and a measure of the differences in use or costs at baseline for those beneficiaries who later enrolled in Prime (compared to those who never joined), we adjusted for this potential bias. By including the baseline-difference factor, we could adjust the CRI effect for Prime enrollees for any differences in the enrollees' use before CRI. However, we could not completely adjust for the possibility that the referral process implemented by CRI may have encouraged the enrollment of beneficiaries whose health had deteriorated recently. These beneficiaries' poorer health would lead to

[6]We did not include a variable to indicate whether the individual had other insurance coverage because we expect that source of care, utilization, and insurance coverage are jointly determined. The employment variable is a proxy for the *availability* of other employer-provided insurance. In Section 5 we show that other insurance rates were lower under CRI and that some Prime enrollees dropped other insurance after enrolling. By not including other insurance coverage in the regressions, we are attributing to CRI the change in utilization and costs that resulted from the change in coverage. We do this because we believe that the change in coverage was due to the improved benefits offered in CRI.

[7]Companion reports will provide information on the use of specific inpatient services for different beneficiary and enrollment groups.

[8]A point-of-service PPO offers eligible individuals the option to use a PPO health care provider and pay less for the care or to use a non-PPO provider and pay more. This choice is available each time they seek care—i.e., at the point of service.

high use in the Prime program, but not as a result of the program itself. The adjustment we have for selective referral to Prime is from the health status measures.

We did not attempt to estimate utilization and costs for Extra users because they are difficult to identify.[9] Beneficiaries who do not enroll in Prime may choose to use Extra each time they seek care, and many will mix Extra and standard CHAMPUS use. It is very difficult to estimate differences in health care use between programs when the programs are not exclusive.[10] The CRI effects that we measure for nonenrollees, therefore, combine the effects of Extra with any effects in the standard program. Combining Extra and standard users does not impair our ability to evaluate the overall effects of CRI, but it does limit our ability to attribute these effects to the various CRI interventions.

DATA SOURCES

The principal data source for this element of the CRI evaluation is a pair of beneficiary surveys: one fielded in the matched CRI and control sites just before CRI was implemented, and the other fielded approximately two years later.[11] The surveys collected information from a sample of randomly selected active-duty and retiree households with CHAMPUS beneficiaries. For each household in the sample, we requested information on one adult (active-duty spouse, retiree or spouse) and, for households with children, one child. The post-CRI survey added an oversample of Prime enrollees to permit comparison between enrollees and nonenrollees. The surveys provided us with information on the following:

- Usual source of routine health care.
- Number of MTF outpatient visits during the most recent six months.
- Number of MTF inpatient days during the most recent six months.
- Prime enrollment status (for beneficiaries in the follow-up survey in CRI sites).
- Other insurance coverage.
- Individual characteristics: health status, age, sex, race, employment status, education.
- Household characteristics: military service affiliation, household size, income, length of residency in area, distance from MTF, sponsor's rank.

We also asked beneficiaries to report the number of civilian visits and days, and the number of MTF days, for the same six-month period and whether CHAMPUS paid for any of that care. We determined that beneficiaries could not reliably report how much of their care was provided through CHAMPUS, or the government cost of that care. Therefore, we relied on CHAMPUS claims records to measure each respondent's use of civilian care under CHAMPUS. Finally, we checked the respondent's report on Prime enrollment against the contractor's enrollment file.

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[9]The CHAMPUS claims record we used does not indicate whether the provider belonged to the CRI network. We attempted to add this information by matching provider identifiers with the contractor's provider file. Unfortunately, the match was not feasible because providers are often identified only by billing group in the claims. Even if we could have identified Extra claims, categorizing users is very difficult in this type of plan (Hosek and Marquis, 1990).

[10]For a discussion of comparisons in point-of-service PPOs, see Hosek and Marquis (1990).

[11]The survey effort is documented in Sloss and Hosek (1993).

Survey Sample

The sample was designed to allow for separate analysis of active-duty dependents and retiree family members because the military health benefit levels vary for these two beneficiary groups. We determined the number of observations necessary to detect a difference of a certain size in the mean number of outpatient visits between the demonstration and control sites. We sized our sample for outpatient use because, for the range of samples that were feasible, the high variance in inpatient use makes it an impractical criterion for sample design.[12] Our specific goal was to detect a difference of 5 percent of the standard deviation in visits for adult respondents—approximately 0.3 visits—with the following probabilities: (1) an 80 percent probability of detecting such a difference when in fact the difference exists and (2) a 2.5 percent probability of estimating this difference when in fact there is none. The sample size meeting these specifications was determined to be 12,800 households—3,200 active duty and 3,200 retiree households in the CRI and control sites before CRI, and another 3,200 each after CRI.

Given the number of respondent households we wanted, we then estimated the number of households we would have to include in the initial mailout for each survey. We inflated the number of responses desired by the expected response rate, based on earlier similar surveys of this population for the baseline survey and the first survey for the second one.

The sample frame was created from an extract of individual DEERS records, created for us in March 1988. DEERS (Defense Enrollment Eligibility Reporting System) registers individuals eligible for MTF care and CHAMPUS. By 1988, DEERS included almost all eligible beneficiaries. We excluded survivors of deceased military personnel and dependents in families with both parents on active duty because there are too few in both groups to study adequately. We also excluded the families of active-duty members who were students, patients, and prisoners because both the member's and his family's locations are difficult to determine and because service members rarely stay long in these statuses. Members of the largest group—students—are far less likely to have dependents than other personnel, so excluding them from the sample frame had little impact.

Survey Response

Our response rates, excluding questionnaires that were undeliverable or mailed to ineligible persons, were: active-duty households at baseline, 60 percent; retiree households at baseline, 68 percent; active-duty households at follow-up, 51 percent; and retiree households at follow-up, 64 percent. The lower response rates for active-duty spouses at follow-up were caused by the deployments to the Persian Gulf, which began soon after survey operations began and decreased our response rates to repeat mailings. With this exception, our response rates were similar to the rates for DoD-wide surveys of this population during the 1980s (Griffith,

[12]Data from the Medicare population demonstrate that cost per day of care declines rapidly with length of stay (Carter and Melnick, 1990). This evidence suggests that any inpatient cost savings from CRI should accrue as a result of lower admission rates. Although these "power calculations" do not focus on inpatient care, the sample was adequate to detect differences in admission rates at a confidence level of 99 percent (as shown in Table 8 in Section 4). Therefore, our sample was adequate to detect any substantial cost savings in inpatient care.

Doering, and Mahoney, 1986).[13] We achieved our target samples for retiree households, but not for active-duty households. Prime enrollees responded at higher rates than similar people who were not enrolled. In estimating CRI and non-CRI outcomes, we reweighted the sample to adjust for these differences in response rates.[14] Thus, the estimates are for the population from which we drew the survey sample. Table 3 shows the final number of eligible responses to the baseline and follow-up surveys. Altogether, we had survey responses for 22,055 adults and 9,152 children. After deleting records with missing data, we had 19,364 in the analytic sample.

Key Variables

MTF Utilization. The MTFs retain an automated record of each inpatient discharge, including patient-identifying information, diagnoses, procedures, admission and discharge dates, and discharge status. However, no automated information is kept on individual outpatient visits. Each MTF manually records the number of visits by clinical service and beneficiary category. In order to carry out individual-level analyses, we had to obtain data on the number of visits directly from the beneficiaries through the survey. Self-reported health care utilization data are subject to recall error. Although there is some bias in recall—older persons, heavier users of health care, and persons in better health tend to underreport—the average number of reported visits in a population is remarkably close to the average actual number (Cleary and Jette, 1984).

The survey asked respondents to report MTF outpatient use during the most recent six months. It requested the number of visits to a health care professional at a military hospital or military clinic, and the number of visits to a Primus/NavCare clinic. As we described earlier, the latter are primary-care clinics operated by civilian contractors. The care is free to the patient, and the contractors were usually paid on a per-visit basis during this time period. Five of the eleven CRI sites we studied acquired these clinics in 1988–1989; three controls acquired these clinics at the same time, and a fourth had a clinic nearby. We used a six-month recall period because we expected that most of these relatively mobile respondents would have lived in the study area for six months. We excluded from our analysis the relatively small number of respondents with less than six months residency (about 1 percent of the sample), as well as those with missing health status data.

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[13]For more information on the surveys, see Sloss et al. (forthcoming). We analyzed the pattern of responses and found that older persons, families of officers (active and retired), women, and families with children living at home were more likely to respond. We were not able to look at the relationship between health care use and response. The response rates were similar in the demonstration and control areas.

[14]Based on an analysis of the nonrespondents for the baseline and follow-up surveys, we identified those observable characteristics that significantly explained the response decision. We computed weights by stratifying the sample into subpopulations on the basis of these observable characteristics, and then computing the ratio of the true population frequency for that group to its sample frequency. For the baseline survey, the population was stratified on the basis of the following information: sponsor's military status (active/retired), sponsor's service branch (Army/Air Force/Navy or Marine), sponsor's pay grade (officer/enlisted for retirees, officer/senior enlisted/junior enlisted for active-duty sponsors), respondent's age group (classification varies with pay grade), and number of children (classification varies with pay grade and age group). Retirees and their spouses were also weighted on the basis of sex. For the follow-up survey, the stratification is also based on Prime enrollment. Weights were computed for the nonenrollees on the same basis as the baseline respondents. The smaller sample of Prime enrollees was grouped only on the basis of the sponsor's military status, rank, and service branch, as well as by sex for the retired enrollees and their spouses. In total, there were 225 nonzero cells for which weights were computed.

Table 3

Final Survey Sample Sizes

Type of Household	Baseline		Follow-up		Full Sample
	CRI	Control	CRI	Control	
Total adults	4,711	4,998	4,883	4,772	19,364
Active-duty	2,076	2,206	2,140	2,081	8,503
Prime	—	—	757	—	
Other	—	—	1,383	—	
Retired	2,635	2,792	2,743	2,691	10,861
Prime	—	—	765	—	
Other	—	—	1,978	—	
Children	2,057	2,268	2,390	2,437	9,152

MTF Costs. To estimate the costs of the reported MTF utilization, we used data from the Medical Expense and Performance Reporting System (MEPRS). MEPRS is discussed further in Section 4.

CHAMPUS Utilization and Costs. For each respondent, we extracted all his/her CHAMPUS claims records for the six-month periods for which most respondents recorded their MTF use:

- Baseline: February 1, 1988 through July 31, 1988
- Follow-up: May 1, 1990 through October 30, 1990

Since the records were extracted at least one year after the date of service, they are almost 100 percent complete. We then processed these records to separate Partnership claims,[15] remove duplicates, incorporate payment adjustments, correct coding errors, and create outpatient visit and hospital stay records. For each respondent in each time period, we calculated the number of outpatient visits to a health care provider, total amount paid by CHAMPUS for outpatient services, the number of inpatient days, and total amount paid for inpatient services. We also calculated the total amount CHAMPUS allowed for all services, the amount reimbursed by other insurance, and the amount paid by the respondent because of cost sharing.

Health Status Measures. The survey included questions on health status and functioning similar to the Short-form General Health Survey, developed as part of the RAND Medical Outcomes Study (Stewart, Hays, and Ware, 1988). These measures have been used in numerous other studies, and they have been shown to be predictive of health care use. From the items included in the survey, we derived measures of current health status, mental health status, pain, health perceptions, social functioning, and role limitations. We did not include items regarding physical functioning in the survey because few in this nonaged popu-

[15]The Partnership program, which began in 1988, permitted civilian physicians to see patients in the MTFs and bill CHAMPUS for their services at a discounted rate. Since the patients seen by Partnership physicians are counted in MEPRS and as MTF care by survey respondents, we deleted these records before calculating CHAMPUS utilization and costs, and then added the costs to the MTF costs derived from MEPRS.

lation suffer from physical limitations. For a more complete description of the survey items and the development of these health status measures, see Sloss and Hosek (1993).

4. EFFECT OF CRI ON HEALTH CARE UTILIZATION AND COSTS

As we discussed in Section 2, CRI is a complex program that includes incentives for beneficiaries to increase their utilization of health care services and perhaps change their sources of care, and also a gatekeeper mechanism and utilization review to deter inappropriate utilization and fill MTF capacity. In this section, we investigate the effects of CRI on the following:

- *Utilization*: the propensity to seek outpatient and inpatient care from the MTF and civilian providers, the numbers of visits and hospital days for those in care, and the numbers of visits and days per beneficiary.
- *Costs*: the costs of MTF and civilian care, and the administrative costs of operating the program.

In Section 2, we argued that some beneficiaries may switch from other sources of care to the MHSS to take advantage of Prime or Extra, be more likely to seek care, and increase their use of outpatient relative to inpatient care. Shifts in the use of MTF versus civilian providers and changes in the levels of care for users were possible, but the direction harder to predict.

Our results compare utilization and costs for the CRI population to estimates of the utilization and costs if CRI had not been implemented. The method explicitly controls for differences between the CRI and control areas in utilization and costs during the baseline period and in the characteristics of the beneficiaries. We conducted separate analyses for adults and children. Since only about 40 percent of the households we surveyed had children, our analysis of children's utilization is more limited than our analysis of adults' utilization.

OUTPATIENT UTILIZATION

The estimates that we provide here are based on the analytic methods we summarized in Section 3. We analyzed utilization of MTF services and CRI-financed civilian services, describing four components: (1) the probability of having some outpatient care during the six-month period covered by the survey, (2) the number of visits for those beneficiaries having at least one visit, (3) the probability of having some inpatient care during the same period, and (4) the number of hospital days for those who were hospitalized.

Utilization by Adults

Tables 4 and 5 show our estimates of outpatient utilization in CRI and the control areas for active-duty spouses and retired adult beneficiaries. These tables, and the tables that follow for inpatient utilization and costs, report predictions from the regression analysis described in Appendix A for beneficiaries in California and Hawaii during May through October 1990. The estimates of utilization and costs in CRI shown in Tables 5 through 9 are the weighted averages of the predicted values for the survey respondents from California and Hawaii only in 1990. The weights adjust for differences in the survey sampling and response rates as discussed in footnote 14 in the previous section. Thus, the estimates we present are for the

eligible CHAMPUS population in the 11 CRI study sites. The "with CRI" estimates present the per-beneficiary utilization and costs for this population. The "without CRI" estimates present the per-beneficiary utilization and cost for the same population under the assumption CRI was not implemented. Appendix A provides a more detailed description of the methodology.

For each component of utilization we report the average number of CHAMPUS services (visits or hospital days), the proportion of beneficiaries who had some CHAMPUS utilization, and the number of services (visits or days) just for those with some use. Similar figures are provided for the MTFs.[1] We also separately estimate the total number of services used in both CHAMPUS and the MTFs.

Civilian visits were determined from the claims records for each respondent during the six months prior to the survey. We combined into a single record all the services provided to the same beneficiary by the same provider on the same day, and we counted a visit only when the procedure codes indicated a face-to-face encounter. With no similar administrative record for MTF visits, we had to rely on self-reported data from the survey.

In Table 4 we find that the average number of civilian visits was higher under CRI. For active-duty spouses, higher civilian outpatient utilization resulted from an increase in the number of users, not the number of visits the users made. Retired beneficiaries showed some increase in both number of CHAMPUS users and rate of use, but the latter was not statistically significant.[2] This result is not surprising. The initial visit to a physician is almost completely patient-initiated, and CRI substantially lowered the cost to the patient of this visit (mainly in its Prime and Extra options) and provided assistance in accessing care through the Health Care Finders. The lower copayments could be expected to increase the beneficiaries' demand for civilian care as a supplement to, or substitute for, MTF care or care from non-MHSS sources. The cost containment programs that would counter the increased demand operate primarily on inpatient care. The only major type of outpatient care affected by utilization review is mental health care. In fact, inpatient reviews may actually increase outpatient utilization by encouraging ambulatory surgery and other outpatient treatment instead of hospitalization.

The changes in MTF and civilian outpatient utilization rates that we estimated for active-duty spouses were not statistically significant. Their MTF outpatient utilization rates appeared to decrease with CRI. On the other hand, their civilian visits appeared to increase. As a result, total visits for active-duty spouses were unchanged. Retirees and their spouses in CRI made more visits to the MTF as well as to civilian providers. Overall, retired beneficiaries had almost 20 percent more visits per capita in CRI, compared to the levels we predicted for this group without CRI.

Table 5 indicates that the higher civilian-sector use in CRI was entirely attributable to Prime enrollees and their greater propensity to seek care from civilian providers (in addition to the

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[1]The number of visits does not necessarily equal the probability of use times the number of visits per user. Each of these estimates was calculated as the mean of the estimates for individual respondents in the sample. For each individual, the probability of use and the conditional-use level multiply to equal the number of visits, but the mean of the products need not equal the product of the means.

[2]Although they are older than active-duty spouses, retirees and their spouses have lower levels of utilization in the MHSS. This finding is consistent with other studies (Phelps et al., 1984). Retired families get some of their care from outside the MHSS, whereas active-duty families generally do not.

Table 4

Effect of CRI on Outpatient Utilization (May through October 1990)

	All Adults	
	With CRI	Without CRI
Civilian visits per beneficiary	1.07*	0.90
Percentage with visits	25%**	22%
Visits per user	4.05	3.80
Military visits per beneficiary	2.01	1.86
Percentage with visits	49%	48%
Visits per user	3.77	3.54
Total visits per beneficiary	3.10**	2.81
Percentage with visits	62%	60%
Visits per user	4.68	4.34

	Active-Duty Spouses		Retirees and Spouses	
	With CRI	Without CRI	With CRI	Without CRI
Civilian visits per beneficiary	1.02	0.89	1.11**	0.90
Percentage with visits	25%**	22%	24%*	22%
Visits per user	3.73	3.87	4.34	3.74
Military visits per beneficiary	2.59	3.54	1.48**	1.25
Percentage with visits	63%	61%	37%	36%
Visits per user	3.94	3.99	3.62*	3.14
Total visits per beneficiary	3.68	3.52	2.59***	2.17
Percentage with visits	74%*	71%	51%	50%
Visits per user	4.79	4.77	4.58**	3.95

NOTE: These predictions were computed using a weighted average of the individual beneficiary predictions for the California and Hawaii follow-up subpopulation (i.e., all CRI participants). The significance tests are based on 300 bootstrapped replications of the difference between the "with CRI" group and the "without CRI" group. Because they are modeled separately, predicted per-beneficiary MTF visits and civilian visits may not sum to total visits. Appendix A contains a complete discussion of these methods, and footnote 14 in Section 3 discusses the weighting scheme in more detail.

*Difference significant at .10 level.

**Difference significant at .05 level.

***Difference significant at .01 level.

care they obtain from MTFs). These claims-based estimates confirm self-reported data from the survey describing a shift by enrollees to civilian providers (described in Section 5). Prime enrollees are almost twice as likely to seek civilian care in a six-month period as are non-enrollees or similar beneficiaries not in CRI. In addition, we find that Prime enrollees have significantly higher civilian visits per user (relative to the level without CRI).

In contrast, the higher levels of MTF use we estimated for all retired beneficiaries in CRI are not attributable solely to enrollees. The pattern of increased visits per retired user occurred across the board and may have reflected an increase in MTF access for these beneficiaries, who have the lowest priority for care.

It is possible that Persian Gulf deployments may have differentially affected the CRI and control sites, thereby confounding estimates of the CRI–no-CRI difference in utilization. To explore the impact of Desert Shield, we tracked these MTFs' outpatient and inpatient workloads for the first ten months of FY 1990 (October 1989 through July 1990) and by month for

Table 5

Outpatient Utilization in CRI: Prime Enrollees versus Nonenrollees

	Prime	Non-Prime	Without CRI
All adults			
Civilian visits per beneficiary	2.12***	0.90	0.90
Percentage with visits	42%***	21%	22%
Visits per user	4.82**	3.93	3.80
Military visits per beneficiary	2.02	2.01	1.86
Percentage with visits	49%	50%	48%
Visits per user	3.88	3.76	3.54
Total visits per beneficiary	4.06***	2.94	2.81
Percentage with visits	71%***	61%	60%
Visits per user	5.47***	4.55	4.34
Active-duty spouses			
Civilian visits per beneficiary	1.98***	0.82	0.89
Percentage with visits	41%***	22%	22%
Visits per user	4.73	3.55	3.87
Military visits per beneficiary	2.48	2.62	2.54
Percentage with visits	60%	64%	61%
Visits per user	3.94	3.94	3.99
Total visits per beneficiary	4.49***	3.91	3.52
Percentage with visits	80%***	73%	71%
Visits per user	5.47	4.64	4.77
Retirees and spouses			
Civilian visits per beneficiary	2.24***	0.97	0.90
Percentage with visits	43%***	21%	22%
Visits per user	4.91**	4.27	3.74
Military visits per beneficiary	1.60	1.46**	1.25
Percentage with visits	38%	37%	36%
Visits per user	3.82	3.59*	3.14
Total visits per beneficiary	3.66***	2.43	2.17
Percentage with visits	63%***	50%	50%
Visits per user	5.46***	4.46	3.95

NOTE: These predictions were computed using a weighted average of the individual beneficiary predictions for the California and Hawaii follow-up subpopulation (i.e., all CRI participants). The significance tests are based on 300 bootstrapped replications of the difference between the "Prime" (or "Non-Prime") group and the "without CRI" group. Because they are modeled separately, predicted per-beneficiary MTF visits and civilian visits may not sum to total visits. Appendix A contains a complete discussion of these methods, and footnote 14 in Section 3 discusses the weighting scheme in more detail.

*Difference significant at .10 level.

**Difference significant at .05 level.

***Difference significant at .01 level.

August 1990 through November 1990, the month after our study period ended.[3] We measured the percent change in visits and beddays from the same months in the preceding year. The result was a remarkable similarity in the patterns at the CRI and control sites. Outpatient workloads were down under 5 percent and inpatient workloads were down 2 percent in both groups of sites. Therefore, we can attribute the differences we observed here to CRI, rather than to differential deployments.[4]

[3]We used the number of outpatient visits and hospital days reported in the Micro DMIS reporting system.

[4]In some cases, the matched pairs were affected quite differently by the deployments. However, with 11 sites in each group, we had an equivalent mixture of some that were heavily affected and some that were not.

The total number of visits per capita in CRI reported in Table 5 for nonenrollees is not significantly different from the level predicted without CRI. The levels are virtually unchanged for active-duty spouses but are over 10 percent higher for retirees and their spouses. The results suggest that better access in CRI may have increased retired demand, but any increase for the active-duty group was offset by utilization review.

If Prime enrollees were more likely to be CHAMPUS users, did this represent an increase in the fraction of overall MHSS users or just in the fraction adding CHAMPUS to their MTF use? In other words, did Prime appear to attract non-MHSS users? To answer this question, we looked at the fraction who had any MHSS outpatient use, either in CHAMPUS or the MTF. We found that active-duty enrollees, because of their increased propensity to use CHAMPUS, accessed the MHSS at a higher rate: 82 percent in CRI versus 73 percent without CRI. Most of the higher utilization in Prime by the active-duty spouses represented an increase in civilian care, apparently to supplement MTF care. Enrolled retirees and retired spouses were also more likely to be MHSS users than either nonenrollees or the no-CRI group—65 percent versus 53 percent.

There are several possible explanations for the high levels of utilization in Prime. One obvious explanation is the first-dollar coverage and enhanced benefits in Prime, which ensure that claims will be filed for just about all care. The standard CHAMPUS and Extra programs do not cover adult preventive care, and they required that the beneficiary pay for the first $50 of care during our study period. Individuals who obtained only preventive care or made only one covered visit would appear as users in Prime, but frequently not in the non-Prime options. As we discussed earlier, the low copayments in Prime also could be expected to increase the demand for care. Other studies of the effects of decreased copayments and HMOs suggest that the demand response should largely take the form of more users, which is what we found for Prime. The best evidence on the effects of copayments on demand is the RAND Health Insurance Experiment, which reported that individuals paying less for their care initiate more episodes of care but have similar expenditures per episode (Keeler et al., 1988). Most military beneficiaries, who are relatively young and healthy, will not have more than one episode of care in six months. Therefore, most of the variation in their utilization will reflect the probability of having an episode instead of the number of episodes.

However, it is also possible that the higher Prime utilization rates result from the enrollment of beneficiaries who were less healthy. As we describe in Appendix A, we attempted to control for health status through the inclusion of age and self-reported health status measures in the regression models. Many of these variables are in fact significant predictors of utilization in this population. We also corrected for the generally higher utilization by those beneficiaries we surveyed at baseline who subsequently enrolled in Prime. Nevertheless, there may remain unmeasured differences in health status between enrollees and nonenrollees. The possibility of unobserved adverse selection in Prime enrollment is heightened by the extensive referral process established through the Health Care Finders and the efforts of the contractors to market Prime to high users. However, it seems unlikely that higher use in Prime was due to unobserved selection in enrollment.

Utilization by Children

Table 6 presents estimates of outpatient utilization by children with and without CRI. Although the number of visits made by children is only 85 percent of the adult visit rate, the

Table 6

Children's Outpatient Utilization in CRI versus Control Areas

	With CRI	Without CRI
Civilian visits per beneficiary	0.90***	0.68
Percentage with visits	25.9%***	19.2%
Visits per user	3.14	3.12
Military visits per beneficiary	1.72	1.80
Percentage with visits	51.8%	53.5%
Visits per user	3.07	3.13
Total visits per beneficiary	2.62	2.48

NOTE: These predictions were computed using a weighted average of the individual beneficiary predictions for the California and Hawaii follow-up subpopulation (i.e., all CRI participants). The significance tests are based on 300 bootstrapped replications of the difference between the "with CRI" group and the "without CRI" group. Because they are modeled separately, predicted per-beneficiary MTF visits and civilian visits may not sum to total visits. Appendix A contains a complete discussion of these methods, and footnote 14 in Section 3 discusses the weighting scheme in more detail.

*Difference significant at .10 level.

**Difference significant at .05 level.

***Difference significant at .01 level.

patterns are strikingly similar. Like the adults, children made about 30 percent more civilian visits under CRI, largely because more of them sought CHAMPUS-financed care. Again, the added use in the civilian sector was not offset by decreased MTF use. We could not compare utilization for Prime enrollees and nonenrollees because our sample is too small.

INPATIENT UTILIZATION

Managed-care programs like CRI look for savings primarily in the hospital. In addition to the discounts negotiated from network hospitals and physicians, the CRI contractors conducted extensive utilization review for all patients in network hospitals (Prime and Extra) and in all hospitals for mental health care. Included were prior review of admissions, on-site concurrent review of patients in the hospital, and retrospective review. In most instances, the reviewers used explicit criteria to determine whether hospitalization was indicated and when the patient should be discharged. Patients requiring lengthy and expensive care were handled by case managers.

For the beneficiaries we sampled, we lack precision for estimating the number of inpatient days, although we can more precisely estimate changes in admission rates, as noted in footnote 12, Section 3. Therefore, we do not present separate estimates for Prime enrollees and nonenrollees in this report. These groups were studied separately in our analyses of the CHAMPUS claims records; there we found that Prime enrollees used more inpatient and outpatient services, compared to nonenrollees.

Utilization by Adults

Table 7 contains our estimates of the number of hospital days per 1,000 active-duty spouses and retired beneficiaries in CRI versus the control areas. Both CRI groups probably aver-

Table 7

Inpatient Utilization With and Without CRI

	All Adults	
	With CRI	Without Control
Civilian days per 1000	98	126
Admissions per 1000	21**	29
Length of stay	5.14	4.47
Military days per 1000	246	208
Admissions per 1000	47	41
Length of stay	5.20	4.93
Total days per 1000	343	340
Admissions per 1000	67	69
Length of stay	4.81	4.44

	Active-Duty Spouses		Retirees and Spouses	
	With CRI	Without CRI	With CRI	Without CRI
Civilian days per 1000	140	182	60	75
Admissions per 1000	34	42	9***	17
Length of stay	5.25	5.53	5.04	3.51
Military days per 1000	299	263	199	158
Admissions per 1000	68	59	28	24
Length of stay	4.16	4.20	6.15	5.58
Total days per 1000	439	451	257	240
Admissions per 1000	100	101	37	41
Length of stay	4.20	4.29	5.35	4.57

NOTE: These predictions were computed using a weighted average of the individual beneficiary predictions for the California and Hawaii follow-up subpopulation (i.e., all CRI participants). The significance tests are based on 200–250 (depending on the specification) bootstrapped replications of each model. Because they are modeled separately, predicted MTF days and civilian days may not sum to total days. Appendix A contains a complete discussion of these methods, and footnote 14 in Section 3 discusses the weighting scheme in more detail.

*Difference significant at .10 level.

**Difference significant at .05 level.

***Difference significant at .01 level.

aged fewer days in civilian hospitals, but the standard errors on our estimates are large and the differences are not statistically significant.[5] We do find a large and significant drop in the civilian admission rate overall, primarily due to a decrease for retirees and their spouses.

Although not significantly different, our estimates indicate that CRI beneficiaries may have had more MTF inpatient days. If so, this would indicate that CRI was more effective in shifting care to the MTF than in decreasing overall inpatient utilization. The shift probably did not occur through formal referral to the MTFs by the Health Care Finders, since only 4 percent of these referrals were reported to be to the MTF. Resource sharing augmented some MTF inpatient capabilities, and the requirement that *all beneficiaries* use the MTF for inpatient care unless care is not available there ensured that any additional capacity would be used.

[5]The decrease in inpatient utilization that we estimate is confirmed by our analysis of the larger claims data file.

Utilization by Children

In our sample of almost 8,500 children in CRI and control areas in both years, only 300 were hospitalized in either a military or a civilian hospital. We analyzed the probability of an admission and found no difference between CRI and the control areas. With only 300 hospitalized, we were not able to evaluate changes in the use of military versus civilian hospitals or in length of stay and costs. Data on hospital use by children from the claims and MTF discharge files show similar patterns for medical and surgical inpatient use by children and adults (Kravitz et al., forthcoming). Mental health inpatient use declined in CRI for both groups, but it increased more rapidly for children in the control areas (Sullivan et al., forthcoming).

COSTS TO DoD

Cost containment was one of the goals of CRI, along with improved coordination of military and civilian health care and better access to care. As we have seen, utilization of outpatient services increased in CRI, and utilization of inpatient services decreased in the civilian sector but may have increased in the MTFs. These measures of utilization can easily miss many of the more subtle changes in treatment patterns that can be made through utilization review. Costs also respond to changes in reimbursement rates and shifts to and from network providers.

Our cost estimates are fairly inclusive, but we have excluded costs for items for which utilization can be measured only in the civilian sector (such as prescriptions). Our estimates include the following:

- Operating costs of providing care in the MTFs.
- Costs of professional and institutional services in the civilian sector.
- Costs of administering the CHAMPUS programs in CRI and the control sites.

We calculated the MTF costs for each beneficiary in our sample by multiplying the average number of visits and days they reported by the average operating cost per day at the MTF in their area. We determined civilian costs directly from the claims data for survey respondents. Although our analysis concentrates on DoD costs, at the end of this section we also provide estimates of the beneficiaries' out-of-pocket costs and the costs to other insurers under CRI.

CHAMPUS Costs

We estimated the average CHAMPUS reimbursement per beneficiary for inpatient and outpatient care in the CRI and control areas during the six-month evaluation period (May through October 1990). As we indicated above, these costs cover professional and institutional services, but not other services. The estimates are adjusted for differences at baseline and in the beneficiary populations served in the two sets of areas. To these estimated health care costs, we added the administrative costs and contractor profits in CRI and the administrative costs in the control areas. To calculate the administrative costs for the average beneficiary in CRI and the control areas, we first calculated a loading fee for administrative costs

(administrative costs divided by health care costs) and then multiplied the loading fee by our estimates of per-capita health care costs in each program. This procedure allocates higher administrative costs to active-duty dependents, who use more CHAMPUS-financed services. Overhead costs in CRI are explained further below.

MTF Costs

The MTFs do not track the costs of caring for individual patients. As we described in Section 3, we collected self-reported information on MTF use through the beneficiary survey. To obtain an estimate of the cost of MTF care for each individual, we multiplied the number of visits and hospital days they used by the average operating cost per bedday and visit at their MTF. We determined the MTF average operating costs using data from MEPRS and procedures that we describe later in this section and in Appendix B.

Government Cost Findings

Tables 8 and 9 present estimates of the per-beneficiary cost of health benefits, both with and without CRI. The tables also provide separate estimates for the active-duty and retired subpopulations. Because overhead costs differ under CRI, Table 8 presents per-beneficiary expenditures inclusive and exclusive of these additional costs. Without including overhead, we estimate total costs to be unchanged under CRI. This result changes when we include overhead costs, which were higher under CRI.

Table 8

Average Cost per Beneficiary With and Without CRI (May through October 1990)

	All Adults	
	With CRI	Without CRI
Total CHAMPUS and MTF costs	$425	$421
Overhead	$42	$10
Resource sharing/Partnership	$17	$15
Total costs	$484*	$446

	Active-Duty Spouses		Retirees and Spouses	
	With CRI	Without CRI	With CRI	Without CRI
Total CHAMPUS and MTF costs	$556	$580	$307	$278
Overhead	$55	$13	$30	$6
Resource sharing/Partnership	$20	$20	$14	$11
Total costs	$631	$613	$351*	$295

NOTE: Overhead is computed as a percentage of health care costs, as detailed in the text. Resource sharing/Partnership figures are computed on a fixed per-capita basis. Significance levels for total CHAMPUS and MTF costs are determined based on 300 bootstrapped replications of the model presented in Appendix A, which contains the details of these computations. Significance levels for total costs assume that overhead and resource sharing/Partnership figures are fixed and known. Figure 1 presents a histogram of the bootstrapped policy estimates for the per-beneficiary cost differential, including overhead.

**Difference significant at .05 level.

***Difference significant at .01 level.

We treat overhead costs as a fixed proportion of CHAMPUS expenditures. We estimate CHAMPUS expenditures to be 43 percent of total CHAMPUS and MTF expenditures under CRI, and 45 percent of these expenditures without the demonstration. Because of the complexity of the CRI program, the overhead rate under CRI is 24 percent, as compared to 5 percent without CRI. Table 8 also presents the per-capita cost of resource-sharing arrangements, both with and without CRI. Including these additional costs, we find that CRI is approximately 9 percent more expensive ($484 compared to $446), relative to what costs would have been without CRI.[6] Total costs for Prime enrollees averaged $700 (57 percent higher than the non-CRI estimate) and total costs for nonenrollees were $443 (equal to the non-CRI estimate).

To test the significance of these results, we recomputed each CRI participant's expected costs both with and without CRI using the "bootstrap" method outlined in Appendix A. This procedure indicates that the difference in costs (exclusive of overhead) is not statistically significant. However, when overhead costs are included we find the difference in relative costs to be significant at the 10 percent level. In fact, we estimate a 90 percent confidence level for the relative per-beneficiary costs to be [1.01, 1.16], which implies that CRI is between 1 and 16 percent more expensive with 90 percent confidence.[7] Figure 1 presents a histogram of these "bootstrapped" cost increases from which the confidence intervals were calculated.

Table 8 also demonstrates that much of the CRI increase may be attributed to higher costs associated with treating the retirees and their spouses. Without including overhead, we find that their costs were approximately 11 percent higher than those that would have obtained without CRI, whereas the cost increase for active-duty spouses was 4 percent lower. As mentioned previously, these costs include provider payments (hospital, physician, etc.) but not other CHAMPUS-reimbursed services.

Table 9 investigates these cost figures in more detail. The trends in the decomposed data corroborate the effects we observed in the utilization data. In particular, CHAMPUS outpatient costs were significantly higher for Prime enrollees, and significantly lower for nonenrollees (relative to the "without CRI" case). We can attribute the latter effect to Extra. As a result, CHAMPUS outpatient costs did not change significantly under CRI. CHAMPUS inpatient costs were lower, but the difference was not statistically significant in the sample. On the military side, we observed a significant increase in outpatient costs for nonenrollees, which led to a significant increase in military outpatient costs for CRI as a whole. This result, combined with higher (but insignificant) inpatient costs under CRI, implied that total military costs rose significantly under CRI.

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[6]The overall cost difference in CRI is highly sensitive to our estimate of the percent enrolled in Prime. This estimate is uncertain because the estimates of the number of eligible beneficiaries who live in the demonstration area are uncertain. Using strict criteria for assigning beneficiaries to the area, we estimate the CRI cost increase to be 11 percent. The estimate used here—9 percent—is based on official population estimates for the study areas, which are higher than the population estimates we derived from DEERS.

[7]The 95 percent confidence interval is [0.99, 1.18]. Earlier in the evaluation, we carried out a preliminary analysis of CRI using simple methods and data that had not been carefully cleaned. The estimates we provided at that time were for a six-month period in 1989, a year earlier than the time period covered by this report. At that time, we found that CRI-area costs were lower than control-site costs. Some of the difference between the earlier results and the results reported here is due to the methods we used. However, we also know that Prime enrollment grew appreciably during the intervening year; since most of the increased demand in CRI was from Prime enrollees, added enrollment almost certainly increased costs.

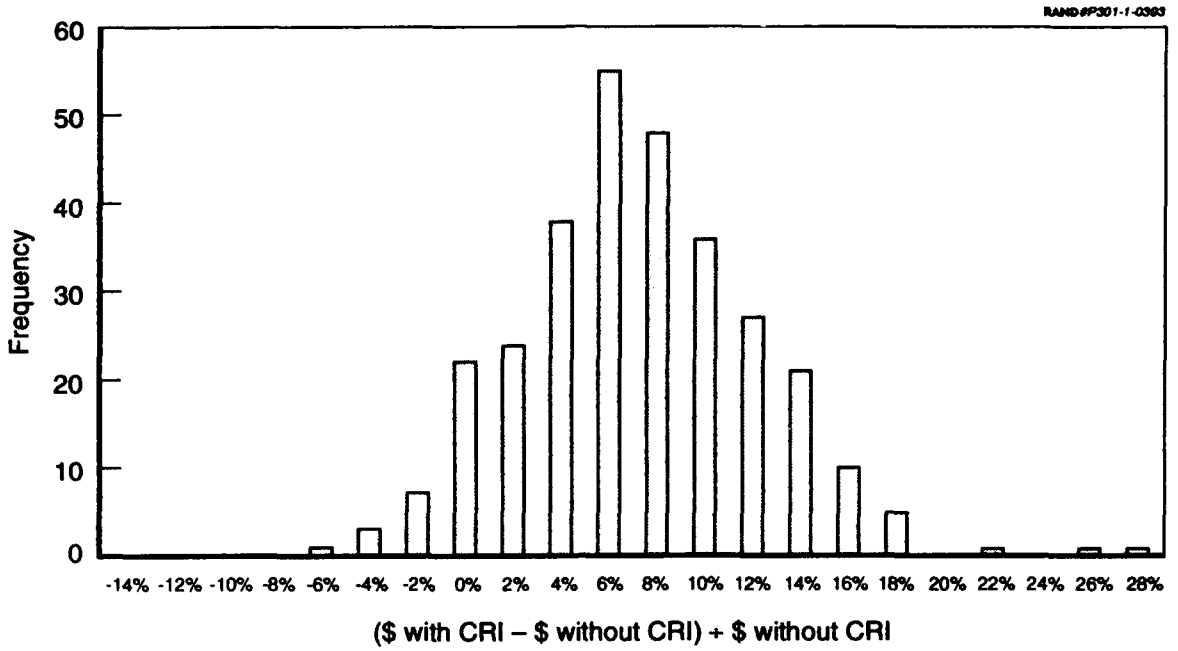

Figure 1--Bootstrapped Estimates of the Per-Beneficiary Total Cost Differential Including Overhead, Relative to the No-CRI Case (N = 300)

When we decompose the figures for all beneficiaries into active-duty and retired subgroups, the patterns look similar, with two notable exceptions. Active-duty spouses tended to have lower CHAMPUS costs under CRI, whereas retirees tended to have higher costs. In both cases, the trend is not significant. Furthermore, retirees had significantly higher MTF costs under CRI, whereas there was less change for the active-duty spouses. For the retirees and their spouses, Prime enrollees as well as nonenrollees tended to have higher military costs.

Unfortunately, we were not able to estimate inpatient costs for Prime enrollees.[8] We did find that, in keeping with their much heavier use of civilian outpatient care, enrollees had higher civilian outpatient costs. As we discussed earlier, we cannot rule out completely the possibility that enrollees would have had more use without CRI. However, without some evidence of adverse selection in Prime enrollment, we attribute these higher costs to increased demand induced by the generous Prime benefits package.

For children, we estimate that CHAMPUS and MTF costs in CRI were $329, almost the same as our estimate of $337 without CRI. Including overhead costs, and the costs of Partnership and resource sharing services, the total costs for the six-month period were $399 and $373, respectively. Thus, we find that CRI costs for children were 6 percent higher. This difference is not statistically significant. Since 37 percent of CHAMPUS eligibles were children in 1990, combining our results for adults and children we find that CRI costs were 8 percent higher.

[8]In Kravitz et al. (forthcoming), we show that enrollees' CHAMPUS inpatient costs were higher.

Table 9

Military and Civilian Costs by Health Plan and Beneficiary Type

	With CRI	Prime	Non-Prime	Without CRI
All adults				
CHAMPUS costs	$170	$362***	$132***	$186
Outpatient	$92	$202***	$70***	$90
Inpatient	$80	—	—	$97
Military costs	$249*	$260	$247	$224
Outpatient	$115	$115	$115	$106
Inpatient	$134	—	—	$113
CHAMPUS and MTF costs	$425	$599***	$393	$421
Active-duty spouses				
CHAMPUS costs	$209	$441**	$158***	$250
Outpatient	$93	$213***	$65***	$102
Inpatient	$135	—	—	$154
Military costs	$328	$330	$327	$309
Outpatient	$148	$142	$150	$145
Inpatient	$163	—	—	$143
CHAMPUS and MTF costs	$556	$739*	$517**	$580
Retirees and spouses				
CHAMPUS costs	$135	$290***	$109	$128
Outpatient	$91	$192***	$74***	$80
Inpatient	$31	—	—	$45
Military costs	$177**	$196*	$174*	$147
Outpatient	$85**	$91	$83**	$71
Inpatient	$109	—	—	$86
CHAMPUS and MTF costs	$307	$472***	$281	$278

NOTE: These predictions were computed using a weighted average of the individual beneficiary predictions for the California and Hawaii follow-up subpopulation only. The significance tests for a difference from the "without CRI" group are based on 300 bootstrapped replications of each specification. Due to modeling error, components need not aggregate exactly. Appendix A and footnote 14 in Section 3 discuss these computations in more detail.

*Difference from "without CRI" significant at .10 level.

**Difference from "without CRI" significant at .05 level.

***Difference from "without CRI" significant at .01 level.

CHAMPUS Cost Components

The administrative costs for CRI are included in the payments made to the contractor. They include fixed amounts for administration, including claims processing, and amounts that can vary somewhat for a profit margin that reflects the contractor's risk. In the control areas, administrative services are purchased on a per-transaction basis.

CRI Administrative Costs. The provider negotiations and utilization review programs in civilian managed-care programs generate high administrative costs. CRI's administrative overhead is even higher because of the resources needed to coordinate with the MTFs and comply with DoD contracting requirements. The payments for administration specified by the CRI contract for Option Period IV (February 1, 1990 through January 31, 1991) totaled $68.4 million. DoD paid an additional $3.8 million to cover the costs of implementing CHAMPUS program changes that applied to CRI as well as the standard program, raising the costs to $72.2 million.

The CRI contractors had six months to implement the program before it became effective in August 1988. DoD's payments to the contractor for implementation were $26.9 million. Since both the program and the contractors were new, one might expect that implementation was more expensive for the demonstration than it would be for an ongoing program. On the other hand, the contractors were unanimous in their opinion that the implementation period was too short, and our interviews during the early stages of the demonstration suggested that the program was not fully operational until after the August start date (Anderson and Hosek, forthcoming). More experience with managed care in the military health care system would be needed to assess the resources needed to implement a new contractor-operated program and to change contractors in an ongoing program. We have included a simple prorated share of the implementation cost, or $4.8 million for Option Period IV.[9] Note that, if the contract covered a longer period than the demonstration period, the implementation cost would be lower.

CRI Contractor Profits. The bid price in the CRI contract includes a profit that we calculate to be equal to over 6 percent of the bid price for direct program costs, including health care and administration. In Option Period IV, the bid-price profit amounted to $32.9 million. The profit can be increased or decreased through the contract's risk-sharing provisions. As we discussed earlier, the bid price is based on estimates made at the time of the contract award of the health care costs that would be incurred in CRI. These estimates were based on projections of several variable factors: the covered beneficiary population, MTF workloads in the demonstration area, overall utilization levels in nondemonstration areas, and inflation in the medical sector of the economy. The estimates are updated periodically to reflect the actual levels of these factors. If the CRI contractor incurs lower costs than the adjusted expected costs, the contractor and DoD share the savings. If costs are higher, they also share the losses. During Option Period IV, actual costs fell short of expected costs by $8.0 million, of which the contractor kept $2.0 million. This increased the profit from the bid-price level of $32.9 million to $34.9 million. Thus, adding in profits, total overhead costs were $107.1 million, or 24 percent of actual health care costs in CHAMPUS. However, we should note that since some of this overhead is for managing the coordination of CHAMPUS with the larger MTF system, the "true" overhead rate is lower.

The profit margin on CRI during our study period appears high by industry standards. Danzon (1992) estimates that the overhead cost to cover risk and profit for private insurers in the United States is 4.5 percent overall. Danzon also cites data prepared by Hay/Huggins Company for a 1988 Congressional Research Service report that shows this percentage dropping to just over 1 percent for employee groups over 10,000.

There are several reasons for expecting that the CRI profit margin might come down over time. The CRI program, especially as it was originally offered to bidders, is essentially a capitated program. The bid price is for all civilian services provided to all CHAMPUS beneficiaries, but the price is adjusted for changes in the number of beneficiaries in the demonstration area. However, the risk associated with this program is greater than the risk associated with civilian capitated plans because the contractor is at risk for shifts of beneficiaries within his area of responsibility. If beneficiaries switch from MTF care or other insurance to take advantage of Prime and Extra, the contractor would incur higher-than-expected costs.

[9]This original CRI contract has been extended so that it will last 5.5 years.

The added risk apparently deterred all but FHC and its subcontractors from bidding. Subsequently, in the final contract negotiations, the cumulative loss for the five-year demonstration was capped at $5 million. Nevertheless, the high level of risk in the original program may have led to a relatively high profit margin.

Second, the lack of bidders for the CRI contract may have lessened competitive pressure to reduce both administrative overhead and profit. A similar contract for the states of Washington and Oregon is out for bid now, and a CRI renewal is expected soon. The results of this competition should indicate whether FHC's ability to earn profits on the first contract has increased competition for the DoD health care business, and whether more intense competition will lower the loading factor for this program.

Administrative Costs in the Control Areas. Included in this category, which applies only to the control areas, are payments for claims processing, utilization review of mental health care, and peer review of inpatient admissions. OCHAMPUS provided us with the payment amounts, which were $119.2 million in FY 1990. This implied a loading fee of 5 percent for the control sites.

Average MTF Operating Costs. MEPRS reports the operating costs of delivering inpatient and outpatient services, and the number of services provided, by clinical specialty. Personnel inputs are measured by the number of full-time equivalents by type, and the costs of military personnel are then estimated using the average cost per person by military rank in DoD. The costs of civilian personnel are based on the actual payroll at each MTF. Also reported are the costs of equipment depreciation, supplies, and maintenance. Facility expenditures over $200,000 are excluded.[10]

During several of the interviews we conducted for this evaluation, the possibility was raised that the services may have shifted resources into or out of the CRI area. Other circumstances not related to CRI may also have led to changes in cost that should not be factored into this evaluation. For example, the San Diego Naval Hospital and David Grant USAF Medical Center at Travis opened new hospitals in 1988 and 1989, respectively.

To investigate the MEPRS data for differential cost trends in the CRI and control areas, we conducted a regression analysis of the data for all CONUS MTFs during the years 1988–1990. This analysis is documented in Appendix B. We found no evidence that resource shifting into or out of the CRI areas caused relative increases or decreases in average operating costs at the MTFs in an area. Although the regressions fit the MEPRS data well, actual average operating costs for individual MTFs exhibited some year-to-year variation. Since our analysis uncovered no systematic patterns in these movements related to CRI, we take them as random fluctuations. In some instances, costs were affected by construction or changes in reporting procedures for free-standing outpatient clinics.

To price the MTF utilization for each individual in our sample, we used the actual average operating costs per visit and per day for their MTF during FY 1988 for baseline data and FY

[10]A recent assessment of the accuracy of MEPRS data collection found significant problems in the allocation of costs to inpatient work centers, but the study did not assess the allocation between inpatient and outpatient care overall, or the allocation to outpatient work centers (Dolfini and Graham, 1991). Based on the methods used to collect and allocate MEPRS data described in the report, we believe that the data are most reliable when aggregated to the inpatient-outpatient level.

1990 for follow-up data. We added to these costs the contractor's payment per capita for resource sharing and each beneficiary's Partnership program costs.

To determine whether our results were affected by the method we used to cost MTF use, we also performed the calculations with the predicted average operating costs obtained from the regressions described above. Our findings did not change appreciably.

COSTS TO OTHERS

In planning CRI, DoD expected fee discounts, lower utilization levels from UR, and lower copayment rates to decrease out-of-pocket costs, especially for beneficiaries who enrolled in Prime. Fee discounts and lower utilization levels would also tend to decrease reimbursements by other insurers. As we describe in Section 5, Prime enrollees were less likely to have had other insurance before CRI, and some who did have coverage subsequently dropped it. Therefore, we expected that other reimbursements would be quite small for this group.

Table 10 shows the average amount of CHAMPUS-allowable costs paid by surveyed beneficiaries and their other insurance, in the CRI and control areas. Our information on beneficiary costs, because it is limited to what we can reliably measure from claims records, is suggestive rather than definitive. The first thing to notice is the decline between 1988 and 1990 in patient and other insurance payments in the control areas. The decline, which occurred for both beneficiary groups, was approximately 25 percent in the share of the amount allowed paid by beneficiaries and 15 percent in the share paid by other insurance.

In the CRI areas before the demonstration began, active-duty spouses (and their other insurers) paid about 50 percent more out of pocket than spouses in the control areas, primarily

Table 10

Share of Allowable Charges Paid by Patients and Other Insurance (Average per beneficiary)

	CRI Areas			Control Areas	
		Postdemonstration			
	Predemonstration	Prime	Others	Predemonstration	Postdemonstration
Active-duty spouses					
Paid by patient					
Amount per year	$171.71	$31.71	$90.30	$112.80	$98.30
Percentage allowed	29.8%	6.4%	21.4%	28.7%	20.8%
Paid by other					
Amount per year	$64.70	$13.65	$28.54	$41.07	$27.73
Percentage allowed	4.6%	1.6%	4.0%	4.4%	3.7%
Retirees and spouses					
Paid by patient					
Amount per year	$386.19	$121.16	$296.76	$361.36	$358.42
Percentage allowed	45.3%	9.3%	33.9%	47.3%	36.9%
Paid by other					
Amount per year	$219.38	$ 20.51	$185.61	$233.22	$206.10
Percentage allowed	19.6%	2.5%	17.3%	22.0%	18.6%

because allowable charges were higher in the CRI areas. During the demonstration, this difference was eliminated and the amounts paid by nonenrollees—and the percentages—were similar to the amounts paid in the control areas. Moreover, as expected, out-of-pocket and other insurance payments were much smaller for active-duty spouses who enrolled in Prime. The average six-month payment by active-duty spouses in California and Hawaii (including enrollees and nonenrollees) decreased 60 percent under CRI. Retired beneficiaries in the CRI and control areas had similar out-of-pocket and other insurance payments at baseline and during the demonstration program, except for Prime enrollees, who again paid far less towards their health care. The average payment by retirees and their spouses decreased 35 percent under CRI. The figures in Table 10 do not include any payments made for services not resulting in a CHAMPUS claim or for amounts above the charges that CHAMPUS allowed. Under CRI, patients who are enrolled in Prime or use network providers cannot be billed for these excess amounts. Over time, we observed an increase in the gap between providers' billed charges and the amounts allowed. Some of the gaps are very large—for network as well as other providers. In addition to CHAMPUS, many insurers pay less than providers' nominal fees, and we do not know how often patients are asked to pay the difference. Without more information on payments above the allowable, we cannot be sure whether patient costs declined for CRI beneficiaries who did not enroll in CHAMPUS Prime. For those who did enroll, however, it is clear that their costs were considerably lower than they would have been without CRI.

It is interesting to consider what the total costs to all payers were with and without CRI. Although, for the reasons just given, our estimates of the costs to other payers are tentative, we have adjusted the cost figures presented above in this section to include all payers. To make this adjustment, we assume that the shares paid by beneficiaries and other insurance would have been the same as the shares for CRI nonenrollees in Table 10. The decline in the shares for nonenrollees mirrors the decline in the control areas, but the levels are slightly different in the CRI areas. With CRI, the shares are lowered because of Prime. Combining the share estimates in Table 10 with the enrollment rates in 1990, we estimate that active-duty spouses and their other insurers paid 23 percent of allowed charges with CRI and would have paid 25 percent without CRI. The estimates for retired beneficiaries are 46 percent and 51 percent, respectively. If we adjust the cost estimates in Table 8 to include other payments, we crudely estimate active-duty spouses' costs at $797 and $806 with and without CRI, and retired adults' costs at $613 and $584. For both groups, we estimate that total costs of MHSS services for all payers were 1 percent lower in CRI.

5. ENROLLMENT IN PRIME

CRI's success in containing costs depends on first attracting beneficiaries to its managed-care options and then saving money on the care delivered to those beneficiaries. In the previous section we explored differences in utilization and cost in CRI versus without CRI and, to some extent, between Prime enrollees and nonenrollees. As we discussed above, the CRI contractor attempted to attract those beneficiaries to Prime whose increase in demand, if any, could be more than offset by savings through care management. Therefore, in this section we describe Prime enrollment patterns and how enrollment altered beneficiaries' insurance coverage and self-identified sources of health care. We look for evidence that Prime in fact did attract beneficiaries who were less healthy and whether they would have been likely to receive their care through other insurance or from the MTF if they had not enrolled.

CHAMPUS Prime was initially implemented only in those areas with relatively large beneficiary and civilian provider populations. In 1990, Prime was available in nine of the eleven areas we studied; the exceptions were Port Hueneme and Vandenberg Air Force Base.[1] Figure 2 shows total enrollment in all CRI areas as a percentage of the eligible population, including those areas not included in our matched sample. Enrollment has grown steadily throughout the demonstration. By October 1990—the end of the period we studied—the enrollment rate in the nine areas we studied was almost 15 percent, above the level for all CRI areas. Figure 2 shows that enrollment of active-duty dependents lagged behind enrollment of retired beneficiaries in the first year, but then increased more rapidly and has now risen well above enrollment of retired beneficiaries. By the summer of 1992, four years into the program, the enrollment rate was over 20 percent overall and 25 percent in the nine study areas with Prime. Thus, in the two years since our survey was fielded, enrollment rates have at least doubled. If the higher levels of utilization we measured for enrollees has continued, increasing enrollment probably has increased costs.

To put these enrollment rates in context, 35 percent of all civilian employees with an HMO option in 1989 were enrolled in an HMO (Davis et al., forthcoming). Among all employees, 17 percent were enrolled in an HMO. It has taken a number of years for civilian HMO plans to attain this market share. CRI's market share of 20 percent after less than four years is relatively high.

WHO ENROLLED IN PRIME?

Research on HMOs consistently shows that they enroll a disproportionate number of young families, attracted by the comprehensive coverage of preventive services. A less consistent finding is that HMO enrollees are healthier than average, either because less healthy individuals are likely to have established provider relationships they want to keep or because they see HMOs as restricting access to care. In a study of 22 HMOs, Lichtenstein et al.

[1] By 1991, Prime was offered in all catchment areas.

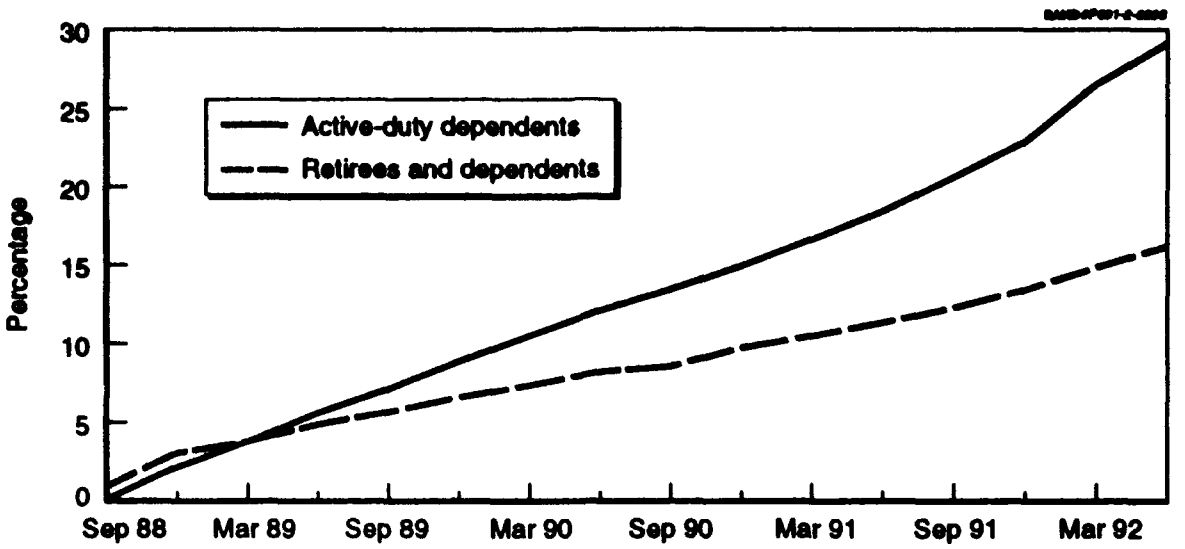

Figure 2—Enrollment in CHAMPUS Prime

(1992) found that more established HMOs enrolled beneficiaries closer to the general population in health and that less experienced HMOs enrolled a healthier population. By asking the CRI contractors to bear some of the risk of *both* fee-for-service and HMO options, DoD set up incentives to encourage cost-effective enrollment. To reiterate, the contractors designed marketing plans with the aim of attracting high users to Prime and discouraging low users or those who used non-DoD sources of care from enrolling. The contractors thus hoped to control costs by managing care for the high users through Prime and avoiding increases in use by others that would result if they enrolled and responded to the low copayments in Prime.

As we discussed in the last section, Prime limits freedom of provider choice in return for lower copayments, enhanced preventive coverage, and less paperwork. We would expect this exchange to be most attractive to lower-income families and those without other, relatively generous insurance coverage. However, some enrollees with other insurance might be attracted to Prime if they believed it to be more generous than their other coverage. If the marketing plan was effective, enrollees would tend to be less healthy. Finally, Prime might be attractive to those beneficiaries who usually used the free care available at the MTFs but had experienced access barriers in that system. With the contractors' beneficiary services personnel located in the MTFs, MTF users had good access to information about Prime and to the enrollment process. In some cases, beneficiaries with chronic illnesses or who would need expensive health care from the civilian sector may have been identified in the MTF and referred to Prime through the Beneficiary Services Center.

We used multivariate techniques to identify the effects on enrollment of personal and family characteristics, including catchment area, age, sex, race, education, employment status, income, household size, length of residence in area, distance from MTF, and health status. We carried out the analysis separately for active-duty spouses and retired beneficiaries; the

effects of the characteristics we studied differed somewhat between these two beneficiary groups. A description of the analysis and detailed results are in Appendix C.

Table 11 shows the differences in estimated enrollment probability if we change one characteristic at a time, leaving the other characteristics constant.[2] For example, the numbers in the first row indicate that the probability that an active-duty spouse would enroll if (s)he lived in the Beale AFB catchment area was 8 percentage points higher than if (s)he lived in the San Diego area. As this example illustrates, we measured significant differences across catchment areas, controlling for the characteristics of the beneficiaries in the areas. For retirees, the areas in which the Prime contractor was established prior to CRI—Beale,

Table 11

Effects of Personal and Family Characteristics on Prime Enrollment (Difference in percentage enrolling)

Characteristic	Active-Duty Spouses	Retirees and Spouses
MTF area (vs. San Diego)		
Beale	8.40	18.75***
March	5.10	4.08**
Mather	0.33	16.17**
Travis	–4.12	7.90***
Ft. Ord	–16.48***	–9.53***
Tripler	–8.71***	–5.46***
Long Beach	12.76***	–2.29
Pendleton	–7.93***	1.61
Background variables		
Female	16.57	7.41
Officer	1.17	–0.75
Nonwhite	–0.60	–0.85
College educated	0.25	–2.06
Employed full time	–5.99***	0.70
10% increase in:		
Household income	–0.24*	–0.46***
Household size	0.88***	0.59***
Years in area	–0.11**	–0.16**
Travel time to MTF	0.04	–0.28***
Health status variables		
Pregnant in last 12 months	2.57	6.94
10% increase in:		
Age	1.32	3.57***
General health status	–0.40	–0.14
Mental health status	0.17	0.23
Level of pain	–0.28	–0.13
Prior health status	–0.12	0.04
Number of observations	2029	2573
Log-likelihood ratio	–845	–1248

*Coefficient significant at .10 level.

**Coefficient significant at .05 level.

***Coefficient significant at .01 level.

[2]These probability differences are calculated from the regression coefficients reported in Appendix C (Table C.1).

Mather, and Travis—had higher enrollment rates. Enrollment was lowest in both groups at Fort Ord, where most beneficiaries use the MTF or one of two Primus clinics instead of CHAMPUS. Fort Ord was one of three areas that implemented Prime 18 months into the demonstration, instead of at the beginning; all three have experienced persistently lower enrollment rates.[3]

As Figure 2 showed, retirees and their spouses were less likely than active-duty dependents to have enrolled in late 1990; this finding is confirmed when the enrollment regression is estimated on the pooled sample (results not shown). However, we found no significant differences by military rank or race, and at best weak evidence of a negative relationship between enrollment and education. The enrollment rate among women was higher than it was among men, adjusting for other characteristics.

Enrollees and nonenrollees differed in their economic circumstances. Active-duty spouses who were employed full time, and therefore likely to be eligible for employer-provided insurance, were less likely to enroll. We did not detect lower enrollment rates for retirees and spouses who work, however. Enrollment rates were lower at higher levels of income and higher for larger households. Controlling for income, household size measures per-capita income and differentiates families with and without children. Most studies of HMO enrollment have found higher rates among families with children.

We also measured the relationship between enrollment and the number of years the respondent had resided in the area because we hypothesized that: (1) active-duty families in the area longer would be more likely to move in the near future and therefore less likely to bother to enroll and (2) retired families in the area longer would be more likely to have established sources of care and therefore be less likely to enroll in a new plan that restricts provider choice. We did find this pattern in both groups. Proximity to the MTF influenced enrollment only for retirees, with lower enrollment among those farther away and probably less reliant on the MHSS for health care. Active-duty families rarely live far from base.

To measure whether Prime did attract sicker beneficiaries, we looked at enrollment by age—a proxy for health status—and self-reported health status. The health status measures generally were not significant determinants of enrollment. We estimated higher enrollment rates for women who reported they were pregnant during the past 12 months and for older retired beneficiaries.

EFFECT OF ENROLLMENT ON OTHER INSURANCE COVERAGE

In the follow-up survey, we asked Prime enrollees whether they had dropped other insurance coverage since enrolling. Approximately 7 percent of Prime enrollees reported that they had dropped private insurance since joining—30 percent of those who apparently had this coverage before enrolling (see Table 12). Private insurance includes fee-for-service or HMO plans provided through an employer or paid for in some other way, but not CHAMPUS supplemen-

[3]The other two catchment areas were in the San Francisco Bay area: Letterman Army Medical Center and Oakland Naval Hospital.

Table 12

Private Insurance Coverage in CRI Areas (CHAMPUS supplements excluded)

Insurance coverage	Active-Duty Spouses		Retirees and Spouses	
	Before CRI			
No other insurance	83.3		56.3	
Have other insurance	16.7		43.7	
	During CRI			
	Prime	Non-Prime	Prime	Non-Prime
No other insurance	86.2	77.4	73.3	37.8
Never had insurance	80.0	—	65.2	—
Dropped other insurance	6.2	—	8.1	—
Have other insurance	13.8	22.6	26.7	62.2

tal policies. We estimated the proportion of Prime enrollees who had nonsupplemental insurance before CRI by adding those who dropped their insurance to those who still have it.

Among active-duty dependents, for example, we infer that 20 percent had private insurance before CRI by adding those who had insurance and dropped it (6.2 percent) to those who had insurance during CRI (13.8). This is just below the fraction we estimated to have had insurance at baseline for active-duty dependents in California and Hawaii. Therefore, it appears that Prime enrollees did not differ in their coverage before enrolling, but some of those who had this insurance dropped it after enrolling.

The pattern is similar for retired enrollees, but the evidence suggests that Prime was more attractive to retired beneficiaries who had no private insurance. We infer that only 35 percent of them had insurance before CRI, compared with 44 percent for all retired beneficiaries in the baseline survey. Of the enrollees who did have insurance, just over one-quarter dropped it.

These figures should be used cautiously. First, we have no way of knowing how accurate these self-reports are. Second, we did not ask non-Prime CRI respondents or control respondents whether they had dropped insurance, so we are unable to compare them to the Prime respondents. However, we did estimate an enrollment regression, specified as the utilization equations were, to identify the difference between the CRI and control areas in the change in the percentage with other coverage. The results also suggest that other insurance coverage became less common under CRI (see Table 13). We estimate that the rates of other coverage under CRI were 12 percent and 7 percent lower for active-duty and retired beneficiaries, respectively, than they would have been without CRI.[4] Since CRI staff discouraged beneficiaries with other insurance from enrolling in this temporary program, much less dropping their other coverage, it is possible that these figures in fact underestimate the decrease in other coverage that would occur if Prime were a permanent offering.

[4]The active-duty estimate is significant at the 10 percent level, and the retired estimate is significant at the 5 percent level.

Table 13

Prevalence of Other Insurance in CRI (October 1990)

Beneficiary Group	With CRI	Without CRI
Active-duty spouses	15.3*	17.3
Retirees and spouses	41.3**	44.6

**Difference between CRI and no-CRI rates statistically significant at .05 level.
*Difference between CRI and no-CRI rates statistically significant at .10 level.

In particular, successful long-term continuation of CRI might attract to the program those who have been relying on their other insurance for care, especially among retired beneficiaries. Awareness of Prime is considerably higher among beneficiaries without other insurance. In the follow-up survey, only 27 percent of the nonenrolled retired beneficiaries with other insurance indicated they had heard or read something about Prime before filling out the survey. In contrast, among nonenrollees without other insurance, 50 percent had heard about Prime. In both groups, in late 1990—two years after CRI began—there were still many who were unaware of the program. These beneficiaries also indicated in the survey that they were more likely to rely on civilian health care sources. If the program were to continue long enough, however, most retirees not now knowledgeable about CRI would learn about it. Whether or not they would favor Prime over their other coverage is an open question.

EFFECT OF ENROLLMENT ON USUAL SOURCE OF CARE

The large majority of both active-duty and retired enrollees reported that their usual source of care for routine problems before enrolling was the MTF, either exclusively or together with a civilian provider. Figure 3 shows on the left the fraction of active-duty enrollees (left-hand side) and retired enrollees (right-hand side) who reported in the follow-up survey that their routine source before joining Prime was the MTF alone, a civilian provider alone, or both; 58 to 64 percent used the MTF, and an additional 14 to 20 percent used the MTF and a civilian provider. Somewhat fewer active-duty spouses than retirees and their spouses used both sources, probably because they were younger and less likely to routinely require specialist care.[5]

Upon enrollment, Prime members choose a primary care provider; if they have no preference, an assignment is made for them by the enrollment staff. The MTF may serve as a primary care provider, and most MTFs do so (Anderson and Hosek, forthcoming). However, many of the MTFs have inadequate primary care service and most of the enrollees we surveyed chose, or were assigned to, a civilian provider.

As shown by the middle set of bars in each panel of Figure 3, 80 percent of enrollees in both beneficiary groups were assigned to a civilian primary care provider upon enrollment. The

[5]Almost all Prime enrollees reported a usual source of care, but it is much rarer in this population not to have a usual source than it is in civilian populations.

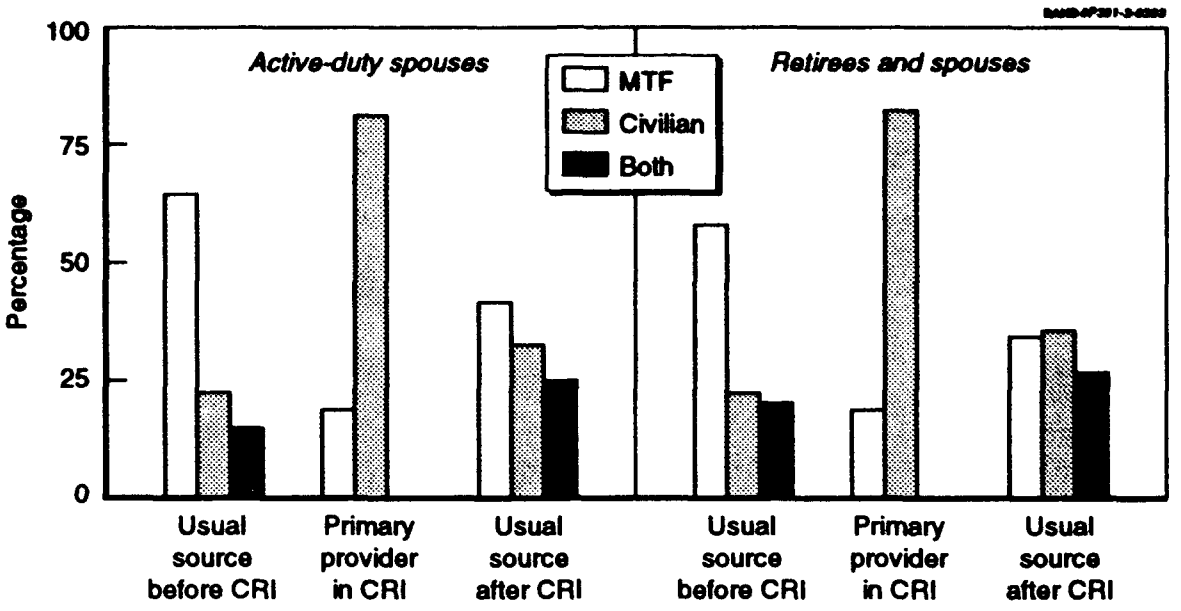

Figure 3—Usual Source of Care Before and After Prime Enrollment

result, as the last set of bars in each panel of Figure 3 shows, was a shift in the usual source of care for enrollees from the MTF to the civilian sector. After enrollment, the proportion whose usual source was a civilian provider increased by 50 percent, and more reported using both the MTF and a civilian source. Many enrollees, however, continued to look to the MTF as their routine source of care even though they were assigned a civilian primary care provider. CRI does not alter the enrollees' ability to access MTF care if they want to do so. Only if they need a referral to a civilian specialist are they required to see their assigned primary care provider.

All but one MTF agreed to the role of primary care provider under CRI. Why, therefore, were so many enrollees assigned to the civilian sector even though some continued to look to the MTF as their primary source of care? Our interviews did not provide an answer to this question. Some enrollees may have joined Prime so that they could use civilian providers at little cost to themselves, but Prime membership decreased their freedom to choose civilian specialists. Others may have questioned their ability to access their MTF's primary care clinics in a timely way; without easy access to primary care, the gatekeeper feature in Prime could create a barrier to care. Finally, the contractor may have assigned a disproportionately large number of enrollees with no preference to civilian network physicians, perhaps because the enrollees required regular care that would be difficult to provide in the MTF. Regardless of the reasons, if DoD wishes to maximize beneficiary use of the MTFs, managed-care programs like CRI must be accompanied by an adequate and attractive MTF primary care system.

Enrollees were actually more likely than the average beneficiary to have been MTF users before CRI. Sixty-four percent of active-duty enrollees and 58 percent of retired enrollees reported that they usually used the MTF before they enrolled in Prime; an additional 14 and

20 percent, respectively, reported they used MTF and civilian sources. In the baseline survey, we asked a similar question about the source of care for routine care, although we allowed for only one choice. Fifty-six percent of the active-duty spouses and 34 percent of the retirees and spouses indicated they used the MTF as their usual source of routine services—a smaller fraction, especially of the retired group, than the fraction of enrollees who said they used the MTF before CRI. This preponderance of MTF users among enrollees is consistent with our earlier finding that enrollment rates were higher at lower incomes and for beneficiaries with no other insurance. These are the same beneficiaries who would be more likely to use the MTF instead of civilian providers in the absence of CRI.

SUMMARY

Enrollment in CHAMPUS Prime has climbed steadily throughout the demonstration, reaching over 20 percent of those eligible to join in under four years. Prime is attractive to beneficiaries for whom the lower copayments and broader coverage are most valuable: retired beneficiaries and those with low incomes, large households, and (among retired beneficiaries) no access to other insurance. The only evidence of health selection is the higher enrollment rates for older retirees, who can be expected to average higher health care use. We found considerable variation across the catchment areas offering Prime that was not explained by the characteristics of the beneficiaries living in the areas. Among retirees and their spouses, but not active-duty spouses, the enrollment rates are higher in areas where the contractors had previously operated health plans.

Most of the enrollees did not appear to have had other insurance or to have been eligible for coverage through their civilian employers. A minority of those who were insured (25 to 30 percent) reported that they dropped their other coverage after enrolling, although the contractors' enrollment personnel tried to discourage this. Although our data are not definitive on this issue, these results do point to the possibility that a successful managed-care program with relatively generous benefits will attract some beneficiaries from other payers to the MHSS.

Finally, we observed that enrollees shifted from heavier-than-average reliance on the MTF for routine care to civilian or MTF and civilian sources. The mechanism for this shift would appear to have been the disproportionate assignment of enrollees to civilian primary care providers. If DoD wishes to avoid moving beneficiaries into the civilian sector, future managed-care options must be designed around strong primary care clinics in the MTFs.

6. CONCLUSIONS

The results presented in this report indicate that CRI did not change health care costs for active-duty spouses, but increased health care costs for retired beneficiaries. Combining the beneficiary groups, we estimate the CRI cost per adult beneficiary, including overhead, at $484—9 percent higher than our non-CRI estimate of $446. These figures include costs for outpatient care, which we can measure with some precision, and for inpatient care, which we measure less precisely. The differences in health care costs for retirees and in total program costs for all beneficiaries are statistically significant. Our crude estimates of the total costs of care to all payers for services financed at least in part by CHAMPUS show no difference.

The substantial increase in demand by Prime enrollees and the high CRI overhead costs were apparently offset in part by savings for nonenrolled beneficiaries. Combining enrollees and nonenrollees, the evidence points to total higher costs in CRI. Our more limited findings for children suggest that their costs in CRI were only 6 percent higher, but this difference is not statistically significant. Combining these estimates for adults and children, we find that CRI was 8 percent more costly to the government than the non-CRI program.

The most dramatic difference we found in CRI was the large and statistically significant increase in the fraction of beneficiaries using outpatient care, especially among Prime enrollees and from civilian providers. Our evaluation of patterns of medical and surgical care in the CHAMPUS claims records, which is reported in a companion report, also found high utilization and costs for Prime enrollees, both for outpatient and inpatient care. The higher utilization and costs of Prime enrollees are of particular concern because of DoD's ongoing efforts to design programs—and their benefits packages—for the future.

The high observed use in Prime may be due to various factors. Even if beneficiaries use the same amount of civilian care, government costs will appear to be higher in Prime because it provides first-dollar coverage, requires minimal copayments, and reimburses for preventive services not otherwise covered. But this cannot be the only explanation, because we also estimated that the visit rates for active-duty spouses and retired Prime enrollees were one-third and two-thirds higher, respectively.

Our Prime findings are consistent with research findings that lower copayments in fee-for-service plans and HMO plans increase beneficiary demand. The Prime benefit package, which is especially generous relative to the standard package for retired beneficiaries, probably increased demand by individuals already relying on the MHSS for health care *and* induced some individuals to shift from other sources of care.

We also noted that most enrollees were assigned to civilian primary care providers, signaling a shift from the MTF to these civilian providers for routine care. In fact, since enrollees continued to rely on the MTF for at least some of their care, the assignment to a civilian primary care provider apparently opened the way to a second source of care. Unfortunately, we do not know what proportion of the assignments were at the beneficiary's request and what proportion reflected limited MTF primary care capabilities.

The survey data also indicate that the percentage of beneficiaries covered by other insurance dropped under CRI. One-third of Prime enrollees who had other insurance before enrolling

reported that they had dropped it. A comparison of the other coverage rates in the CRI and control areas, controlling for baseline differences, indicates that the CRI rates were around 10 percent lower.

Our results indicate that the beneficiaries responded to CRI's generous HMO option by increasing their demand for MHSS care. This demand response offset the savings from civilian provider discounts and utilization review. (These savings are shown more clearly in our companion reports on patterns of care than they are in this report.) Some of the added demand apparently represented a shift from nonmilitary sources of care. This demand response was to be expected in a program that decreased average out-of-pocket costs by 60 percent for active-duty dependents and 35 percent for retired dependents—and almost eliminated these costs in Prime, its HMO option. The increased demand was especially pronounced for retired beneficiaries, with the result that our estimates of the costs to the MHSS for their care, excluding overhead costs, are higher in CRI. For active-duty spouses, the program was able to hold estimated nonadministrative health care costs at or below non-CRI levels.

Appendix A
STATISTICAL METHODS FOR ESTIMATING CRI EFFECTS

STATISTICAL MODEL

In the subsequent analysis, we will make use of the following variables:

y_i = health expenditures (or utilization) for individual i

x_i = vector of individual characteristics

d_i = vector of dummy variables indicating survey participation and health plan choice.

The goal is to evaluate the impact of CRI changes (as denoted by the vector d_i) on the mean level of health care expenditures (y_i) and to perform some simple policy simulations. To accomplish this task, we need to account for the nonnormal statistical properties of health data. In particular, the observed distribution of health care expenditures has a mass point at zero, and for positive values it has excess weight in the tail that is inconsistent with a truncated normal distribution. Because these data are similar to those found in the RAND Health Insurance Experiment, we chose to employ a similar analysis (Manning et al., 1987).

The following specification determines whether an individual has positive expenditures, where the subscript i has been suppressed for convenience:

$$I^* = x\alpha_x + d\alpha_d + \epsilon_I$$

$$\epsilon_I \sim N(0,1)$$

$$\text{If } \begin{pmatrix} I^* > 0 \\ I^* \leq 0 \end{pmatrix}, \text{ then we observe } \begin{pmatrix} y > 0 \\ y = 0 \end{pmatrix}.$$

Conditional on an observation of positive expenditures (or equivalently a realization of ϵ_I), we model the distribution of (log) expenditures as follows:

$$\log(y) | (y > 0) = x\beta_x + d\beta_d + \epsilon_2$$

$$\epsilon_2 | y > 0 \sim N(0, \sigma^2).$$

In this model, we assume x and d are nonstochastic.[1] The assumption of normality yields a convenient representation for the conditional mean of the untransformed expenditures:

[1]The vector d contains dummy variables indicating membership in Prime. Prime enrollment is endogenous to utilization because beneficiaries base their enrollment decision on expected utilization. We partially control for this endogeneity by including another set of dummy variables for individuals in the baseline California and Hawaii

$$E[y|z, y>0] = \exp\left(z\beta + \frac{\sigma^2}{2}\right)$$

$$\beta = (\beta_x, \beta_d)$$

$$z = (x, d)$$

Therefore, the unconditional mean of y can be computed as

$$E[y|z] = \Phi(z\alpha)\exp(z\beta)\gamma$$

$$\gamma = \exp\left(\frac{\sigma^2}{2}\right)$$

$$\alpha = (\alpha_x, \alpha_d),$$

where $\Phi(\cdot)$ denotes the standard normal cumulative distribution function.

VARIABLE SPECIFICATION

The vector x consists of sociodemographic variables, health status measures, and base dummies. These base dummies are site-specific fixed effects, and can be thought of as controls for practice variation across catchment areas, or more generally as unobserved heterogeneity which depends on location. The vector d contains dummies that determine the survey from which the data come, as well as dummy variables for Prime enrollment or standard CHAMPUS. These variables are:

[base dummies]	=	1 for the catchment area in which the individual resides (0 for all others)
POST	=	1 for all observations in the follow-up sample
	=	0 for all observations in the baseline sample
PRIME	=	1 for all beneficiaries at baseline and follow-up who had joined Prime at follow-up
	=	0 for all beneficiaries in any area who never joined Prime
PRIME_EFF	=	1 for Prime members at follow-up
	=	0 for all others

sample who subsequently enrolled. This point is pursued in more detail below. An alternative approach is to estimate a selection model, which explicitly parameterizes this endogeneity. These models enable a researcher to consistently estimate the coefficients, assuming there was no parametric misspecification. For our purposes, however, we are interested in obtaining consistent predictions of the conditional mean of (log) expenditures. The standard linear regression techniques we employ are adequate for this purpose. However, it may be difficult to place meaningful behavioral interpretations on the individual parameter estimates (Maddala, 1985).

NON_PRIME_EFF = 1 for non-enrolled CRI beneficiaries at follow-up (i.e., potential users of Extra)

= 0 for all others

The following table shows how we calculate the levels of the dependent variables for each group of sites (at each time period) using this dummy variable specification.

	Baseline	Follow-Up
Control	Base dummies	Base Dummies + *POST*
Demonstration	Base dummies	Base dummies + *POST* + *PRIME_EFF* (Prime)
		Base dummies + *POST* + *NON_PRIME_EFF* (Extra)

INTERPRETATION

From a policy perspective, we are interested in comparing mean health care expenditures for CRI participants with their predicted expenditures without CRI. We also wish to distinguish between the program effect for Prime enrollees and for the nonenrollees. The dummy specification in the previous table estimates these effects while controlling for intertemporal and geographic heterogeneity in the data.

Controlling for Intertemporal Heterogeneity

There are strong *a priori* reasons to believe that health expenditures violate any assumption of time homogeneity. The variable *POST* is designed to account for this property of the data. As the table indicates, *POST* will be 1 only if the data come from the follow-up survey, irrespective of whether the observation is a demonstration or control site. Thus, if we regress (log) health expenditures on the vector z and dummy structure d, the coefficient on *POST* yields the common intertemporal change in expenditures from baseline to follow-up. In this way, *POST* identifies and controls for a natural time trend in the data.

Controlling for Geographic Heterogeneity

Just as health data are time inhomogenous, so too they vary from location to location. The 22 base dummies included in the table will pick up any structural differences (intercept

changes) in the consumption of health services across MTF sites both before and after the intervention.[2] Therefore, to the extent that demonstration and control sites differ in the consumption and delivery of health care, this specification will estimate program effects adjusted for this site-by-site variation.

Controlling for Endogenous Selection

It may be the case that Prime enrollees differ from non-Prime enrollees in the manner in which they consume health services. The dummy variable *PRIME*, which does not appear in the table, equals 1 for any individual in the four cells who *prospectively enrolls in the HMO*. This variable proxies for any unobserved heterogeneity between individuals who enrolled in Prime and their non-Prime counterparts. First, we identify people in the baseline survey (either in the control or demonstration group) who later enrolled in Prime.[3] The variable *PRIME* is equal to 1 for this group, and so the estimated coefficient on *PRIME* measures the impact of being a future HMO enrollee on health expenditures while *under standard CHAMPUS*. As such, the inclusion of this variable controls for a structural difference between enrollees and nonenrollees in the way they consume health care, even under the same plan.

Adequacy of Controls

The CRI dummies (*PRIME_EFF* and *NON_PRIME_EFF*) measure changes in health care expenditures once we have controlled for demographic, temporal, and geographic trends. It is natural to ask whether this control structure is sufficient to adequately assess program effects. For the individual-specific data, split sample tests of model specification from the RAND Health Insurance Experiment verify that the demographic and health status controls we use are sufficient to accurately predict expenditures (Duan et al., 1982). In fact, it is precisely this point that makes it necessary to augment the claims data using survey data (rather than just claims data, which do not provide the vital characteristics) in order to adequately measure program effects. Table A.14 compares the baseline differences in observable characteristics between the demonstration and control sites.

As for the geographic and temporal trends, we cannot directly assess their adequacy due to a fundamental identification problem that plagues any social experiment. To measure program impact with complete certainty, we would have to turn back the clock and run the demonstration again, but not change the health care system. However, ample indirect evidence confirms that our model is not misspecified. For instance, it could be argued that because the data differ geographically, there may be differential seasonal effects in the data. In order for this differential to bias our results, one would have to argue that these site-specific differences were not present in the baseline data, but did manifest themselves in the follow-up survey. Furthermore, these trends in the follow-up data would have to differentially affect CRI and control sites (e.g., the baseline data missed flu season for everyone, but the follow-up data caught flu season for only the CRI sites). However, it is important to note that the control sites span seven states around the country (Washington, Virginia, Mississippi,

[2]Table 2 in the main text specifies each of these sites.

[3]For the baseline controls, *PRIME* = 1 denotes an individual who moved to a demonstration site and enrolled in Prime subsequent to being surveyed.

Texas, South Carolina, Florida, and Delaware). Therefore, if differential trends are present in the data, they should manifest themselves in trend differences across the control sites. This constitutes a testable hypothesis.

Using a single-equation model of total costs, we tested and rejected the hypothesis that we could identify a unique time trend for each site.[4] Put another way, we find that these seven control sites, which range from the Pacific Northwest to the Southeast, need only a single time trend to identify any temporal change. Therefore, it is reasonable to presume that given the current specification, the geographical variation in the data will not bias estimates of the time trend as well as program effects.

Measuring Program Impact

We wish to measure the mean health care expenditures of a randomly chosen individual under three alternative health plans: Prime, Extra, and standard CHAMPUS. Given the dummy structure above, the differences between Prime and Extra relative to the standard CHAMPUS alternative are computed as the coefficients on the variables *PRIME_EFF* and *NON_PRIME_EFF* respectively.[5] As mentioned previously, these program effects explicitly control for time trends, site-specific effects, and endogenous selection into the HMO in the manner discussed in the previous subsections. Using these estimates, we can easily predict mean expenditures for any chosen subpopulation under each of the alternative health plans. The next section of this appendix discusses this method in more detail.

POINT ESTIMATION

To construct a consistent estimate of the mean level of expenditures, we estimate the two-part model sequentially. In the first stage, we use maximum likelihood techniques under the assumption of normality to compute an estimate of α. In the second stage, (log) expenditures *for those individuals with positive use* are regressed on these same covariates to get an estimate of β. We compute a consistent estimate for the retransformation factor, γ, using the smearing estimator.[6] As a result, we obtain a consistent estimate of the mean health care expenditures of an individual with demographic characteristics x_i and dummy specification d_i using

$$\hat{E}(y_i|z_i) = \hat{\text{Prob}}(y_i > 0|z_i)\hat{E}(y_i|z_i, y_i > 0)$$

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[4]In practice, we performed a linear regression of total costs on the specification used in the text, but we allowed the control site base dummies to interact with the secular trend *POST*. Each of these interaction terms tests whether that site has a time trend in the data that differs from a general trend term. Using a standard *F*-test, we found that we could not reject the hypothesis that all of these trends are the same (upper-tail area is .76). Furthermore, each of the interaction terms was individually insignificant at the 10 percent level.

[5]We note here that standard CHAMPUS participation is the excluded category in health plan choice.

[6]The smearing estimator is the sample average of the exponentiated residuals (i.e., $\hat{\gamma} = \frac{1}{N}\Sigma\exp(\hat{\varepsilon}_i)$). Duan (1983) discusses this estimator in detail.

$$= \Phi\left(z_i'\hat{\alpha}\right)\exp\left(z_i'\hat{\beta}\right)\hat{\gamma}.$$

For policy simulation, we restrict our attention to those individuals who participated in CRI (i.e., those individuals residing at a demonstration site at the time of the follow-up survey). For these individuals, exactly one of the dummy variables *PRIME_EFF* (HMO enrollees) or *NON_PRIME_EFF* (potential Extra users) will be 1. These two variables are components of the larger vector d_i, where $i = 1,...,k$ denotes those individuals in CRI. If $z_i \equiv (x_i, d_i)$, then $\hat{E}(y_i|z_i)$ denotes the mean level of expenditures for a particular CRI participant. We can then construct the vector $z_i^* \equiv (x_i, d_i^*)$, where d_i^* differs from d_i only in that the dummy variables *PRIME_EFF* and *NON_PRIME_EFF* have both been set to zero. Thus, z_i^* may be thought of as a pseudo-individual who differs from the original z_i only in that z_i^* is now in the standard CHAMPUS health plan, rather than Prime or Extra. The quantity $\hat{E}(y_i|z_i^*)$ denotes the predicted expenditures of this pseudo-individual under standard CHAMPUS. The difference $\hat{E}(y_i|z_i) - \hat{E}(y_i|z_i^*)$ represents the expected savings in mean health care expenditures for individual z_i under CRI, relative to standard CHAMPUS.[7] If w_i denotes the population weight associated with a CRI participant, then an overall estimate of the mean impact of CRI may be computed as

$$\Delta \equiv \frac{1}{\sum w_i}\sum_{i=1}^{k} w_i\left[\hat{E}(y_i|z_i) - \hat{E}(y_i|z_i^*)\right].$$

Tables A.1 to A.13 contain the point estimates and *t*-statistics for all equations estimated.

COMPUTING BOOTSTRAPPED POLICY ESTIMATES

In order to perform hypothesis tests on our policy estimates, we rely on bootstrapping techniques which are easier to implement than standard parametric methods. We therefore need to generate a sequence of T policy estimates, denoted $\Delta^{(1)}, \Delta^{(2)},..., \Delta^{(T)}$ for some predetermined value of T. Given this sequence, we can construct confidence intervals to formally test the relevant hypotheses.

The following procedure is employed to produce the estimate $\Delta^{(t)}$:

1. Given the maximum-likelihood estimate $\hat{\alpha}$, we can construct the fitted probability that each individual will have positive expenditures as $\hat{\text{Prob}}(y_i > 0) = \Phi(z_i\hat{\alpha})$. For each individual, we draw once from a uniform [0,1] distribution. If we denote this draw as u_i, then we can construct a sequence

[7] This measure of CRI savings explicitly controls for differences between the demonstration and control sites (as well as other factors) in the manner discussed above.

$$y_i^* = \begin{cases} 1 \text{ if } u_i < \Phi(z_i\hat{\alpha}) \\ 0 \text{ otherwise} \end{cases} \quad \text{for } i = 1,\ldots, N.$$

This sequence $y_1^*, y_2^*, \ldots, y_N^*$ gives us a new sample of individuals with positive use. We then construct a new maximum-likelihood estimate using the relationship

$$\text{Prob}(y_i^* = 1) = \Phi(z_i'\alpha).$$

We call this estimate $\hat{\alpha}^{(t)}$.

2. Given our conditional OLS estimate $\hat{\beta}$, we can construct the sequence of associated residuals for those who accessed the system:

$$e_i = \log(y_i) - z_i'\hat{\beta},\ i = 1, \ldots, N_1,^8$$

where N_1 = number of survey participants with positive expenditures.

Construct the empirical distribution function X, which assigns discrete probability $\frac{1}{N_1}$ to each of the residuals $e_1, e_2, \ldots, e_{N_1}$. Let $N^* \equiv \sum_{i=1}^{N} y_i^*$ denote the number of observations associated with a value of 1. In general, N^* need not equal N_1. We then draw N^* times from X to generate a new sequence of residuals $e_{n_1}, e_{n_2}, \ldots e_{n_{N^*}}$. Using this resample, a new set of dependent variables is generated by

$$\log(y_j^{(t)}) \equiv x_j'\hat{\beta} + e_j^{(t)},\ j = n_1, n_2, \ldots n_{N^*}.$$

It is useful to note that j indexes all N^* observations for which $y_j^* = 1$. Therefore, regressing $\log(y^{(t)})$ on z, the vector of covariates, yields a new set of estimates of β and γ, which we denote as $\hat{\beta}^{(t)}$ and $\hat{\gamma}^{(t)}$.

3. Using our bootstrapped estimates $\hat{\alpha}^{(t)}, \hat{\beta}^{(t)}$ and $\hat{\gamma}^t$, we compute

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[8]For convenience, we assume our observations are stacked in such a way that the first N_1 "bootstrapped" individuals had positive expenditures.

$$\Delta^{(t)} = \frac{1}{\sum w_i} \sum_{i=1}^{k} w_i \left[\hat{E}^{(t)}(y_i|z_i) - \hat{E}^{(t)}(y_i|z_i^*) \right],$$

or, in the case of total costs, we use the relative program effect

$$\Delta^{(t)} = \frac{\frac{1}{\sum w_i} \sum_{i=1}^{K} w_i \hat{E}^{(t)}(y_i|z_i)}{\frac{1}{\sum w_i} \sum_{i=1}^{K} w_i \hat{E}^{(t)}(y_i|z_i^*)} = 1,$$

where K = number of CRI data points and $\hat{E}^{(t)}(y_i|z_i) = \Phi\left(z_i' \hat{\alpha}^{(t)}\right) \exp\left(z_i' \hat{\beta}^{(t)}\right) \hat{\gamma}^{(t)}$. This value is the percentage change in y due to the imposition of CRI.

4. Repeating steps (1)–(3) T times, we generate the desired sequence:

$$\Delta^{(1)}, \Delta^{(2)}, \ldots, \Delta^{(T)}.$$

As an example of step 4, Figure 1 in the main text provides a histogram of these policy estimates for total costs.

HYPOTHESIS TESTING

Above we derived the point estimate Δ for the policy simulation of interest. Then we used a bootstrap technique to produce a sequence of draws from the distribution function for this policy effect. We denoted these draws as $\Delta^{(1)}, \ldots, \Delta^{(T)}$. From this sequence, we were able to assign standard errors to our estimate of the policy impact.

We are further interested in determining whether our policy effect is significantly different from zero. To this end, we can use our sequence of estimates to construct 90%, 95%, and 99% confidence intervals for our original point estimate. If these confidence intervals do not contain zero, then we fail to reject the hypothesis that the policy had no effect at the corresponding significance level. To construct an s-confidence interval for Δ, where $s \in \{.90, .95, .99\}$, we use the following simple procedure:

1. Reorder the resamples $\Delta^{(1)}, \ldots, \Delta^{(T)}$ in ascending order.

2. Compute $k = (1 - s)T/2$.[9] This value represents the number of points that need to be excluded from the tail of the empirical distribution of $\Delta^{(1)}, \ldots, \Delta^{(T)}$ to construct this confidence interval.

3. Compute the s-confidence interval as $C_s = \left[\Delta^{(k+1)}, \Delta^{(T-k)} \right]$.

We fail to reject the hypothesis that $\Delta = 0$ (at the s significance level) if $0 \in C_s$.

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[9] If k was not an integer, we used $k^* = \text{int}(k) + 1$.

Table A.1

Estimation Results for Civilian Outpatient Visits

Variable	Probit -- Any Visits		OLS - Number of Visits	
	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	0.704429	1.24731	2.13334	2.76968
Ft. Ord	-0.107268	-0.202496	2.03451	2.75932
Tripler	0.071795	0.136374	2.12744	2.90934
Long Beach	0.365802	0.651397	2.3145	3.00595
Pendleton	0.17225	0.306321	2.30864	2.9994
San Diego	0.227063	0.403811	2.1847	2.83693
Beale	0.120479	0.212458	2.14612	2.76619
March	-0.050168	-0.089059	2.348	3.04205
Mather	-0.112665	-0.200117	2.29611	2.98081
Travis	-0.359703	-0.636798	2.3704	3.0677
Vandenberg	0.158423	0.279006	2.25268	2.90462
Ft. Hood	-7.21E-03	-0.013672	2.07532	2.83041
Madigan	-0.391829	-0.743203	2.21417	3.02566
Orlando	0.229594	0.40796	2.06938	2.68666
Charleston	0.233094	0.41416	2.22637	2.88495
Portsmouth	0.513196	0.91345	2.08639	2.71294
Quantico	-0.507671	-0.891401	2.5268	3.21148
Dover	-0.12484	-0.219431	1.89929	2.43446
Carswell	0.016558	0.029428	2.24914	2.92047
Homestead	0.10409	0.184419	2.20054	2.85513
Keesler	-0.316802	-0.559746	2.0026	2.58
Shaw	-0.08838	-0.155858	2.04689	2.62646
Not Army	2.10E-03	0.010968	-0.112037	-0.474205
College	0.059341	2.03109	0.021829	0.60784
Employed-full	-0.052681	-2.16805	8.06E-03	0.262284
Officer	0.221345	7.36321	0.076276	2.08395
Nonwhite	-0.180212	-6.55868	-0.080599	-2.26351
Female	-0.635532	-1.19892	-0.875421	-1.18525
Age	-0.045841	-2.13051	-0.013312	-0.446806
Age squared	5.75E-04	2.63251	1.43E-04	0.477333
Female age	0.051546	2.30362	0.043015	1.39941
Female age squared	-6.01E-04	-2.58645	-4.40E-04	-1.39813
Household size	-0.023572	-2.38062	-7.04E-03	-0.551933
Log residence	0.028924	2.4028	0.027563	1.84059
Log time to MTF	0.049071	4.76466	-0.019079	-1.49211
Income	1.48E-03	2.24383	1.05E-04	0.128375
Current health	2.02E-03	0.943524	2.10E-03	0.832948
Current health squared	-5.09E-05	-2.94568	-4.62E-05	-2.21039
Mental health	-4.43E-03	-1.33252	-6.22E-03	-1.60809
Mental health squared	2.47E-05	0.976259	1.95E-05	0.646969
Pain	-3.70E-03	-2.2714	-5.37E-03	-2.84817
Pain squared	1.99E-05	1.50078	4.20E-05	2.65799
Prior health	-4.42E-04	-0.313163	1.46E-04	0.087937
Prior health squared	-1.46E-05	-1.22217	-7.99E-06	-0.551941
Social functioning	1.01E-03	0.393908	-6.43E-03	-2.28258
Social functioning squared	-2.78E-05	-1.47442	3.92E-05	1.85559
Treatable condition	0.174176	5.56886	8.17E-03	0.219223
Pregnant in last 12 mo.	0.064212	1.60916	-0.017432	-0.350276
Smoke	0.039742	1.76264	-4.04E-03	-0.143269
Physically limited	0.026024	0.742797	-0.034402	-0.823304
Retired, post	-2.54E-03	-0.04703	-0.052481	-0.75921
Retired, prime	-0.152891	-1.10233	-0.03372	-0.193354
Retired, prime, post	0.662081	5.96549	0.271167	1.93899
Retired, nonprime, post	-0.050708	-0.940218	0.132518	1.89376
Retired	-0.109255	-2.21471	-0.107153	-1.71444
Post	0.131428	2.72264	-4.89E-03	-0.081128
Prime	0.246973	2.43726	-0.147032	-1.21144
Prime, Post	0.574056	4.95057	0.200481	1.47925
Nonprime, post	2.16E-03	0.035867	-0.085955	-1.10541

Table A.2

Estimation Results for Civilian Inpatient Days

Variable	Probit -- Any Visits		OLS -- Number of Visits	
	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	-2.43758	-1.48428	9.68261	3.18238
Ft. Ord	-3.09751	-1.88636	9.91493	3.2681
Tripler	-3.12235	-1.90682	10.1301	3.34313
Long Beach	-2.32073	-1.42007	9.80535	3.24255
Pendleton	-2.7966	-1.70792	9.77339	3.22964
San Diego	-2.80239	-1.71229	9.49851	3.1369
Beale	-3.26806	-1.96733	8.8541	2.87374
March	-2.51169	-1.53378	9.86347	3.25679
Mather	-2.63715	-1.6084	9.6523	3.17342
Travis	-3.39397	-2.05082	9.78989	3.21015
Vandenberg	-2.48688	-1.51402	9.32085	3.07202
Ft. Hood	-2.98121	-1.82212	10.2643	3.40423
Madigan	-3.22851	-1.97166	9.73518	3.216
Orlando	-2.4953	-1.52421	10.1224	3.34988
Charleston	-2.58437	-1.57956	10.0942	3.33441
Portsmouth	-2.61691	-1.6017	9.75407	3.23433
Quantico	-3.13483	-1.89938	9.419	3.09051
Dover	-3.07639	-1.86621	10.1266	3.3263
Carswell	-2.87171	-1.75279	10.1717	3.35793
Homestead	-2.65247	-1.61739	9.85609	3.24105
Keesler	-2.93938	-1.78937	10.6468	3.51365
Shaw	-2.73345	-1.66514	9.89034	3.25091
Employed-full	-0.22097	-3.97678	-0.029862	-0.29884
Female	1.60162	0.968927	-8.48591	-2.79386
Age	0.034493	0.521974	-0.302361	-2.44524
Age squared	-2.73E-04	-0.416273	2.90E-03	2.35228
Female age	-0.060481	-0.898145	0.322835	2.58517
Female age squared	5.82E-04	0.858857	-3.02E-03	-2.38388
Household size	0.046656	2.25587	4.20E-03	0.105512
Log residence	0.019938	0.808829	0.049004	1.17543
Income	1.58E-03	1.12246	3.72E-03	1.3973
Current health	-4.37E-03	-3.57235	-2.69E-03	-1.25875
Mental health	-1.10E-03	-0.773987	-2.45E-03	-1.004
Social functioning	-7.10E-03	-6.42489	-4.98E-03	-2.63781
Treatable condition	0.194764	2.85127	0.096771	0.793353
Pregnant in last 12 mo.	1.10978	16.3807	-0.303892	-2.32604
Retired	-0.0213	-0.186767	-0.351436	-1.65824
Retired, post	-0.130653	-1.14339	-0.447095	-2.08586
Retired, post, CRI	-0.263095	-2.09723	0.360259	1.45589
Post	0.27711	3.03543	0.129578	0.797376
Active, post, CRI	-0.118755	-1.13185	-0.051759	-0.290226

Table A.3

Estimation Results for Military Outpatient Visits

Variable	Probit -- Any Visits		OLS -- Number of Visits	
	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	0.783428	1.64325	2.87398	7.47476
Ft. Ord	1.34255	3.03893	2.96531	8.40221
Tripler	1.17893	2.68522	2.85774	8.12566
Long Beach	0.564346	1.19452	2.89806	7.65085
Pendleton	1.00881	2.13221	3.10283	8.19562
San Diego	0.984095	2.08161	3.10642	8.2057
Beale	1.09689	2.29927	2.93938	7.68927
March	1.23879	2.61558	3.0507	8.04669
Mather	1.04942	2.21627	3.02877	7.97301
Travis	1.33266	2.80673	3.02511	7.96489
Vandenberg	1.42217	2.97082	3.03887	7.95965
Ft. Hood	1.2981	2.95022	2.9329	8.31525
Madigan	1.23735	2.81652	2.89783	8.21834
Orlando	0.980878	2.07159	2.96687	7.81722
Charleston	1.23712	2.61324	3.04797	8.03929
Portsmouth	1.03029	2.18001	3.07796	8.13381
Quantico	1.53955	3.23356	3.21084	8.43065
Dover	1.45823	3.04948	3.10763	8.12703
Carswell	1.13217	2.39169	2.97008	7.82563
Homestead	1.28864	2.7099	2.96724	7.81011
Keesler	1.57314	3.30665	3.09304	8.12953
Shaw	1.52343	3.19409	2.93496	7.71691
Not Army	-0.053262	-0.313298	-0.154295	-1.13775
College	0.018491	0.69065	0.013908	0.619225
Employed-full	-0.081963	-3.74851	-0.011253	-0.631435
Officer	0.120811	4.32063	0.03[illegible]7	1.53315
Nonwhite	0.025751	1.07663	0.020444	1.08065
Female	0.140141	0.318792	-0.988599	-2.78439
Age	-9.76E-03	-0.542731	-0.046392	-3.13142
Age squared	1.11E-04	0.600305	4.42E-04	2.87188
Female age	-3.58E-03	-0.189726	0.043663	2.81104
Female age squared	-2.41E-05	-0.121444	-4.46E-04	-2.68387
Household size	4.89E-03	0.55887	-0.01781	-2.53951
Log residence	-0.095422	-8.81743	-0.010471	-1.20633
Log time to MTF	-0.069756	-7.53261	-0.016959	-2.41285
Income	-6.65E-03	-10.8097	-1.66E-03	-2.97307
Current health	5.66E-04	0.280852	2.56E-04	0.165303
Current health squared	-4.13E-05	-2.58501	-3.10E-05	-2.45848
Mental health	-1.75E-03	-0.551693	-4.98E-03	-2.09191
Mental health squared	1.83E-05	0.767784	3.74E-05	2.05223
Pain	-1.45E-03	-0.948232	-4.36E-03	-3.72354
Pain squared	-7.87E-06	-0.640334	1.62E-05	1.67827
Prior health	-1.02E-03	-0.769964	-4.23E-04	-0.412687
Prior health squared	-6.61E-06	-0.597768	-8.90E-06	-1.02182
Social functioning	3.76E-03	1.51776	-4.92E-03	-2.65707
Social functioning squared	-4.05E-05	-2.24701	1.34E-05	0.984765
Treatable condition	0.183561	6.2864	0.120485	5.27257
Pregnant in last 12 mo.	0.092	2.52835	0.355295	13.869
Smoke	-0.079489	-3.88993	-2.16E-03	-0.131323
Physically limited	0.02141	0.652544	1.84E-03	0.071917
Retired, post	-0.087036	-1.78959	-0.078252	-2.01664
Retired, prime	0.17886	1.40077	-0.105939	-1.02174
Retired, prime, post	0.056398	0.56227	0.197898	2.2684
Retired, nonprime, post	0.023557	0.488905	0.135639	3.17664
Retired	-0.217785	-4.87127	0.013102	0.344772
Post	0.320166	7.18907	0.193261	5.96877
Prime	0.044613	0.462838	0.0759	1.04514
Prime, Post	-0.017737	-0.159276	-0.013333	-0.160459
Nonprime, post	0.078263	1.43928	-0.010946	-0.2716

Table A.4

Estimation Results for Military Inpatient Days

	Probit -- Any Visits		OLS -- Number of Visits	
Variable	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	-0.155199	-0.186495	2.97597	2.00705
Ft. Ord	1.02802	1.35584	2.42369	1.94719
Tripler	1.03473	1.37238	2.47437	2.0037
Long Beach	0.232111	0.306467	2.83983	2.31009
Pendleton	0.988121	1.30674	2.43073	1.96424
San Diego	0.876678	1.16061	2.3393	1.88781
Beale	0.767896	0.998745	2.48211	1.96828
March	0.85169	1.12243	1.93986	1.55405
Mather	0.980508	1.29251	2.41908	1.93415
Travis	1.12748	1.4831	2.24191	1.79484
Vandenberg	1.00535	1.3106	2.11389	1.6724
Ft. Hood	1.10962	1.46749	2.44948	1.97431
Madigan	1.29065	1.7113	2.4889	2.01725
Orlando	0.977986	1.28947	2.34339	1.87521
Charleston	0.779444	1.02934	2.33949	1.88643
Portsmouth	0.637947	0.845435	2.45385	1.98903
Quantico	1.11351	1.45704	2.07605	1.65775
Dover	1.19245	1.56233	2.20418	1.76943
Carswell	1.15459	1.52417	2.24554	1.80428
Homestead	1.16328	1.52952	2.34225	1.88262
Keesler	1.24524	1.6388	2.65293	2.13304
Shaw	1.02901	1.35113	2.00026	1.61958
Employed-full	-0.182492	-4.44952	-0.059809	-0.858356
Female	-1.98343	-2.54915	-0.561396	-0.438389
Age	-0.080729	-2.50115	-9.59E-03	-0.179481
Age squared	9.24E-04	2.77007	1.10E-04	0.197476
Female age	0.092685	2.72432	8.62E-03	0.15334
Female age squared	-1.07E-03	-2.95592	2.08E-05	0.034468
Household size	0.010039	0.62814	-0.016845	-0.649764
Log residence	-0.037122	-1.95903	0.05255	1.70787
Income	-3.34E-03	-3.00705	-4.89E-06	-2.53E-03
Current health	-6.11E-03	-6.68011	-1.29E-03	-0.897198
Mental health	-1.06E-03	-0.974194	-1.55E-04	-0.092894
Social functioning	-6.14E-03	-7.06286	-7.86E-03	-6.17861
Treatable condition	0.156138	3.06176	0.056042	0.676998
Pregnant in last 12 mo.	1.02191	19.8346	0.064814	0.773127
Retired	-0.204005	-2.38254	-0.099535	-0.651587
Retired, post	0.120753	1.397	0.030982	0.218764
Retired, post, CRI	0.069429	0.790523	0.09673	0.641758
Post	0.072355	1.01862	-0.1175	-1.14647
Active, post, CRI	0.087276	1.04367	-0.010016	-0.078758

Table A.5

Estimation Results for Total Outpatient Visits

	Probit -- Any Visits		OLS -- Number of Visits	
Variable	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	1.6254	3.35924	3.24266	8.4162
Ft. Ord	1.71543	3.83735	3.23015	9.02134
Tripler	1.64906	3.71206	3.15488	8.84827
Long Beach	1.34305	2.79982	3.27133	8.56402
Pendleton	1.54137	3.20674	3.34848	8.76374
San Diego	1.57566	3.28116	3.32698	8.70756
Beale	1.70525	3.51719	3.14081	8.14632
March	1.63749	3.40333	3.31643	8.66478
Mather	1.4581	3.03202	3.27139	8.53664
Travis	1.58871	3.29337	3.26588	8.51624
Vandenberg	1.89011	3.88504	3.27712	8.49879
Ft. Hood	1.72809	3.88227	3.20461	8.9633
Madigan	1.52685	3.43616	3.14377	8.79559
Orlando	1.56716	3.25894	3.18011	8.30958
Charleston	1.77258	3.68599	3.29319	8.60222
Portsmouth	1.7576	3.66083	3.30439	8.65279
Quantico	1.7456	3.6107	3.40526	8.84272
Dover	1.76272	3.62854	3.28734	8.51073
Carswell	1.59888	3.32583	3.21384	8.39606
Homestead	1.75638	3.63636	3.21955	8.39385
Keesler	1.87433	3.87757	3.22716	8.40002
Shaw	1.86667	3.85113	3.13444	8.15638
Not Army	-0.073729	-0.416621	-0.089545	-0.669682
College	0.042138	1.56869	0.024928	1.1684
Employed-full	-0.134675	-6.12378	-5.42E-03	-0.31215
Officer	0.204762	7.29701	0.085241	3.81693
Nonwhite	-0.08702	-3.58667	-0.014723	-0.777797
Female	-0.012803	-0.028952	-1.11996	-3.11284
Age	-0.025586	-1.42031	-0.048395	-3.25156
Age squared	3.11E-04	1.68736	4.76E-04	3.10071
Female age	0.012534	0.663456	0.051415	3.3119
Female age squared	-2.03E-04	-1.02254	-5.12E-04	-3.12316
Household size	-6.79E-03	-0.765844	-0.0167	-2.41186
Log residence	-0.059441	-5.37793	-5.16E-03	-0.611109
Log time to MTF	-0.029102	-3.05371	-0.017216	-2.46663
Income	-4.24E-03	-7.05052	-1.07E-03	-2.09617
Current health	1.04E-03	0.491256	4.85E-04	0.322855
Current health squared	-5.04E-05	-3.0465	-4.40E-05	-3.59383
Mental health	-3.81E-03	-1.12588	-6.40E-03	-2.77433
Mental health squared	3.05E-05	1.21819	3.99E-05	2.25688
Pain	-3.14E-03	-1.96791	-5.49E-03	-4.83171
Pain squared	5.06E-06	0.398687	2.83E-05	3.03398
Prior health	-2.13E-03	-1.55184	2.27E-05	0.022837
Prior health squared	-1.82E-06	-0.160407	-1.54E-05	-1.82596
Social functioning	2.48E-03	0.924648	-5.57E-03	-3.13697
Social functioning squared	-4.09E-05	-2.12098	1.90E-05	1.45112
Treatable condition	0.285702	9.44467	0.112014	5.05484
Pregnant in last 12 mo.	0.171722	4.45696	0.275999	10.7271
Smoke	-0.047345	-2.28959	0.013535	0.846207
Physically limited	0.034894	1.0362	-1.90E-03	-0.076591
Retired, post	-0.103172	-2.07828	-0.076565	-2.02259
Retired, prime	0.089955	0.685399	-0.088833	-0.88518
Retired, prime, post	0.351042	3.45182	0.324857	3.94476
Retired, nonprime, post	-0.010589	-0.2229	0.122175	3.01777
Retired	-0.218573	-4.86871	-0.03699	-1.02166
Post	0.377404	8.09566	0.17091	5.30116
Prime	0.130638	1.28895	0.018615	0.261111
Prime, Post	0.307497	2.57029	0.137479	1.69938
Nonprime, post	0.056676	1.0114	-0.025963	-0.644227

Table A.6

Estimation Results for Total Inpatient Days

Variable	Probit -- Any Visits		OLS -- Number of Visits	
	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	0.285718	0.386424	3.6572	3.14063
Ft. Ord	0.510885	0.70064	3.88121	3.40002
Tripler	0.507193	0.699392	3.97368	3.50574
Long Beach	0.460518	0.634776	3.82577	3.37377
Pendleton	0.539475	0.741949	3.88714	3.42386
San Diego	0.469477	0.646484	3.66505	3.22569
Beale	0.251569	0.340212	3.76846	3.25513
March	0.576758	0.791716	3.61883	3.17102
Mather	0.618218	0.848011	3.75583	3.27894
Travis	0.591111	0.808482	3.6711	3.20521
Vandenberg	0.701141	0.953953	3.4608	3.00906
Ft. Hood	0.589134	0.810669	3.97949	3.50126
Madigan	0.711008	0.980521	3.91066	3.45348
Orlando	0.652022	0.895462	3.93265	3.44591
Charleston	0.504211	0.693473	3.97474	3.49593
Portsmouth	0.404986	0.558411	3.79429	3.35169
Quantico	0.551922	0.75096	3.53486	3.07942
Dover	0.590118	0.803624	3.76258	3.29146
Carswell	0.62801	0.862536	3.88241	3.4015
Homestead	0.706612	0.966678	3.8783	3.394
Keesler	0.726939	0.995434	4.19052	3.67548
Shaw	0.592739	0.81008	3.6089	3.18067
Employed-full	-0.221523	-6.05756	-0.061288	-1.05454
Female	-1.24623	-1.67387	-2.10788	-1.81098
Age	-0.060668	-1.97528	-0.063581	-1.30365
Age squared	7.08E-04	2.24309	6.47E-04	1.27744
Female age	0.060424	1.88158	0.076567	1.51494
Female age squared	-7.13E-04	-2.10416	-7.03E-04	-1.31037
Household size	0.026451	1.86754	-0.022497	-1.02349
Log residence	-0.022339	-1.31866	0.054092	2.16158
Income	-1.67E-03	-1.73186	9.87E-04	0.634655
Current health	-5.73E-03	-6.95128	-2.09E-03	-1.73739
Mental health	-1.18E-03	-1.20858	-2.45E-03	-1.74663
Social functioning	-7.46E-03	-9.49544	-6.49E-03	-6.09815
Treatable condition	0.191425	4.16149	0.06388	0.924054
Pregnant in last 12 mo.	1.23441	26.708	-0.06593	-0.931429
Retired	-0.132741	-1.75383	-0.156938	-1.25985
Retired, post	6.69E-03	0.086502	-0.090496	-0.759922
Retired, post, CRI	-0.048972	-0.618343	0.157412	1.2229
Post	0.184568	2.8862	-0.037735	-0.433171
Active, post, CRI	-2.95E-03	-0.039803	-0.023052	-0.222092

Table A.7

Estimation Results for Civilian Outpatient Dollars

	Probit -- Any Visits		OLS -- Number of Visits	
Variable	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	0.405432	0.699474	6.30366	4.9878
Ft. Ord	-0.354545	-0.652115	6.69407	5.53564
Tripler	-0.177904	-0.329282	6.69995	5.58807
Long Beach	0.075925	0.13173	6.71611	5.32226
Pendleton	-0.152	-0.263372	6.72227	5.32997
San Diego	-0.069307	-0.120094	6.47291	5.12912
Beale	-0.183814	-0.315877	6.2961	4.9533
March	-0.341371	-0.590503	6.68671	5.28762
Mather	-0.412214	-0.713436	6.33608	5.02033
Travis	-0.647368	-1.11639	6.32516	4.9917
Vandenberg	-0.122073	-0.209568	6.59127	5.19052
Ft. Hood	-0.236029	-0.435859	6.76324	5.62214
Madigan	-0.626613	-1.15803	6.64054	5.53212
Orlando	-0.115228	-0.199494	6.23367	4.93805
Charleston	-0.073098	-0.126546	6.19391	4.89663
Portsmouth	0.184946	0.320698	6.1055	4.84118
Quantico	-0.799446	-1.36794	6.59474	5.11778
Dover	-0.403894	-0.691943	6.09234	4.7681
Carswell	-0.277734	-0.480997	6.37997	5.05588
Homestead	-0.172444	-0.297768	6.72082	5.32276
Keesler	-0.632675	-1.08909	5.94968	4.67694
Shaw	-0.375235	-0.644868	6.14358	4.81187
Not Army	0.079245	0.403243	0.383799	1.00616
College	0.061144	2.07105	-0.014086	-0.246417
Employed-full	-0.048401	-1.96808	-0.060126	-1.22498
Officer	0.227925	7.50498	0.199934	3.42692
Nonwhite	-0.172987	-6.2196	-0.086318	-1.5221
Female	-0.486861	-0.894976	-1.08613	-0.898327
Age	-0.039285	-1.78216	-0.022699	-0.466723
Age squared	5.08E-04	2.27041	2.06E-04	0.422457
Female age	0.046213	2.01771	0.035853	0.715747
Female age squared	-5.54E-04	-2.33266	-2.80E-04	-0.547369
Household size	-0.026035	-2.59268	-2.28E-03	-0.111129
Log residence	0.030318	2.48455	8.65E-03	0.359806
Log time to MTF	0.05068	4.85677	-0.038785	-1.90468
Income	1.78E-03	2.6751	-1.44E-03	-1.10549
Current health	3.13E-03	1.44532	2.12E-03	0.53074
Current health squared	-6.23E-05	-3.56542	-3.42E-05	-1.02894
Mental health	-2.45E-03	-0.725946	-6.87E-03	-1.10182
Mental health squared	9.24E-06	0.360505	1.44E-05	0.296287
Pain	-4.21E-03	-2.56196	-3.28E-03	-1.09697
Pain squared	2.42E-05	1.80278	1.54E-05	0.611913
Prior health	-7.45E-04	-0.523918	8.92E-04	0.33846
Prior health squared	-1.26E-05	-1.03964	-1.90E-05	-0.821837
Social functioning	-2.74E-04	-0.106151	-6.84E-03	-1.53839
Social functioning squared	-1.88E-05	-0.991856	2.86E-05	0.856715
Treatable condition	0.171059	5.42181	-0.038849	-0.657661
Pregnant in last 12 mo.	0.048189	1.18921	0.084639	1.06192
Smoke	0.055398	2.42734	0.024697	0.54968
Physically limited	0.01338	0.378022	-0.111721	-1.67407
Retired, post	-0.020439	-0.372684	-0.0513	-0.462602
Retired, prime	-0.263517	-1.8643	0.277986	0.982008
Retired, prime, post	0.786443	6.89468	0.127387	0.551628
Retired, nonprime, post	-0.030124	-0.55241	-0.042265	-0.378817
Retired	-0.108088	-2.16489	-0.39207	-3.91629
Post	0.135955	2.78404	0.216665	2.24521
Prime	0.274144	2.69289	-0.14977	-0.783393
Prime, Post	0.57234	4.91291	0.144464	0.675811
Nonprime, post	-6.24E-03	-0.102379	-0.438846	-3.52411

Table A.8

Estimation Results for Civilian Inpatient Dollars

	Probit -- Any Visits		OLS -- Number of Visits	
Variable	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	-1.83829	-1.44713	10.9806	2.20353
Ft. Ord	-2.84991	-2.23964	11.1967	2.24552
Tripler	-2.79375	-2.20339	10.7629	2.16724
Long Beach	-2.06125	-1.62858	11.7316	2.36536
Pendleton	-2.49179	-1.96455	11.2305	2.26297
San Diego	-2.54566	-2.00771	11.3811	2.29094
Beale	-3.28813	-2.52738	11.8392	2.30914
March	-2.35688	-1.85705	11.9096	2.39556
Mather	-2.57424	-2.02449	12.2835	2.45601
Travis	-3.16356	-2.46291	12.288	2.44904
Vandenberg	-2.09263	-1.64999	11.5506	2.35753
Ft. Hood	-2.80154	-2.21036	11.8059	2.38593
Madigan	-3.0392	-2.39658	11.2502	2.26893
Orlando	-2.26822	-1.7887	11.6203	2.34361
Charleston	-2.39115	-1.88679	11.494	2.31589
Portsmouth	-2.18552	-1.72743	11.2409	2.27193
Quantico	-2.95794	-2.30719	11.3212	2.26033
Dover	-2.70827	-2.12373	10.9984	2.21143
Carswell	-2.58007	-2.03237	11.4823	2.30334
Homestead	-2.55331	-2.00648	12.172	2.44214
Keesler	-2.99251	-2.34304	11.4401	2.28302
Shaw	-2.76025	-2.16495	11.8876	2.37849
Employed-full	-0.115865	-2.46408	-0.670527	-4.20558
Female	1.6215	1.26296	-3.99583	-0.797835
Age	0.042542	0.82205	-0.168618	-0.825214
Age squared	-3.93E-04	-0.760374	1.79E-03	0.874606
Female age	-0.068115	-1.28385	0.133629	0.637831
Female age squared	6.97E-04	1.28854	-1.04E-03	-0.48031
Household size	-4.59E-03	-0.248068	0.171002	2.65547
Log residence	0.040091	1.8631	-0.048107	-0.696882
Income	3.98E-04	0.324844	6.11E-03	1.31589
Current health	-3.82E-03	-3.52651	-8.55E-03	-2.26099
Mental health	2.57E-04	0.201019	-9.82E-04	-0.225553
Social functioning	-7.96E-03	-7.98719	-1.14E-03	-0.344612
Treatable condition	0.124695	2.09733	0.360637	1.75016
Pregnant in last 12 mo.	1.44299	24.1019	-0.801166	-3.58631
Retired	-0.098774	-0.96568	-1.02662	-2.50565
Retired, post	0.021145	0.216726	-0.837604	-2.26558
Retired, post, CRI	-0.319528	-2.99692	0.278406	0.643017
Post	0.207789	2.58436	0.118009	0.438759
Active, post, CRI	-0.188305	-2.03474	0.162057	0.543

Table A.9

Estimation Results for Military Outpatient Dollars

Variable	Probit -- Any Visits		OLS -- Number of Visits	
	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	0.783428	1.64325	6.89306	17.9278
Ft. Ord	1.34255	3.03893	6.98439	19.7903
Tripler	1.17893	2.68522	6.87682	19.5535
Long Beach	0.564346	1.19452	6.91715	18.2612
Pendleton	1.00881	2.13221	7.12191	18.8114
San Diego	0.984095	2.08161	7.1255	18.8222
Beale	1.09689	2.29927	6.95846	18.203
March	1.23879	2.61558	7.06979	18.6476
Mather	1.04942	2.21627	7.04785	18.553
Travis	1.33266	2.80673	7.04419	18.5468
Vandenberg	1.42217	2.97082	7.05795	18.4868
Ft. Hood	1.2981	2.95022	6.95198	19.71
Madigan	1.23735	2.81652	6.91691	19.6166
Orlando	0.980878	2.07159	6.98595	18.4068
Charleston	1.23712	2.61324	7.06705	18.64
Portsmouth	1.03029	2.18001	7.09704	18.7546
Quantico	1.53955	3.23356	7.22992	18.9835
Dover	1.45823	3.04948	7.12672	18.6377
Carswell	1.13217	2.39169	6.98917	18.4152
Homestead	1.28864	2.7099	6.98632	18.3888
Keesler	1.57314	3.30665	7.11212	18.693
Shaw	1.52343	3.19409	6.95404	18.2843
Not Army	-0.053262	-0.313298	-0.154295	-1.13775
College	0.018491	0.69065	0.013908	0.619225
Employed-full	-0.081963	-3.74851	-0.011253	-0.631435
Officer	0.120811	4.32063	0.036587	1.53315
Nonwhite	0.025751	1.07663	0.020444	1.08065
Female	0.140141	0.318792	-0.988599	-2.78439
Age	-9.76E-03	-0.542731	-0.046392	-3.13142
Age squared	1.11E-04	0.600305	4.42E-04	2.87188
Female age	-3.58E-03	-0.189726	0.043663	2.81104
Female age squared	-2.41E-05	-0.121444	-4.46E-04	-2.68387
Household size	4.89E-03	0.55887	-0.01781	-2.53951
Log residence	-0.095422	-8.81743	-0.010471	-1.20633
Log time to MTF	-0.069756	-7.53261	-0.016959	-2.41285
Income	-6.65E-03	-10.8097	-1.66E-03	-2.97307
Current health	5.66E-04	0.280852	2.56E-04	0.165303
Current health squared	-4.13E-05	-2.58501	-3.10E-05	-2.45848
Mental health	-1.75E-03	-0.551693	-4.98E-03	-2.09191
Mental health squared	1.83E-05	0.767784	3.74E-05	2.05223
Pain	-1.45E-03	-0.948232	-4.36E-03	-3.72354
Pain squared	-7.87E-06	-0.640334	1.62E-05	1.67827
Prior health	-1.02E-03	-0.769964	-4.23E-04	-0.412687
Prior health squared	-6.61E-06	-0.597768	-8.90E-06	-1.02182
Social functioning	3.76E-03	1.51776	-4.92E-03	-2.65707
Social functioning squared	-4.05E-05	-2.24701	1.34E-05	0.984765
Treatable condition	0.183561	6.2864	0.120485	5.27257
Pregnant in last 12 mo.	0.092	2.52835	0.355295	13.869
Smoke	-0.079489	-3.88993	-2.16E-03	-0.131323
Physically limited	0.02141	0.652544	1.84E-03	0.071917
Retired, post	-0.087036	-1.78959	-0.078252	-2.01664
Retired, prime	0.17886	1.40077	-0.105939	-1.02174
Retired, prime, post	0.056398	0.56227	0.197898	2.2684
Retired, nonprime, post	0.023557	0.488905	0.135639	3.17664
Retired	-0.217785	-4.87127	0.013102	0.344772
Post	0.320166	7.18907	0.220558	6.81182
Prime	0.044613	0.462838	0.0759	1.04514
Prime, Post	-0.017737	-0.159276	-0.013333	-0.160459
Nonprime, post	0.078263	1.43928	-0.010946	-0.2716

Table A.10

Estimation Results for Military Inpatient Dollars

	Probit -- Any Visits		OLS -- Number of Visits	
Variable	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	-0.155199	-0.186495	9.17693	6.18908
Ft. Ord	1.02802	1.35584	8.62464	6.92902
Tripler	1.03473	1.37238	8.67532	7.02512
Long Beach	0.232111	0.306467	9.04079	7.35431
Pendleton	0.988121	1.30674	8.63169	6.97513
San Diego	0.876678	1.16061	8.54025	6.89198
Beale	0.767896	0.998745	8.68306	6.88555
March	0.85169	1.12243	8.14082	6.52174
Mather	0.980508	1.29251	8.62004	6.89205
Travis	1.12748	1.4831	8.44286	6.75925
Vandenberg	1.00535	1.3106	8.31485	6.57828
Ft. Hood	1.10962	1.46749	8.65044	6.97236
Madigan	1.29065	1.7113	8.68985	7.04314
Orlando	0.977986	1.28947	8.54435	6.83728
Charleston	0.779444	1.02934	8.54044	6.88652
Portsmouth	0.637947	0.845435	8.65481	7.01536
Quantico	1.11351	1.45704	8.27701	6.60928
Dover	1.19245	1.56233	8.40514	6.74731
Carswell	1.15459	1.52417	8.44649	6.78671
Homestead	1.16328	1.52952	8.54321	6.86673
Keesler	1.24524	1.6358	8.85388	7.11881
Shaw	1.02901	1.35113	8.20121	6.64039
Employed-full	-0.182492	-4.44952	-0.059809	-0.858356
Female	-1.98343	-2.54915	-0.561396	-0.438389
Age	-0.080729	-2.50115	-9.59E-03	-0.179481
Age squared	9.24E-04	2.77007	1.10E-04	0.197476
Female age	0.092685	2.72432	8.62E-03	0.153339
Female age squared	-1.07E-03	-2.95592	2.08E-05	0.034468
Household size	0.010039	0.62814	-0.016845	-0.649764
Log residence	-0.037122	-1.95903	0.05255	1.70787
Income	-3.34E-03	-3.00705	-4.89E-06	-2.53E-03
Current health	-6.11E-03	-6.68011	-1.29E-03	-0.897198
Mental health	-1.06E-03	-0.974194	-1.55E-04	-0.092894
Social functioning	-6.14E-03	-7.06286	-7.86E-03	-6.17861
Treatable condition	0.156138	3.06176	0.056042	0.676998
Pregnant in last 12 mo.	1.02191	19.8346	0.064814	0.773127
Retired	-0.204005	-2.38254	-0.099535	-0.651587
Retired, post	0.120753	1.397	0.030982	0.218764
Retired, post, CRI	0.069429	0.790523	0.096731	0.641758
Post	0.072355	1.01862	-0.017504	-0.170792
Active, post, CRI	0.087276	1.04367	-0.010016	-0.078758

Table A.11

Estimation Results for Total CHAMPUS Dollars

Variable	Probit -- Any Visits		OLS -- Number of Visits	
	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	0.627634	1.09534	6.63167	4.78666
Ft. Ord	-0.293177	-0.54438	6.81391	5.12248
Tripler	-0.138469	-0.258649	6.71523	5.08865
Long Beach	0.258238	0.453299	7.03617	5.08786
Pendleton	0.050127	0.087876	6.89168	4.98441
San Diego	0.082248	0.144179	6.68184	4.8308
Beale	-0.052332	-0.090981	6.44946	4.62806
March	-0.175601	-0.3073	7.07817	5.10625
Mather	-0.263004	-0.460473	6.73489	4.86674
Travis	-0.503138	-0.877816	6.58315	4.73951
Vandenberg	0.042026	0.073023	7.01627	5.04819
Ft. Hood	-0.192425	-0.358697	6.8941	5.21132
Madigan	-0.601512	-1.12191	6.77545	5.12746
Orlando	0.033588	0.058832	6.68516	4.8326
Charleston	0.102475	0.17949	6.52112	4.70527
Portsmouth	0.355273	0.623265	6.39666	4.62989
Quantico	-0.603865	-1.04657	6.76987	4.80569
Dover	-0.276124	-0.478713	6.36272	4.54609
Carswell	-0.122038	-0.213812	6.6957	4.84097
Homestead	-0.055797	-0.097456	7.10887	5.13524
Keesler	-0.497966	-0.867297	6.19874	4.44716
Shaw	-0.222421	-0.386864	6.68012	4.77501
Not Army	-0.01976	-0.103729	0.23628	0.591856
College	0.064666	2.21003	-0.011278	-0.180466
Employed-full	-0.050105	-2.05856	-0.150986	-2.81912
Officer	0.225101	7.46319	0.145468	2.26785
Nonwhite	-0.16883	-6.16215	-0.091833	-1.49531
Female	-0.428651	-0.795785	-0.603584	-0.454569
Age	-0.041944	-1.91928	-0.012041	-0.224662
Age squared	5.37E-04	2.42277	7.94E-05	0.147468
Female age	0.042964	1.89326	8.18E-03	0.148394
Female age squared	-5.18E-04	-2.20105	3.17E-05	0.056316
Household size	-0.019833	-2.00309	0.030062	1.35511
Log residence	0.031144	2.5896	1.89E-03	0.072523
Log time to MTF	0.052876	5.1609	-0.040901	-1.86379
Income	1.58E-03	2.39132	-1.77E-03	-1.23391
Current health	1.93E-03	0.898238	1.12E-03	0.25505
Current health squared	-5.15E-05	-2.97805	-2.51E-05	-0.689604
Mental health	48E-03	-0.44382	2.52E-03	0.372287
Mental health squared	74E-07	0.014762	-5.53E-05	-1.05016
Pain	56E-03	-2.86541	-2.18E-03	-0.664055
Pain squared	.92E-05	2.20006	1.22E-05	0.444379
Prior health	-5.95E-04	-0.421066	-1.34E-03	-0.460202
Prior health squared	-1.32E-05	-1.10541	-8.25E-06	-0.32706
Social functioning	-1.91E-04	-0.074841	-0.013684	-2.79438
Social functioning squared	-1.96E-05	-1.0415	5.45E-05	1.48369
Treatable condition	0.169609	5.41237	-0.012238	-0.188171
Pregnant in last 12 mo.	0.389004	10.0922	0.894196	11.1655
Smoke	0.052437	2.32641	0.07108	1.45274
Physically limited	0.020876	0.59452	-0.07051	-0.962837
Retired, post	-0.043699	-0.810333	-0.082197	-0.686047
Retired, prime	-0.259686	-1.86382	0.393896	1.2878
Retired, prime, post	.752531	6.65447	0.125276	0.491538
Retired, nonprime, post	-0.057103	-1.0539	-0.089166	-0.722156
Retired	-0.100384	-2.02796	-0.401801	-3.64935
Post	0.1657	3.4626	0.185311	1.79918
Prime	0.286663	2.86701	-0.283214	-1.40467
Prime, Post	0.476302	4.15047	0.127352	0.562137
Nonprime, post	-0.074006	-1.23866	-0.381184	-2.86243

Table A.12

Estimation Results for Total Military Dollars

Variable	Probit -- Any Visits		OLS -- Number of Visits	
	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	0.698103	1.46317	8.06746	14.9111
Ft. Ord	1.31216	2.96862	8.29384	16.6654
Tripler	1.16097	2.64298	8.22562	16.5855
Long Beach	0.483051	1.02167	8.1321	15.2585
Pendleton	0.946215	1.99836	8.46054	15.8829
San Diego	0.903945	1.91064	8.46286	15.8882
Beale	1.01358	2.12305	8.24516	15.3285
March	1.16027	2.44796	8.31952	15.5959
Mather	0.978298	2.06455	8.37461	15.6674
Travis	1.25101	2.6328	8.37872	15.6779
Vandenberg	1.33706	2.79095	8.33994	15.5243
Ft. Hood	1.27061	2.8863	8.32184	16.7304
Madigan	1.21454	2.76321	8.36833	16.8296
Orlando	0.90357	1.90689	8.34855	15.634
Charleston	1.15316	2.43402	8.33153	15.6184
Portsmouth	0.949618	2.00779	8.36379	15.7088
Quantico	1.46761	3.08006	8.55101	15.9573
Dover	1.38294	2.88973	8.46994	15.7428
Carswell	1.06349	2.24495	8.37981	15.6928
Homestead	1.20622	2.53469	8.36853	15.6542
Keesler	1.49567	3.14139	8.51102	15.8987
Shaw	1.4563	3.05086	8.25164	15.4187
Not Army	-5.05E-03	-0.029619	-0.149878	-0.796276
College	0.01703	0.635556	6.50E-03	0.205565
Employed-full	-0.086083	-3.93383	-0.067483	-2.68961
Officer	0.115348	4.12271	3.09E-03	0.09178
Nonwhite	0.026133	1.09107	-1.09E-03	-0.040888
Female	0.191202	0.434735	-1.49941	-2.99488
Age	-7.60E-03	-0.422313	-0.067297	-3.22166
Age squared	8.97E-05	0.487285	7.14E-04	3.2896
Female age	-5.66E-03	-0.300415	0.069234	3.16138
Female age squared	-4.03E-06	-0.020295	-7.55E-04	-3.22362
Household size	5.91E-03	0.674603	-0.018596	-1.88836
Log residence	-0.096876	-8.93851	-0.010917	-0.893841
Log time to MTF	-0.070391	-7.58325	-0.027818	-2.81529
Income	-6.65E-03	-10.8189	-1.42E-03	-1.81047
Current health	6.15E-04	0.304629	-3.94E-03	-1.80794
Current health squared	-4.09E-05	-2.55456	-3.00E-06	-0.16912
Mental health	-1.39E-03	-0.435866	-4.98E-03	-1.48605
Mental health squared	1.47E-05	0.616559	3.30E-05	1.28436
Pain	-1.43E-03	-0.933085	-5.53E-03	-3.353
Pain squared	-7.52E-06	-0.611433	2.36E-05	1.7444
Prior health	-1.04E-03	-0.787061	-2.02E-03	-1.40269
Prior health squared	-7.39E-06	-0.667811	-5.30E-06	-0.432948
Social functioning	3.64E-03	1.4647	-0.016342	-6.29313
Social functioning squared	-4.14E-05	-2.29312	7.89E-05	4.1382
Treatable condition	0.181147	6.19375	0.152169	4.73451
Pregnant in last 12 mo.	0.124538	3.40575	0.788203	21.967
Smoke	-0.078173	-3.82026	8.24E-03	0.356598
Physically limited	0.018411	0.560397	-0.014275	-0.395137
Retired, post	-0.081542	-1.67426	-9.27E-03	-0.169791
Retired, prime	0.181057	1.41565	-0.017575	-0.120414
Retired, prime, post	0.059295	0.590887	0.241333	1.96122
Retired, nonprime, post	0.024719	0.512767	0.148718	2.473
Retired	-0.22174	-4.95533	-0.049178	-0.919323
Post	0.310826	6.96271	0.205283	4.51013
Prime	0.037655	0.389658	-0.05884	-0.57687
Prime, Post	-0.015069	-0.13501	0.074562	0.638486
Nonprime, post	0.085761	1.57286	0.016517	0.29157

Table A.13

Estimation Results for Total Dollars

Variable	Probit -- Any Visits		OLS -- Number of Visits	
	Est. Coef.	t-statistic	Est. Coef.	t-statistic
Port Hueneme	1.51727	3.11772	8.21178	14.0931
Ft. Ord	1.52572	3.41173	8.32643	15.3215
Tripler	1.47756	3.32472	8.20602	15.162
Long Beach	1.19528	2.47786	8.4125	14.5677
Pendleton	1.38467	2.86461	8.4517	14.6303
San Diego	1.40504	2.90965	8.37526	14.4989
Beale	1.50529	3.08799	8.08573	13.8724
March	1.48002	3.05899	8.40037	14.5175
Mather	1.29891	2.68596	8.31527	14.3506
Travis	1.41385	2.91499	8.31704	14.3391
Vandenberg	1.74461	3.56346	8.37717	14.3831
Ft. Hood	1.55083	3.48268	8.31294	15.3178
Madigan	1.34957	3.03615	8.29235	15.2834
Orlando	1.38027	2.85439	8.2333	14.2312
Charleston	1.62041	3.35047	8.2311	14.2226
Portsmouth	1.60192	3.31758	8.22682	14.2487
Quantico	1.59302	3.27683	8.45334	14.5219
Dover	1.56243	3.19815	8.31446	14.2385
Carswell	1.43863	2.97595	8.26684	14.2855
Homestead	1.57705	3.24694	8.40074	14.4876
Keesler	1.7072	3.51177	8.27238	14.2436
Shaw	1.70619	3.49977	8.16997	14.0623
Not Army	-0.078959	-0.42998	-0.021165	-0.108151
College	0.041446	1.53158	0.01527	0.477584
Employed-full	-0.139363	-6.29191	-0.094107	-3.62215
Officer	0.206159	7.30542	0.082354	2.45807
Nonwhite	-0.086239	-3.51914	-0.021989	-0.77712
Female	0.259595	0.586931	-1.27414	-2.33459
Age	-0.018008	-1.00016	-0.05491	-2.43288
Age squared	2.37E-04	1.28565	5.84E-04	2.51281
Female age	1.36E-03	0.072177	0.054107	2.30094
Female age squared	-9.47E-05	-0.477182	-5.54E-04	-2.2337
Household size	-4.14E-03	-0.463022	-2.09E-03	-0.202175
Log residence	-0.061972	-5.53879	-0.018467	-1.46308
Log time to MTF	-0.028065	-2.89759	-0.024912	-2.39515
Income	-4.21E-03	-6.96189	-2.06E-03	-2.70453
Current health	1.45E-03	0.682211	-2.79E-03	-1.24098
Current health squared	-5.44E-05	-3.25974	-1.81E-05	-0.989008
Mental health	-2.42E-03	-0.704251	-3.16E-03	-0.913608
Mental health squared	1.83E-05	0.721534	9.98E-06	0.376429
Pain	-3.63E-03	-2.24617	-5.84E-03	-3.43304
Pain squared	8.79E-06	0.685408	2.85E-05	2.03993
Prior health	-2.71E-03	-1.95788	-1.59E-03	-1.0683
Prior health squared	1.99E-06	0.173721	-1.39E-05	-1.1001
Social functioning	1.45E-03	0.530071	-0.017559	-6.63796
Social functioning squared	-3.51E-05	-1.79051	7.91E-05	4.05716
Treatable condition	0.281194	9.20551	0.124582	3.75465
Pregnant in last 12 mo.	0.467339	11.3083	0.924506	24.6043
Smoke	-0.045012	-2.15512	0.036109	1.50984
Physically limited	0.029348	0.86542	-0.021363	-0.574058
Retired, post	-0.135282	-2.68275	-0.041147	-0.725875
Retired, prime	0.025434	0.190294	0.044123	0.293256
Retired, prime, post	0.389827	3.83392	0.325606	2.60989
Retired, nonprime, post	-0.012262	-0.257367	0.018995	0.312149
Retired	-0.204786	-4.53561	-0.200379	-3.67914
Post	0.405774	8.52334	0.247365	5.14565
Prime	0.16824	1.60912	-0.074653	-0.708445
Prime, Post	0.265942	2.15229	0.16851	1.40742
Nonprime, post	0.010638	0.186382	-0.119702	-1.9908

Table A.14

Baseline Comparison of Means for CRI and Control Sites

	CRI Sites	Control Sites	CRI-Control
Non-Army Sponsor	0.78	0.68	0.10
	(0.41)	(0.47)	(11.35)
College	0.22	0.18	0.04
	(0.41)	(0.38)	(4.59)
Work Fulltime	0.44	0.43	0.01
	(0.50)	(0.49)	(0.95)
Employer Coverage	0.25	0.21	0.04
	(0.43)	(0.41)	(4.71)
Officer	0.25	0.22	0.03
	(0.44)	(0.42)	(3.56)
Non-White	0.26	0.17	0.09
	(0.44)	(0.37)	(11.18)
Female	0.71	0.72	-0.01
	(0.46)	(0.45)	(-1.27)
Age	43.68	43.06	0.62
	(13.68)	(13.44)	(2.22)
Female*Age	28.05	28.24	-0.19
	(21.37)	(20.96)	(-0.45)
Household Size	2.98	3.00	-0.02
	(1.29)	(1.23)	(-0.77)
Length of Residency	11.12	10.81	0.31
	(10.82)	(10.52)	(1.46)
Minutes from MTF	20.74	22.85	-2.11
	(18.17)	(18.03)	(-5.76)
Income	35.29	32.12	3.17
	(20.83)	(19.12)	(7.82)
Current Health (0-100)	71.55	70.16	1.39
	(24.58)	(25.18)	(2.74)
Mental Health (0-100)	76.60	75.79	0.81
	(16.84)	(17.59)	(2.32)
Pain (0-100)	67.94	66.07	1.87
	(29.59)	(29.81)	(3.11)
Prior Health (0-100)	68.00	67.37	0.63
	(30.60)	(31.55)	(0.99)
Social Functioning (0-100)	90.39	90.00	0.39
	(19.47)	(20.24)	(0.97)
Presence of Treatable Condition	0.99	0.99	0.00
	(0.12)	(0.12)	(0.34)
Pregnant in Last 12 Months	0.11	0.10	0.01
	(0.31)	(0.30)	(0.57)
Smoke	0.57	0.60	-0.03
	(0.49)	(0.49)	(-2.62)
Role Limitations	0.10	0.09	0.01
	(0.30)	(0.29)	(1.13)
Retired	0.56	0.56	0.00
	(0.50)	(0.50)	(0.07)
Outpatient CHAMPUS Expenditures	75.30	49.89	25.41
	(355.52)	(241.07)	(4.14)
Inpatient CHAMPUS Expenditures	100.85	68.67	32.18
	(1188.19)	(721.30)	(1.62)
Total CHAMPUS Expenditures	176.15	118.55	57.60
	(1309.73)	(771.50)	(2.66)
Total MTF Expenditures	192.53	264.63	-72.10
	(934.99)	(1401.63)	(-2.96)
Total Expenditures (CHAMPUS + MTF)	368.68	383.19	-14.51
	(1606.87)	(1611.84)	(-0.44)
MTF Visits	1.49	1.73	-0.24
	(3.15)	(3.40)	(-3.58)
MTF Hospital Days	0.22	0.34	-0.12
	(1.78)	(2.75)	(-2.52)
CHAMPUS Visits	0.97	0.80	0.17
	(3.72)	(2.98)	(2.53)
CHAMPUS Hospital Days	0.12	0.13	-0.01
	(1.49)	(1.51)	(-0.27)

Note: For the CRI and Control columns, standard deviations are in parentheses. In the difference column, the expression in parentheses is th t-statistic corresponding to a test that the two means are the same. There are 4,711 and 4,998 adults in the baseline CRI and control groups, respectively.

Appendix B

AVERAGE OPERATING COSTS IN CRI AND CONTROL MTFs

We estimated separate regressions for the total operating costs of inpatient and outpatient services. The explanatory variables were (1) total workload—beddays and outpatient visits, respectively; (2) the service to which the MTF belongs; (3) the year; and (4) whether the MTF was in the CRI, control, or other demonstration areas. We estimated these regressions in two forms: linear and with both cost and workload transformed by taking the natural logarithm. Both the linear and log specifications fit the data well, but the log specification appeared to fit the outpatient data better.[1]

The results for the logarithmic versions of the pooled regressions, including the demonstration sites, are shown in Table B.1. Although we would expect the regression to fit this small

Table B.1

Regression Results for MTF Operating Costs: All MTFs in CONUS, 1988–1990

Explanatory Variable	Outpatient Care Log(visits)	Inpatient Care Log(beddays)
Intercept	4.7725***	14.2570***
Log(workload)	0.9523***	–0.4849***
Log(workload)^2	—	0.0679***
Air Force MTFs	–0.1297***	–0.1542***
Army MTFs	–0.1706***	–0.0768***
Matched CRI sites	–0.0093	0.1032*
Control sites	0.0737	0.0518
Other demonstration sites	–0.1097**	0.0207
Increase: 1988–89	0.0399	0.0856***
Increase: 1988–90	0.1234***	0.1897***
CRI and control sites in 1989	–0.0604	–0.0382
CRI and control sites in 1990	–0.1263	0.0400
CRI only in 1989	0.0111	0.0254
CRI only in 1990	0.1098	–0.0083
All other demonstrations in 1989	0.1398*	0.0556
All other demonstrations in 1990	0.1150	0.0199
N	470	373
Adjusted *R*-square	0.9225	0.9675

NOTE: Coefficients measure the percent increase in cost from a 1 percent increase in workload or by service, demonstration area, or year.

*Coefficient significant at .10 level, two-tailed test.

**Coefficient significant at .05 level, two-tailed test.

***Coefficient significant at .01 level, two-tailed test.

[1]We also estimated separate regressions for each year to investigate whether the effects of workload and service differed by year. The coefficients were remarkably stable.

sample size relatively well, the very high R-squares for the pooled and unpooled regressions indicate a very good fit even though the MTFs are diverse, ranging from 20-bed hospitals to 1,000-bed hospitals and from small clinics to huge multisite outpatient systems.[2]

The coefficients for workload in this log specification measure the percent change in total operating costs associated with a 1 percent increase in workload. Thus, we found that a 1 percent increase in the number of visits resulted in a nearly proportional 0.95 percent increase in outpatient costs. The quadratic relationship in the inpatient regression indicates that as the number of beddays increases, inpatient costs increase more than proportionately.

Operating costs systematically differ between Navy MTFs and the other services' MTFs, both for inpatient and outpatient care. The higher costs in the Navy have been noted by others and probably reflect different organizational structures that result in different accounting practices. Navy MTFs often operate separately from other Navy installations and therefore procure most of their resources directly. Air Force and Army MTFs are located on larger installations and rely on base operations to provide some services (e.g., laundry). If this is in fact the explanation for the service differences we estimate, the Navy costs are more accurate and we should use Navy cost levels to price MTF utilization for all services. However, without the evidence to support the greater validity of the Navy cost figures, we have chosen to price utilization at each MTF at the levels estimated for the relevant service.

The coefficients for the indicator variables for the study sites in 1989 and 1990 measured differential growth between the CRI and control sites on the one hand and other MTFs on the other. The coefficients are negative in the outpatient equation in both years, but not significantly different from zero at conventional levels of significance. There is no consistent pattern in the insignificant coefficients in the inpatient equation. The indicator variables for the CRI sites only measure the difference in the growth over time in costs between the CRI and control sites. In the outpatient equation, the coefficient for the CRI sites in 1990 is positive, but clearly not significant (t-value = 0.894). When we plotted the actual costs and workloads for the CRI and control sites together with the regression line for workload, we saw no consistent pattern in the data for either group of sites.

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[2]These regressions do not include case-mix adjusters because the beneficiaries could not give us the information for determining the case mix for their visits.

Appendix C

MULTIVARIATE ANALYSIS OF PRIME ENROLLMENT

To determine the relationship between beneficiary characteristics and Prime enrollment, we estimated probit regressions. The sample for these regressions included respondents to the follow-up survey who lived in the CRI areas where Prime was offered. Nine of the 11 areas included in our survey had Prime by the survey date; the two areas without Prime were Vandenberg and Port Hueneme.

The dependent variable in the regressions indicated whether the individual was enrolled in Prime as of the survey date, and the explanatory variables were the following: catchment area, age and age squared, sex, race, education, employment status, income, household size, length of residence in area, distance from MTF, and health status. Length of residence and time in area were transformed by taking the natural logarithm because these variables are approximately log normal. Since the follow-up survey oversampled Prime enrollees, we have a choice-based sample for the enrollment analysis. Unbiased coefficients can be estimated for choice-based samples if the data are weighted to represent the population from which they were drawn. The standard errors were calculated using methods described in Manski and Lerman (1977). Using essentially the same specification, we estimated regressions for the two groups separately.

Table C.1 contains the coefficients and *t*-statistics that we estimated for each of the two regressions. The explanatory variables are of two types: (1) categorical variables that indicate whether the individual belonged to the group (e.g., college educated) or not and (2) continuous variables that measure the level for each individual (e.g., age in number of years). These results are discussed in Section 5.

Table C.1

Regression Results for Prime Enrollment

Variable	Active-Duty Spouses		Retirees and Spouses	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Intercept	–2.018	–2.350	–2.739	–8.682
MTF area (vs. San Diego)				
Beale	0.323	1.601	0.715	5.165
March	0.205	1.589	0.193	2.153
Mather	0.014	0.097	0.655	8.116
Travis	–0.193	–1.433	0.349	3.594
Ft. Ord	–1.140	–7.831	–0.681	–3.986
Tripler	–0.413	–4.824	–0.319	–2.871
Long Beach	0.475	4.910	–0.121	–1.375
Pendleton	–0.390	–4.037	0.079	0.751
Background variables				
Officer	0.050	0.540	–0.039	–0.552
Female	1.342	1.561	0.375	1.056
Nonwhite	–0.026	–0.407	–0.044	–0.693
College educated	0.011	0.135	–0.107	–1.563
Employed full time	–0.262	–4.055	0.036	0.589
Household income	–0.004	–1.650	–0.006	–4.806
Household size	0.111	4.400	0.109	4.747
Years in area	–0.009	–1.981	–0.005	–2.084
Travel time to MTF	0.001	0.549	–0.005	–3.253
Health status variables				
Age	0.019	0.868	0.032	5.861
Female*Age	–0.018	–0.839	–0.005	–0.742
General health status	–0.002	–1.315	–0.001	–0.739
Mental health status	0.001	0.514	0.002	0.778
Level of pain	–0.002	–1.530	–0.001	–1.001
Prior health status	–0.001	–0.686	0.000	0.370
Pregnant in last 12 months	0.109	1.489	0.305	0.735
Number of observations	2029		2573	

Appendix D

GEOGRAPHIC ACCESS TO PRIME/EXTRA PHYSICIANS

The significant participation rates in Prime and Extra suggest that beneficiaries have access to an adequate number of providers in the network that supports these options. As of November 1989, the network included 131 acute care hospitals, 9,628 physicians, and 1,382 nonphysician providers. To enable a more direct, if preliminary, assessment of the CHAMPUS beneficiaries' geographic access to network physicians, we calculated local-area CRI provider/population ratios and compared them with similar civilian provider/population ratios in the same areas. We first constructed a zip-code-level database containing the number of CHAMPUS beneficiaries, the number of CRI network physicians, the total civilian population, and the total number of civilian physicians in practice. The Defense Eligibility Enrollment System, augmented with data from automated military personnel files, provided individual beneficiary records as of May 1989, which we aggregated by five-digit zip code. Estimates of the civilian population were taken from the 1980 census, updated to 1987 by Western Economic Research, Inc. We calculated the number of physicians in the CRI network and in civilian practice from the FHC provider file (May 1989) and the American Medical Association (AMA) Physician Masterfile (1988), respectively.

For each zip code, we calculated the provider/population ratios by dividing the number of network providers in zip codes within 5, 10, or 20 miles of the first zip code by the number of beneficiaries living in zip codes similarly defined. We used the 5-, 10-, and 20-mile radii to smooth the data over clusters of beneficiaries and providers in nearby zip codes. We then averaged the ratios across all the zip codes in 11 major California urban areas (San Diego, Orange County, Palm Springs, San Bernardino/Riverside/Ontario, Long Beach, Central Los Angeles, Oxnard/Santa Barbara, Fresno, Salinas/Monterey, the San Francisco Bay area, and Sacramento) and for seven medical specialty groups (general/family practice, internal medicine, pediatrics, obstetrics/gynecology, psychiatry/psychology, radiology/pathology, and surgery).[1]

The FHC provider file included 6,977 network physicians in California—11 percent of the 62,070 physicians in the AMA file. Between May and November 1989, the network grew by almost 40 percent; the ratios we calculated are for approximately the same time period as the enrollment and claims data, but they underestimate geographic access. As shown in Table D.1, the specialty distributions of the network physicians closely match the distribution for all civilian physicians.

Overall, the CRI provider/population ratio in May 1989 was 12.14, more than five times the civilian ratio of 2.30. Tables D.2 and D.3 show the relative provider/population ratios (CRI/civilian) by specialty and urban area, respectively. Across specialties, the relative provider/population ratios varied from over 4 for general/family practice to 7 for radiology/pathology and surgery. In contrast, there was much greater variation in the relative ratios

[1]Pediatrics ratios are based on children under 18 years of age, and obstetrics/gynecology ratios are based on women between the ages of 18 and 45. We also calculated ratios for all other specialties combined, but the results may be affected by different coding conventions in the files we used.

across urban areas. In San Diego and Salinas/Monterey, the concentrations of network physicians relative to the CHAMPUS populations served were about equal to the overall concentrations in the civilian markets. At the other extreme, Long Beach and Fresno had concentrations at least 20 times community levels.

These ratios must be interpreted cautiously, since we have no estimate of the amount of time network physicians devote to CHAMPUS beneficiaries. The ratios must be recalculated after the network has ceased growing so rapidly. Nevertheless, it is likely that physicians in San Diego, where CHAMPUS is a major payer, carry much higher CHAMPUS volumes than do physicians in Fresno, where the CHAMPUS population is smaller. Overall, the evidence suggests that the network was at least adequate in most areas, even before its recent growth.

Table D.1

Specialty Distribution of Physicians: CRI Network versus All Civilians in Practice (In percent)

Specialty	CRI Network (N = 6,977)	All Civilian MDs (N = 62,070)
General/family practice	12	14
Internal medicine	24	23
Pediatrics	8	8
Obstetrics/gynecology	9	6
Psychiatry/psychology	6	8
Radiology/pathology	10	8
Surgery	22	17
Other	10	17
Total	100	100

Table D.2

CRI and Civilian Provider/Population Ratios by Physician Specialty

Specialty	CRI Ratio	Civilian Ratio	CRI/Civilian
General/family practice	1.49	0.32	4.66
Internal medicine	2.89	0.52	5.56
Pediatrics	3.47	0.72	4.82
Obstetrics/gynecology	4.23	0.65	6.51
Psychiatry/psychology	0.68	0.18	3.78
Radiology/pathology	1.20	0.17	7.06
Surgery	2.65	0.38	6.97
Other	1.20	0.40	3.00
Total	12.14	2.30	5.28

Table D.3

Provider/Population Ratios by Urban Area

Area in California	CRI	Civilian	CRI/Civilian
San Diego	2.92	2.46	1.19
Orange County	11.97	2.57	4.65
Palm Springs	9.84	1.32	7.46
San Bernardino/Riverside/Ontario	11.93	1.55	7.72
Long Beach	43.34	2.39	18.14
Central Los Angeles	37.66	2.89	13.04
Oxnard/Santa Barbara	14.56	2.09	6.98
Fresno	36.08	1.61	22.41
Salinas/Monterey	2.44	1.66	1.48
San Francisco Bay area	17.45	2.78	6.28
Sacramento	12.60	2.17	5.81
All areas	12.14	2.30	5.28
		Obstetrics/Gynecology	
San Diego	0.57	0.61	0.93
Orange County	3.95	0.77	5.16
Palm Springs	3.45	0.52	6.72
San Bernardino/Riverside/Ontario	4.36	0.47	9.24
Long Beach	21.99	0.75	29.35
Central Los Angeles	15.07	0.81	18.53
Oxnard/Santa Barbara	5.37	0.52	10.35
Fresno	15.73	0.49	31.83
Salinas/Monterey	0.95	0.44	2.15
San Francisco Bay area	7.52	0.72	10.38
Sacramento	5.76	0.60	9.60
All areas	4.23	0.65	6.51
		Pediatrics	
San Diego	0.42	0.72	0.58
Orange County	6.05	0.81	7.48
Palm Spring	2.51	0.23	10.90
San Bernardino/Riverside/Ontario	3.51	0.48	7.30
Long Beach	15.19	0.76	20.09
Central Los Angeles	16.49	0.94	17.50
Oxnard/Santa Barbara	3.35	0.39	8.55
Fresno	12.42	0.48	25.99
Salinas/Monterey	0.27	0.39	0.68
San Francisco Bay Area	6.70	1.05	6.37
Sacramento	2.80	0.64	4.39
All areas	3.47	0.72	4.82

Appendix E

DISCOUNTS GRANTED BY NETWORK PHYSICIANS

The discounts negotiated with network providers are an important source of savings under CRI. To determine the potential of discounting in the program, we compared the discounts incorporated into the CRI physician contracts with the fees allowed by CHAMPUS just prior to the CRI. This comparison provides the best estimate available of the discount levels prevailing in the CRI. We know the fees individual physicians charge from claims records, but these fees average more than twice the amounts paid under the CRI, even for nonnetwork providers who do not discount. Since these providers also are paid substantially less than their posted fees by many other payers, we conclude that comparing contracted fees with billed fees would be misleading. The comparison with pre-CRI allowed fees provides a closer estimate of the actual network discounts.

METHODS USED TO DETERMINE DISCOUNTS

For each of 12 major specialties, we selected one to three procedures that are relatively frequently used and well defined (Table E.1). For each specialty-procedure combination, we calculated the average payment allowed under the contract for each network provider. Altogether, we considered 24,166 contractual arrangements effective in September 1989 for physicians, physician groups, osteopaths, and psychologists. We were able to calculate negotiated rates for 32,668 procedure-contract combinations. We averaged these rates, by urban area and region, for each of the specialty-procedure combinations.

To obtain comparison figures for the pre-CRI period, we computed from CHAMPUS claims records the average billed and allowed charges for California and Hawaii residents in the seven months prior to the CRI demonstration project (January to July 1988). During this period, there were 114,642 occurrences of the selected specialty-procedure combinations.

We deleted records for the following reasons:

- The date of service predated the updating of the CHAMPUS prevailing fee for that procedure.
- Coding of inpatient versus outpatient indicators for mental health procedures was inconsistent.
- The provider was not the attending provider or was dispensing drugs only.
- The pricing was not based on billed or prevailing charges.
- The billed or allowed charges, after adjustments, were negative.
- The amount allowed for payment was greater than the billed amount.

Consolidating multiple records that referred to the same claim left 92,027 observations.

Table E.1

Specialties and Procedure Codes Used in Analysis of Discounts

Specialty	CPT Code	Procedure Description
General practice	12001	Simple repair/closure, superficial wound
	90020	New patient; comprehensive office visit
Family practice	12001	Simple repair/closure, superficial wound
	90020	New patient; comprehensive office visit
Internal medicine	90020	New patient; comprehensive office visit
Cardiology	93015	Cardiovascular stress test using bicycle or treadmill exercise
	93547	Combined left heart catheterization/coronary angiography/ left ventricular angiography
	93549	Combined left and right heart catheterization/coronary arteries/left ventricular angiography
Gastroenterology	43235	Upper gastrointestinal endoscopy; complex diagnostic tests
	45378	Colonoscopy, fiberoptic, beyond splenic flexure; diagnostic procedure
Pediatrics	90020	New patient; comprehensive office visit
	90764	Established patient; well-infant care, routine examination (age under one year)
General surgery	47605	Biliary tract excision: cholecystectomy with cholangiography
Obstetrics/gynecology	58150	Total hysterectomy (Ob excision)
	58400	Uterine suspension (Ob repair)
	59501	Caesarean section including antepartum and postpartum care
Orthopedic surgery	29075	Forearm cast, elbow to finger
	29877	Surgical arthroscopy, knee, with removal of cartilage
	29881	Surgical arthroscopy, knee, with meniscectomy
Psychiatry	90812	45–60 minute family therapy
	90844	45–50 minute individual psychotherapy
Psychology	90812	45–60 minute family therapy
	90844	45–50 minute individual psychotherapy

Some of the mental health claims reported multiple instances of the same procedure in the same line item. After splitting these into separate records (each with billed and allowed amounts equal to the total amounts divided by the number of services), we had 194,628 observations. The billed and allowed amounts for each specialty-procedure combination were then averaged across urban areas and regions in the same way as the contract figures. We estimated the discount by taking the ratio of the average CRI contract amount to the average allowed amount pre-CRI.

We recognize that physician fees probably increased between early 1988 and September 1989. Therefore, we also present a comparison of the claims and contract averages, each divided by the appropriate CHAMPUS prevailing fee effective during the two periods. The prevailing fees were extracted from the prevailing CHAMPUS fee files for 1988 and 1989.[1]

[1]The increase in the prevailing schedule was very small; fees were kept at 1988 levels until February 1, 1989, and were then increased only 1 percent for nonprimary care and 3 percent for primary care.

DISCOUNT RESULTS

Table E.2 shows the average discount estimated for each specialty-procedure combination by region. For most of the 25 specialty-procedure combinations considered, network physicians' contracts stipulate payments for 1989 that are lower than the actual payments made in 1988 (after adjusting for the CHAMPUS allowable). Across all areas, the average difference in adjusted payments ranges from 40 percent below 1988 levels for psychotherapy visits to 35 percent above 1988 levels for pediatric well-baby visits.[2] Based on this limited procedure list, it appears that network pediatricians are consistently being paid as much as or more than nonnetwork pediatricians, and psychiatrists and psychologists are being paid less. The fees for most other network specialists are 10 to 20 percent less for the procedures studied.

We caution that our methods could be overestimating the actual fees paid to contracting physicians because the contracts call for payment of billed charges if they are lower than the contract amount. However, since the network claims show that payments average just under one-half for network providers, the error probably is not large.

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[2]For some uncommon outpatient visit codes, the maximum payment allowed by CHAMPUS does not differ by specialty; therefore, specialists charging lower fees, such as pediatricians, are rarely affected by the CHAMPUS allowable.

Table E.2

Physician Payments for Selected Specialties and Procedure Codes: Average by Region

Specialty and Procedure	1988 Allowed Amount/ CHAMPUS Prevailing			1989 Contracted Amount/CHAMPUS Prevailing			1989 Contracted Amount/1988 Allowed Amount[a]		
	S. Cal	N. Cal	Hawaii	S. Cal	N. Cal	Hawaii	S. Cal	N. Cal	Hawaii
General practice									
Wound repair	0.80	0.75	0.55	0.61	0.47	0.41	0.77	0.64	0.74
New comprehensive visit	0.81	0.80	0.68	0.80	0.76	0.73	1.02	0.98	1.10
Family practice									
Wound repair	0.73	0.88	0.56	0.61	0.47	0.41	0.84	0.55	0.73
New comprehensive visit	0.79	0.77	0.91	0.80	0.77	0.80	1.04	1.04	0.83
Internal medicine									
New comprehensive visit	0.90	0.92	0.95	0.80	0.79	0.73	0.92	0.87	0.79
Cardiology									
Exercise test	0.86	0.87	0.84	0.83	0.76	0.78	0.98	0.88	0.93
Left heart catheterization	0.89	0.94	0.93	0.75	0.70	0.85	0.85	0.76	0.92
Left and right heart catheterization	0.89	0.87	[b]	0.88	0.79	[b]	1.00	0.92	[b]
Gastroenterology									
Gastrointestinal endoscopy, diagnostic	0.88	0.88	0.58	0.81	0.71	0.73	0.93	0.81	1.27
Colonoscopy, diagnostic	0.85	0.79	0.95	0.97	0.80	0.82	1.15	1.00	0.87
Pediatrics									
New comprehensive visit	0.63	0.65	0.37	0.81	0.79	0.73	1.32	1.26	2.04
Established patient, well-infant care	0.94	0.92	0.92	0.94	0.89	0.88	1.02	0.98	0.96
General surgery									
Cholecystectomy w/ cholangiography	0.94	0.95	0.96	0.83	0.74	0.70	0.90	0.78	0.79
Obstetrics/gynecology									
Total hysterectomy	0.89	0.87	0.95	0.72	0.69	0.74	0.82	0.78	0.79
Uterine suspension	0.56	[b]	[b]	0.78	[b]	[b]	1.41	[b]	[b]
Caesarean section	0.94	0.90	0.92	0.80	0.78	0.78	0.88	0.88	0.85
Orthopedic surgery									
Forearm cast, elbow to finger	0.84	0.87	0.84	0.82	0.80	0.86	0.97	0.90	1.03
Knee arthroscopy w/ cartilage removal	0.68	0.75	0.89	0.58	0.58	0.75	0.85	1.06	1.20
Knee arthroscopy w/ meniscectomy	0.77	0.68	0.84	0.72	0.70	0.70	0.94	0.98	0.94
Psychiatry[c]									
45–60 min. family therapy (all)	[b]	0.94	0.96	[b]	0.72	0.88	[b]	0.77	0.92
45–60 min. family therapy (inpatient)	0.87	[b]	[b]	0.58	[b]	[b]	0.62	[b]	[b]
45–60 min. family therapy (outpatient)	0.88	[b]	[b]	0.58	[b]	[b]	0.63	[b]	[b]
45–50 min. psychotherapy (all)	[b]	0.93	0.91	[b]	0.81	0.85	[b]	0.88	0.93
45–50 min. psychotherapy (inpatient)	0.95	[b]	[b]	0.67	[b]	[b]	0.71	[b]	[b]
45–50 min. psychotherapy (outpatient)	0.92	[b]	[b]	0.67	[b]	[b]	0.80	[b]	[b]
Psychology[c]									
45–60 min. family therapy (all)	[b]	0.85	0.89	[b]	0.54	1.00	[b]	0.64	1.13
45–60 min. family therapy (inpatient)	0.91	[b]	[b]	0.44	[b]	[b]	0.48	[b]	[b]
45–60 min. family therapy (outpatient)	0.89	[b]	[b]	0.50	[b]	[b]	0.56	[b]	[b]
45–50 min. psychotherapy (all)	[b]	[b]	0.87	[b]	[b]	0.96	[b]	[b]	1.11
45–50 min. psychotherapy (inpatient)	0.94	0.92	[b]	0.54	0.60	[b]	0.57	0.64	[b]
45–50 min. psychotherapy (outpatient)	0.93	0.87	[b]	0.54	0.67	[b]	0.70	0.79	[b]

[a]Adjusted for the change in CHAMPUS prevailing between 1988 and 1989.

[b]Insufficient number of claims.

[c]The coding of mental health visits differs by geographic area and specialty. In southern California and for psychotherapy visits made to psychologists in northern California, inpatient and outpatient visits are coded separately. In Hawaii and otherwise in northern California, the same code is used for inpatient and outpatient visits.

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