California HealthCare Foundation

Preventable Hospitalizations among Medi-Cal Beneficiaries and the Uninsured

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About the Authors

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About the Foundation

The California HealthCare Foundation, based in Oakland, is an independent philanthropy committed to improving California's health care delivery and financing systems. Formed in 1996, our goal is to ensure that all Californians have access to affordable, quality health care. For more information about CHCF, visit us online at www.chcf.org.

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I. Executive Summary

Approximately half of California's 6.5 million Medicaid (Medi-Cal) beneficiaries are in managed care. California's Medi-Cal managed care program serves nearly all women and children living in urban counties who are eligible for federal Temporary Assistance for Needy Families, which in California is referred to as the CalWORKs program. Most Medi-Cal beneficiaries with disabilities are in fee-for-service Medi-Cal, although some are required to enroll in managed care, and many others may enroll on a voluntary basis. Stimulated by state budget constraints, serious consideration has been given to expanding mandatory Medi-Cal managed care for disabled Medi-Cal beneficiaries.

Despite Medi-Cal's long history with managed care, there is relatively little information on the impact of managed care on the Medi-Cal population. This report uses preventable hospitalization rates for ambulatory-care-sensitive conditions to compare the performance of Medi-Cal managed care with fee-for-service care.

This report builds on findings in a 2004 report on preventable hospitalizations, published by the California HealthCare Foundation, in three ways: (1) it provides a more up-to-date understanding of Medi-Cal managed care, and includes a sufficient number of observations to assess the effects of Medi-Cal managed care on disabled beneficiaries; (2) it examines variation in the performance among Medi-Cal managed care plans; and (3) it describes variation in county rates of preventable hospitalizations for Medi-Cal beneficiaries and the uninsured.

Key findings include:

From 1994 to 2002, the average annual preventable hospitalization rate among CalWORKs beneficiaries was more than a third lower in managed care than in fee-for-service. For disabled beneficiaries, the average annual preventable hospitalization rate was approximately 25 percent lower in managed care than in fee-for-service.

Had all CalWORKs beneficiaries been enrolled in managed care from 1994 to 2002, the projected average annual hospital savings would have been approximately $26 million. Had all disabled beneficiaries been enrolled in managed care from 1994 to 2002,

the projected average annual hospital savings would have been approximately $46 million.

There was a three-fold difference in preventable hospitalization rates across the health plans serving a minimum of 1,000 CalWORKs beneficiaries, and a seven-fold difference in the preventable hospitalization rates across the health plans serving a minimum of 1,000 disabled Medi-Cal beneficiaries. Health plans with low preventable hospitalization rates for CalWORKs beneficiaries also tended to have low preventable hospitalization rates for disabled beneficiaries. County-level factors outside the control of a health plan accounted for approximately 60 percent of the difference in preventable hospitalization rates across plans.

There was a two-fold difference in preventable hospitalization rates for the uninsured across counties. In general, counties that had high rates of preventable hospitalizations for their Medi-Cal population had high rates for their uninsured as well.

These findings suggest that Medi-Cal managed care has a beneficial effect on preventable hospitalization rates for CalWORKs and disabled beneficiaries. Combining these results with other assessments of Med-Cal beneficiaries' experiences, such as their satisfaction with services, may be useful in determining the safety and effectiveness of Medi-Cal managed care for various subgroups of beneficiaries.

The wide variation in preventable hospitalization rates across health care plans serving Medi-Cal beneficiaries suggests that there are significant differences in the quality of care being provided by Medi-Cal managed care plans. More than half of these differences are attributable to county-level factors that may be difficult for a managed care plan to influence, such as the underlying disease prevalence of the population, or the availability of primary and specialty care providers in the community. Nevertheless, the findings suggest that there is a meaningful opportunity in both fee-for-service and managed care to reduce the variation in care for Medi-Cal beneficiaries, such as through the adoption of effective quality improvement strategies to support provider decision-making and patient self-management.

I. Introduction

The Growth of Medicaid Managed Care

During the 1990s, nearly all states implemented managed care programs as a mechanism to control Medicaid costs. Enrollment in Medicaid managed care programs increased dramatically in the late 1990s with the passage of the Balanced Budget Act of 1997, which allowed enrollment of certain Medicaid populations, mostly women and children, in managed care programs without a federal waiver. From 1990 to 2002, enrollment in managed care increased from less than 5 million to more than 23 million beneficiaries nationwide. By 2002, 47 states and the District of Columbia operated managed care programs.[1] These programs mainly target beneficiaries (predominantly women and children) who are eligible for federal Temporary Assistance for Needy Families (TANF). Despite initial concerns that resource limitations associated with managed care would have adverse effects on Medicaid beneficiaries, mounting evidence suggests that managed care programs can improve access and quality of care, without increasing—and perhaps reducing—costs.[2,3,4,5]

In recent years, states have confronted severe budget deficits and escalating costs in their Medicaid programs. This has led to a growing interest in expanding Medicaid managed care programs to include people with disabilities. While people with disabilities represent a small percentage of Medicaid beneficiaries, they account for a substantial portion of expenditures. In 2003, 16 percent of all Medicaid beneficiaries were disabled, but accounted for 43 percent of the total Medicaid expenditures.[6] It has been suggested that by enrolling this costly Medicaid population in managed care, states may have the opportunity to contain Medicaid spending, while perhaps improving beneficiaries' access to and quality of care.

California's Experience

California first experimented with Medicaid managed care programs in the 1970s, and greatly expanded the program during the 1990s. Between 1994 and 1999, enrollment in California's Medicaid Program (Medi-Cal) increased from 16 percent of all Medi-Cal beneficiaries to its present level of 50 percent statewide. Medi-Cal managed care was expanded on a county-by-county basis through a combination of voluntary and predominantly mandatory managed care programs. As was the case in other parts of the country, Medi-Cal managed care has primarily targeted

beneficiaries eligible through TANF, known as the CalWORKs program in California. Smaller percentages of disabled Medi-Cal beneficiaries are enrolled in managed care programs.

Counties that deliver Medi-Cal services through managed care generally do so using one of three models: geographic managed care (GMC); the two-plan model; or county organized health systems (COHS). The GMC model allows multiple commercial health plans to operate within a designated county. Under the two-plan model, the state contracts with two health plans, typically one commercial plan and one locally operated plan. In counties that operate either GMC or two-plan models, enrollment in a managed care plan is mandatory for beneficiaries eligible through CalWORKs, and voluntary for other categories of Medi-Cal beneficiaries, e.g., the disabled on supplemental security income (SSI). In the COHS counties, the county operates a single health plan, and enrollment in the plan is mandatory for both CalWORKs and disabled Medi-Cal beneficiaries.

In 2005, the California governor's office and the federal government negotiated an agreement on a Section 1115 Medicaid reform waiver designed in part to increase Medi-Cal's ability to provide coverage to the uninsured. As a part of the waiver, California was offered financial incentives to pursue a threefold increase in the number of seniors and people with disabilities enrolled in Medicaid managed care by August 2007.[7] The waiver required state legislative approval. In September 2005, the legislature rejected the governor's proposal to shift some Medi-Cal beneficiaries with disabilities to managed care plans. Under a provision of the federal waiver agreement, the state forfeited $360 million in federal funds. However, the governor's office remains supportive of managed care for seniors and people with disabilities, and has invested in efforts to expand voluntary enrollment.

Impact on Medicaid Beneficiaries with Disabilities

The governor's proposal rekindled concerns raised over several years in many states that Medicaid managed care could lead to a restriction in services, thereby increasing the level of unmet needs for beneficiaries with disabilities.[8,9] Disabled beneficiaries have relatively greater need for health care than other Medicaid beneficiaries, and therefore may be at particularly high risk for poor outcomes if they face barriers to medical services. Supporters of Medicaid managed care for the disabled population have argued that it might improve coordination of services by assigning disabled beneficiaries a primary care physician who can serve as a regular source of care.[10]

At present, there is insufficient evidence of the impact of managed care on the disabled. There have been a small number of studies involving the disabled that directly compare the quality of care provided by Medicaid managed care and fee-for-service plans. These studies tend to be of limited scope, focusing on children with special health care needs (SHCN). For the most part, these studies find that Medicaid managed care plans perform the same or slightly better than fee-for-service plans.

Three studies reporting on a partially capitated voluntary Medicaid managed care program in Washington, D.C., found that primary caregivers of children with SHCN enrolled in Medicaid managed care plans were less likely to have access problems or report unmet needs compared to those enrolled in fee-for-service plans.[11,12,13] A 2001 study in Oregon found that children with SHCN enrolled in a mandatory Medicaid managed care program experienced the same difficulties and shortcomings as those allowed to remain in fee-for-service.[14] A study in Ohio found that children with SHCN enrolled in a voluntary Medicaid managed care program had fewer hospitalizations compared to those in fee-for-service, but no differences in health care costs were reported between the two groups.[15] A separate study of two Ohio counties that included a small number of disabled adults as well as children found that disabled beneficiaries who voluntarily enrolled in an

Ohio Medicaid managed care program had decreased health care costs and utilization of services.[16]

In one California study, families of children with SHCN enrolled in Medi-Cal managed care plans were less likely to report satisfaction with their health care plan or health care provider than families with children with SHCN enrolled in fee-for-service.[17] However, a more recent study of children with SHCN in Los Angeles reported that unmet need for specialty care was higher among those in fee-for-service Medi-Cal than among those in managed health plans.[18]

While these studies provide some insight into the experience of the disabled in Medicaid managed care, most were conducted among children in areas where enrollment in Medicaid managed care was voluntary. This leaves open the possibility that selection bias may have affected the results, since healthier patients tend to select managed care over fee-for-service care.

Preventable Hospitalizations As a Measure of Access to Care

Among the stated goals of Medi-Cal managed care is improving beneficiaries' access to care. One measure generally used to assess access to ambulatory care is preventable hospitalization rates. Preventable hospitalizations are admission rates for ambulatory-care-sensitive admissions, including asthma, diabetes, and hypertension, which can often be treated in outpatient settings, thereby preventing hospitalization. When patients with these conditions do not have adequate access to care, they may experience a decline in health that can result in hospitalization.

Several studies have validated the use of hospital admissions for ambulatory-care-sensitive conditions as an indicator of the health consequences of inadequate access to ambulatory care.[19] The U.S. Department of Health and Human Services' Agency for Healthcare Research and Quality (AHRQ) has adopted hospitalizations for ambulatory-care-sensitive conditions as the key Prevention Indicator among its four recommended Quality Indicators.[20]

Preventable hospitalizations are an appealing measure of health care performance for several reasons. First, unlike many other measures of health plan performance, such as those in the National Committee for Quality Assurance's (NCQA) widely used Health Plan Employer Data Information Set (HEDIS), preventable hospitalizations are available for beneficiaries in both managed care and fee-for-service Medi-Cal. Second, unlike many other measures, preventable hospitalizations focuses on and reflects the quality of care provided to sicker patients, many of whom have chronic diseases. This is particularly important for Medi-Cal, for which 40 percent of disabled beneficiaries have one or more chronic conditions.[21] Third, the routine administrative data collection processes at California's Office of Statewide Health Planning and Development (OSHPD) and the Department of Health Care Services (DHCS) makes it possible and efficient to determine annual hospitalization rates for all Medi-Cal plans without imposing an additional burden on health plans. Fourth, this measure may provide insight into whether a health plan's HEDIS scores are indicative of quality only for measured activities, or the quality of a health plan in general. For example, a health plan with better than average HEDIS scores and a high preventable hospitalization rate may be one where the HEDIS scores could give a misleading impression of quality of care not explicitly measured as part of HEDIS.

Purpose of This Study

A 2004 California HealthCare Foundation report titled *Preventing Unnecessary Hospitalizations in Medi-Cal: Comparing Fee-For-Service with Managed Care* described the results of a study conducted when many urban counties in California were mandating enrollment in Medi-Cal managed care, predominantly for women and children who were eligible for CalWORKs. That study found the annual preventable hospitalization rate among CalWORKs beneficiaries was more than a third lower in managed care than in fee-for-service, and estimated that the reduction in preventable hospitalization rates resulted in 7,000 fewer hospitalizations per year. The 2004 report also found

that annual preventable hospitalization rates were a third lower among disabled beneficiaries enrolled in managed care than fee-for-service. However, since enrollment of the disabled population remained at low levels for most of the 1994-1999 study period, it was difficult to extrapolate the effects of implementing managed care on a larger scale given the limited number of observations.

This report expands on these findings by extending the time period in which differences in preventable hospitalization rates between fee-for-service and managed care are evaluated by three years. This report provides a more up-to-date understanding of Medi-Cal managed care in general due to a substantial increase in the number of observations available to assess the effects of Medi-Cal managed care on disabled beneficiaries. Managed care enrollment for disabled beneficiaries increased in California from 7 percent in 1994 to 22 percent in 2002. Approximately half of the disabled beneficiaries in managed care reside in counties that provide Medi-Cal managed care through a county-organized health system (COHS), where it is mandatory to receive services through managed care. The other half of disabled Medi-Cal beneficiaries in managed care elected it voluntarily.

In addition to comparisons between Medi-Cal managed care and fee-for-service care, this report explores variations in preventable hospitalization rates among managed care plans. In 2002, there were 22 health care plans operating in the 24 counties in California that enroll at least some of their Medi-Cal beneficiaries in managed care. Analysis of these plans provides the opportunity to look at variation within managed care, and to propose possible explanations as to why these variations exist. This analysis is pertinent because public and private health care purchasers are increasingly using more specific measures to evaluate health care performance. In 2005, California implemented a performance-based auto-assignment program in seven counties. Through this program, beneficiaries who neglected to select a managed care plan were automatically assigned to the best-performing managed care plan in the county, as determined by seven performance measures. According to a 2006 CHCF report, in the first year of this performance-based program, 17,000 Medi-Cal managed care enrollees were assigned to superior health care plans.[22] If preventable hospitalization rates prove to be a reliable health plan performance measure, there is the potential to use these data as a part of pay-for-performance programs to improve the quality of care for Medi-Cal beneficiaries.

Finally, this report examines variation in preventable hospitalization rates for Medi-Cal beneficiaries and compares it with variation in preventable hospitalization rates across counties for the uninsured. In most counties, the same safety-net providers who care for Medi-Cal beneficiaries also care for the uninsured. Therefore, if preventable hospitalization rates are attributable to the access and quality of safety-net providers, then it is likely that there would be a high level of agreement in the pattern of preventable hospitalization rates for Medi-Cal beneficiaries and the uninsured across counties.

II. Methodology

This study used preventable hospitalization rates to compare ambulatory care delivery with Medi-Cal fee-for-service to Medi-Cal managed care for CalWORKs and disabled beneficiaries. The analytic strategy assumed that if Medi-Cal managed care was having a positive effect on Medi-Cal beneficiaries' access to ambulatory care, then preventable hospitalization rates would be lower among Medi-Cal beneficiaries in managed care than among those in fee-for-service. The study also examined rates of preventable hospitalizations among Medi-Cal health plans and, separately, among the uninsured by county.

The analysis was conducted by linking Medi-Cal eligibility files from the DHCS with hospital discharge data available from OSHPD. Because older Medi-Cal beneficiaries are also likely to have Medicare insurance, the analysis was limited to individuals under the age of 65. However, disabled Medicaid beneficiaries younger than 65 who also had Medicare (dual eligibles) were included. Analysis of health plan performance was further limited to plans that had at least 1,000 beneficiaries per month to ensure an adequate number of hospitalizations. Preventable hospitalization rates for disabled Medi-Cal beneficiaries were analyzed separately from those in CalWORKs in recognition of the fact that the policy on using Medi-Cal managed care has differed in these two groups, and that the former are on average much sicker. Eligibility codes that did not correspond to CalWORKs or to SSI were excluded from the analysis.

Within the CalWORKS and disabled Medi-Cal subpopulations, this study compared preventable hospitalization rates in managed care and fee-for-service beneficiaries after adjusting for age, sex, race/ethnicity, county, and month and year of admission. These adjustments were done to isolate the contribution of managed care as compared to fee-for-service from the potential confounding effects of beneficiaries' demographics, county residence, admission time of year, and the year of admission. The analytic strategy allowed beneficiaries to be represented in the sample in correspondence to their actual experience in fee-for-service, managed care or both. Thus, in counties that made the transition from fee-for-service to managed care, many beneficiaries serve as their own control, with the major difference being the change in the Medi-Cal delivery model.

Some health plans enrolled Medi-Cal beneficiaries in more than one county. Analysis of these plans was subdivided by county by including only those enrollees within a specific county. There were 44 health plan-county combinations serving CalWORKS beneficiaries, and 32 which served a minimum of 1,000 disabled beneficiaries. To facilitate comparisons between the health plan data presented in this report with HEDIS performance data, the analysis used here mirrored the methods used by the NCQA and adjusted data only by age and sex.

The preventable hospitalization rate for the uninsured population was calculated using the hospital discharge data and estimates of the uninsured population from the 2001 and 2003 California Health Interview Survey. The uninsured preventable hospitalization rates were adjusted for county differences in the age, sex, and race/ethnicity of the uninsured populations.

The average hospitalization charges for ambulatory-care-sensitive conditions for Medi-Cal beneficiaries were calculated by aid category in managed care and fee-for-service using the charges reported in OSHPD's Patient Discharge Data. Because this approach might overstate the true amount paid by Medicaid, hospital charges were adjusted downward based on the ratio of the calculated average per diem rates in the Patient Discharge Data with a separately available list of Medicaid fee-for-service negotiated hospital per diem rates for medical admissions for the same time period.[23] These adjusted charges were then projected using the rates of preventable hospitalizations in Medi-Cal managed care and fee-for-service care to determine the average annual hospital savings in Medi-Cal managed care, and what the hospital savings would have been had all Medi-Cal beneficiaries been in managed care.

More information on the methodology can be found in the Appendix.

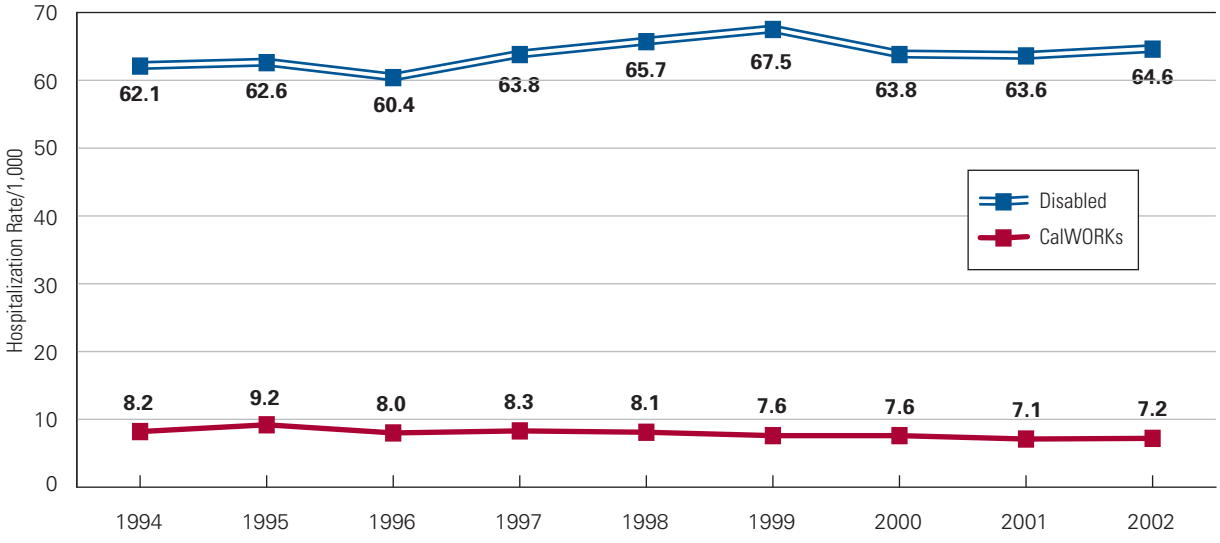
III. Findings

Preventable Hospitalization Rates in Medi-Cal

From 1994 to 2002, the average annual preventable hospitalization rate for Medi-Cal beneficiaries below the age of 65 was 16.6 per 1,000. However, there were dramatically different rates of preventable hospitalizations between CalWORKs and disabled Medi-Cal beneficiaries. Disabled beneficiaries experienced almost eight times as many preventable hospitalizations than the CalWORKs-eligible population (63.0 and 7.9 per 1,000, respectively). Adjusting for age, sex, race/ethnicity, county residence, and month of admission differences between the two groups of Medi-Cal beneficiaries slightly reduced the preventable hospitalization rate differences. Adjusted preventable hospitalization rates for disabled Medi-Cal beneficiaries were 58.8 per 1,000 versus 8.1 per 1,000 for CalWORKs beneficiaries.

The substantially higher rates of preventable hospitalizations among disabled Medi-Cal beneficiaries highlights the importance of developing strategies to reduce such episodes among this group, as well as the differences in underlying health status between these two Medi-Cal populations. CalWORKs beneficiaries tend to be relatively young women and children, whereas disabled

Figure 1: Unadjusted Average Annual Preventable Hospitalization Rates among Non-Elderly CalWORKs and Disabled Medi-Cal Beneficiaries



Source: California Office of Statewide Health Planning and Development/Department of Health Services 1994-2002

beneficiaries are eligible for Medi-Cal because their disability or chronic condition contributes to their poor health.

Between 1994 and 2002, the annual preventable hospitalization rate for all Medi-Cal beneficiaries younger than 65 decreased from 17.2 per 1,000 beneficiaries to 15.8 per 1,000 beneficiaries. Adjusting for age, sex, race/ethnicity, county residence, and month of admission differences among Medi-Cal beneficiaries over this time period suggests that the rates of preventable hospitalizations were unchanged: 17.1 per 1,000 in 1994 and 17.0 per 1,000 in 2002.

During the study period, the rate of preventable hospitalizations decreased among the CalWORKs beneficiaries even as they increased for disabled beneficiaries. From 1994 to 2002, preventable hospitalizations for CalWORKs beneficiaries dropped by 12 percent, from 8.2 per 1,000 in 1994 to 7.2 per 1,000 in 2002 (Figure 1). Conversely, the rate of preventable hospitalizations among disabled beneficiaries increased by 4 percent, from 62.1 to 64.6 per 1,000 over the nine-year study period (Figure 1). Adjusting these rates for changes in age, sex, race/ethnicity, county residence, and month of admission differences of the beneficiaries during this time period did not have any appreciable effect.

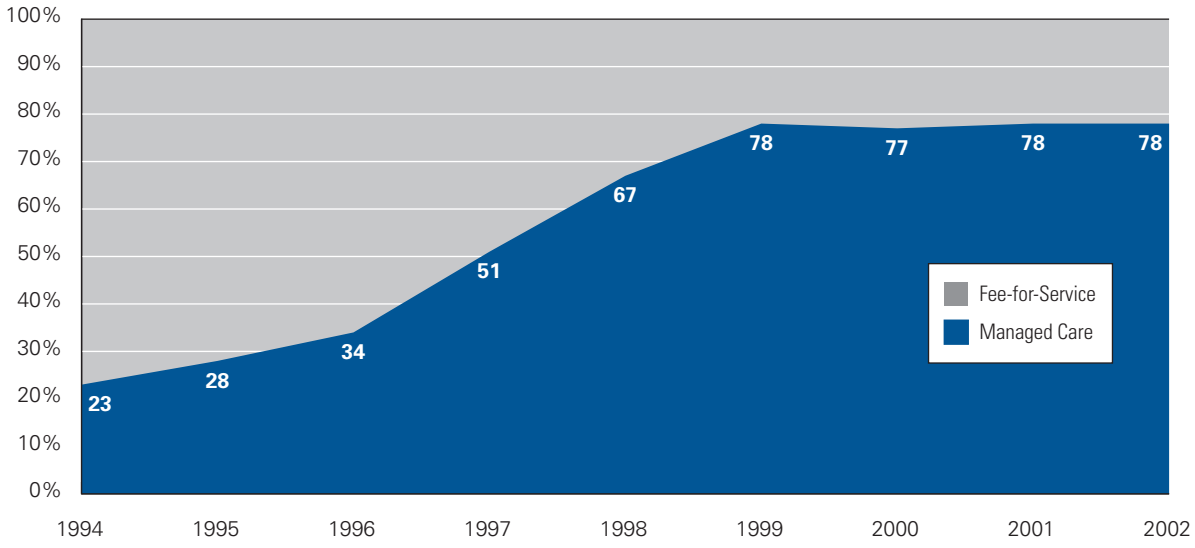
Medi-Cal Managed Care Versus Fee-for-Service

Enrollment in Managed Care

Reflecting the policy focus, the growth in Medi-Cal managed care enrollment has been more dramatic among CalWORKs beneficiaries than among disabled beneficiaries. In 1994, 23 percent of CalWORKs-eligible Medi-Cal beneficiaries were in managed care. By 1999, managed care enrollment grew to 78 percent, where it has remained (Figure 2). The approximately 20 percent of CalWORKs Medi-Cal beneficiaries who are not in managed care typically reside in rural counties where mandatory managed care has not been implemented.

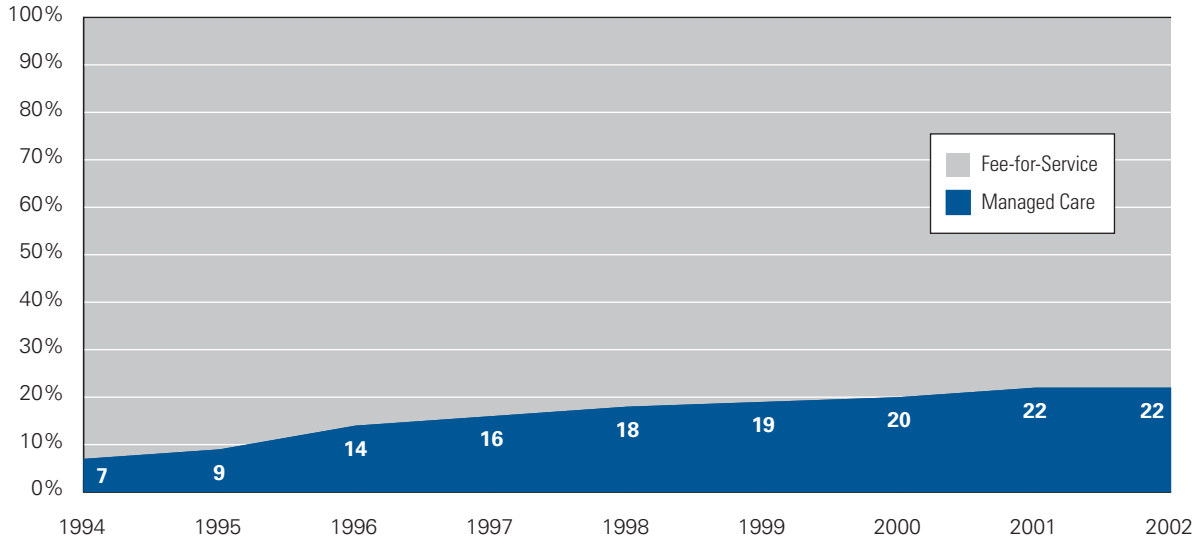
Among disabled beneficiaries, 7 percent were enrolled in managed care in 1994. By 2002, 22 percent were enrolled in managed care (Figure 3). A large percentage of disabled beneficiaries remain in fee-for-service because enrollment in managed care is only mandatory in the eight COHS counties and voluntary in the remainder of the state.

Figure 2: Percentage of Non-Elderly CalWORKS-Eligible Medi-Cal Beneficiaries Enrolled in Fee-for-Service and Managed Care



Source: California Department of Health Services 1994-2002

Figure 3: Percentage of Non-Elderly Disabled Medi-Cal Beneficiaries Enrolled in Fee-for-Service and Managed Care



Source: California Office of Statewide Health Planning and Development/Department of Health Services 1994-2002

Influence of Managed Care

During the study period, preventable hospitalization rates for both CalWORKs and disabled beneficiaries were significantly lower in managed care than fee-for-service. The charges per hospitalization were also substantially lower in managed care because of shorter lengths of stay compared to those in fee-for-service care. The data available for this study do not provide information on the cost of ambulatory services. Therefore, it is not possible to determine the size of the investment needed to achieve these hospital savings and whether it is greater or less than the amount saved.

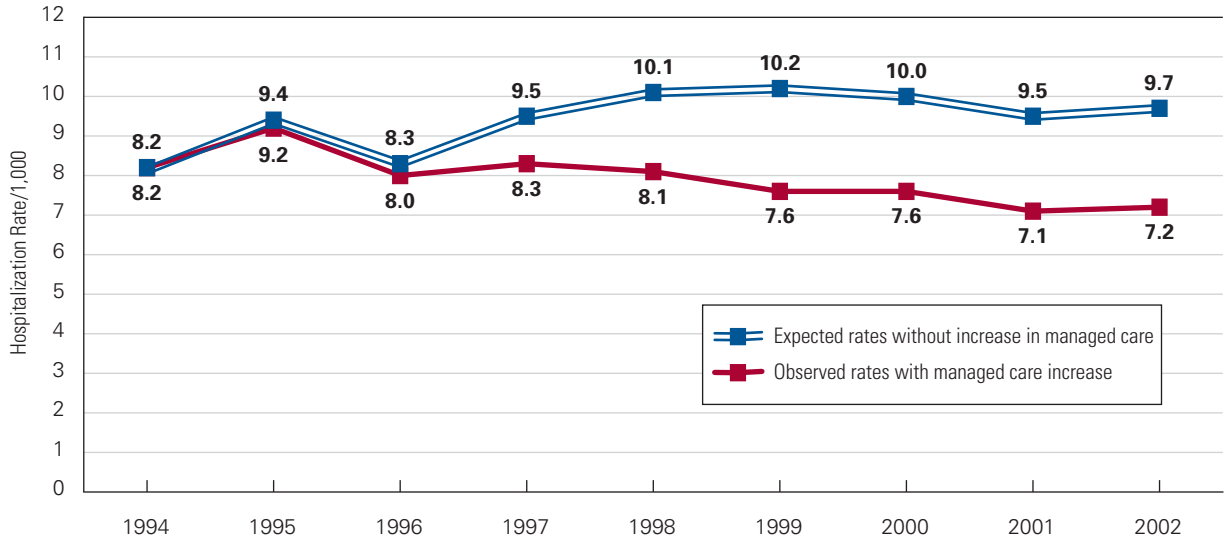
CalWORKs Beneficiaries

From 1994 to 2002, the average annual preventable hospitalization rate for CalWORKs-eligible Medi-Cal beneficiaries was more than a third lower than those in fee-for-service: 6.4 per 1,000 managed care enrollees versus 9.9 per 1,000 fee-for-service enrollees. Adjusting for changes over time between Medi-Cal managed care and fee-for-service beneficiaries' demographics, county of residence, and month of admission slightly widened the difference: 6.1 per 1,000 for managed care enrollees compared to 10.5 per 1,000 for fee-for-service enrollees.

The differences in preventable hospitalization rates persisted between 1999 and 2002, when enrollment in managed care was stable. Had enrollment in managed care remained steady at 23 percent observed in 1994, the average annual adjusted preventable hospitalization rate would have been expected to be 9.7 per 1,000 beneficiaries in 2002 (Figure 4). Instead, with the expansion of managed care, the rate of preventable hospitalizations decreased over time to 7.2 per 1,000 beneficiaries in 2002. In other words, there were 26 percent fewer preventable hospitalizations associated with the growth of managed care between 1994 and 2002.

Based on information reported by hospitals to OSHPD, the average charge per hospitalization was approximately $1,500 lower in managed care than fee-for-service ($9,200 and $10,700, respectively). This was primarily due to differences in the length of stay. The combination of fewer preventable hospitalizations and lower charges per hospitalization in managed care resulted in an average annual reduction of $85 million in preventable hospitalization charges for CalWORKs-eligible beneficiaries during the study period. On average, Medicaid's true costs were only 19.3 percent of the Medicaid charges reported in the OSHPD Patient

Figure 4: Observed and Expected Average Adjusted* Annual Preventable Hospitalization Rates among Non-Elderly CalWORKs-Eligible Medi-Cal Beneficiaries



*Controls for differences in age, sex, race/ethnicity, county, and month of admission
Source: California Office of Statewide Health Planning and Development/Department of Health Services 1994-2002

Discharge Data. Thus, the average annual hospital cost savings attributable to managed care for Medi-Cal during the study period was approximately $17 million. Had all CalWORKs-eligible beneficiaries been enrolled in managed care from 1994 to 2002, the projected average hospital savings would have been $26 million per year.

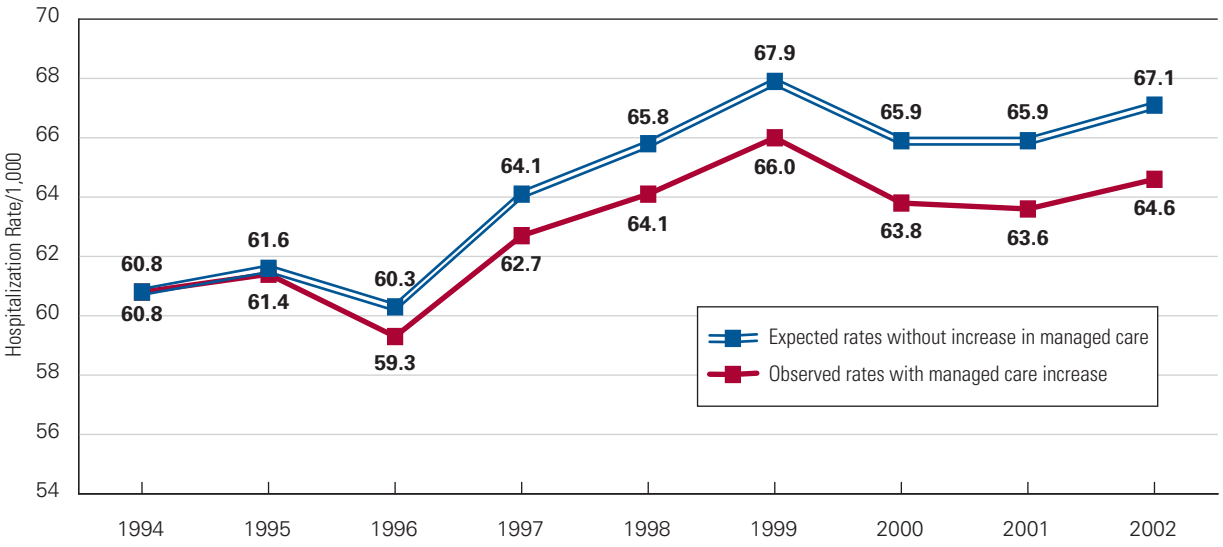
Disabled Beneficiaries

The average annual preventable hospitalization rate among disabled Medi-Cal beneficiaries was approximately 25 percent lower in managed care than fee-for-service: 48.2 per 1,000 managed care enrollees versus 65.9 per 1,000 fee-for-service enrollees. Adjusting for differences between Medi-Cal managed care and fee-for-service beneficiaries' demographics, county of residence, and month of admission produced little change: 49.6 per 1,000 for managed care enrollees versus 65.6 per 1,000 for fee-for-service enrollees. Had the penetration of Medi-Cal managed care remained stable for disabled beneficiaries at the 7 percent level observed in 1994, the adjusted annual preventable hospitalization rate would have been expected to have increased from 60.8 per 1,000 beneficiaries in 1994 to 67.1 per 1,000 beneficiaries in 2002 (Figure 5).

Instead, with the expansion of managed care to 22 percent of the disabled Medi-Cal beneficiaries, the annual preventable hospitalization rate rose to just 64.6 per 1,000 beneficiaries in 2002. This represents significantly lower expected preventable hospitalization rates in managed care compared to fee-for-service in each of the nine study years.

Between 1994 and 2002, the average charge per preventable hospitalization for disabled beneficiaries was $2,200 less in managed care than in fee-for-service ($14,100 and $16,300, respectively). As was the case for CalWORKs beneficiaries, this difference was largely due to variation in the length of stay between managed care and fee-for-service beneficiaries. Applying the estimate that Medicaid's true costs were only 19.3 percent of the Medicaid charges reported in the OSHPD Patient Discharge Data, the average annual hospital cost savings attributable to managed care for Medi-Cal during the study period was approximately $8 million. Had all disabled beneficiaries been enrolled in managed care from 1994 to 2002, the projected average hospital savings would have been $46 million per year. Approximately 20 percent of non-elderly, disabled Medi-Cal beneficiaries with

Figure 5: Observed and Expected Adjusted* Average Annual Preventable Hospitalization Rates among Non-Elderly Disabled Medi-Cal Beneficiaries

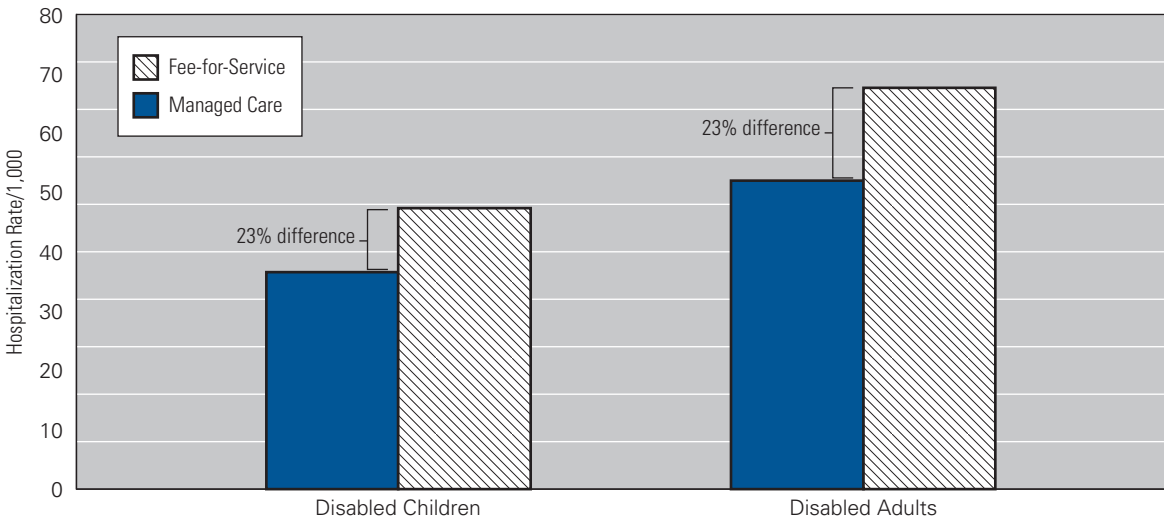


*Controls for differences in age, sex, race/ethnicity, county, and month of admission
Source: California Office of Statewide Health Planning and Development/Department of Health Services 1994-2002

hospitalizations for ambulatory-sensitive conditions also have Medicare coverage, and for these patients the hospital savings would most likely accrue to Medicare, rather than Medi-Cal.

Disabled adults 18 years of age or older enrolled in either managed care or fee-for-service programs experienced higher preventable hospitalization rates compared to disabled children age 18 or younger, but preventable hospitalization rates were lower in managed care than in fee-for-service in a similar proportion for both age groups (Figure 6). The average annual preventable hospitalization rates

Figure 6: Average Adjusted* Preventable Hospitalization Rates Among Disabled Child and Adult Medi-Cal Beneficiaries Enrolled in Managed Care and Fee-For-Service



*Controls for differences in sex, race/ethnicity, county, year, and month of admission
Source: California Office of Statewide Health Planning and Development/Department of Health Services 1994-2002

were 23 percent lower in managed care than in fee-for-service for both the disabled adult and disabled child populations (52.3 versus 68.0 per 1,000 adult beneficiaries, and 37.0 versus 47.8 per 1,000 child beneficiaries). Thus, while disabled adults have higher preventable hospitalization rates than disabled children, both adults and children enrolled in managed care had substantially fewer preventable hospitalizations compared to those enrolled in fee-for-service.

Comparing Medi-Cal Health Care Plans

Variation among Health Care Plans

Preventable hospitalization rates varied greatly across individual health care plans. In 2002, there were 44 combinations of counties and managed health care plans with an average monthly enrollment of more than 1,000 CalWORKs beneficiaries. Adjusted for average age and sex, the preventable hospitalization rate for all 44 CalWORKs health care plans was 5.4 per 1,000 beneficiaries. There was an approximately three-fold difference in the age- and sex-adjusted preventable hospitalization rates across the 44 health plans (3.3 per 1,000 to 10.6 per 1,000 CalWORKs beneficiaries).

Within Medi-Cal managed care, health plans compete at the county level. Although preventable hospitalization rates varied somewhat across counties, within most counties there were no significant differences in the preventable hospitalization rates across plans (Table 1). Preventable hospitalization rates are significantly different from one another in cases in which the 95 percent confidence intervals for the rates do not overlap. For example, in Sacramento, Molina Medical Centers, Blue Cross of California, and Health Net have significantly lower rates of preventable hospitalizations than Western Health Advantage.

While there was great variability of preventable hospitalization rates among different health care plans serving CalWORKs beneficiaries, the performance of an individual health care plan relative to other plans in the state was stable across years. Plans that performed well in 2002 tended to have also performed well in 2001 and 2000. The correlations between a health care plan's preventable hospitalization rate in 2002 and 2001, and between 2002 and 2000, were highly significant.[24]

There are many factors that can contribute to variation in preventable hospitalization rates among health care plans. The main factor of interest is the access to and quality of primary health care provided by the plans. Unmeasured differences among plans in the health status of their enrollees can also influence the preventable hospitalization rate, as can community factors that are beyond the control of a health plan. These include the availability of health care resources and the quality of the environment for supporting healthy behaviors such as physical activity and nutrition. This analysis found that approximately 60 percent of the variation in preventable hospitalization rates across health plans could be attributed to county characteristics and 40 percent to health plan differences. It is beyond the scope of this study to determine the main causes of variation at the county and health plan level.

In 2002, there was an even wider range of preventable hospitalization rates across health plans serving disabled Medi-Cal beneficiaries than those for CalWORKs beneficiaries. Of the 32 health care plans with an average monthly enrollment of more than 1,000 disabled Medi-Cal beneficiaries, there was an approximately seven-fold difference in the preventable hospitalization rates across plans (9.8 per 1,000 to 73.2 per 1,000 beneficiaries). The average preventable hospitalization rate for all 32 health care plans was 50.0 per 1,000 beneficiaries. The eight COHS plans with mandatory enrollment of disabled Medi-Cal beneficiaries had a similar average preventable hospitalization rate (50.2 per 1,000) with a smaller range of performance (38.5 per 1,000 to 67.0 per 1,000).

In most counties, there was only one health plan serving 1,000 or more disabled Medi-Cal beneficiaries in managed care. This limits the ability to judge health plan performance within a county. However, differences in preventable hospitalization

rates for disabled Medi-Cal beneficiaries in managed care in San Diego and Sacramento, where multiple plans compete for these patients, suggests some differences in performance (Table 2).

As was the case for health plans serving CalWORKs beneficiaries, the performance of an individual health care plan serving the disabled was consistent across years between 2000 and 2002. Correlations between a health care plan's preventable hospitalization rate in 2002 and 2001 and in 2002 and 2000 were highly significant.[25]

Health care plans with low preventable hospitalization rates for their CalWORKs beneficiaries also tended to have low preventable hospitalization rates for their disabled beneficiaries. For example, in 2002, Health Net-Sacramento and Molina Medical Centers-Sacramento had the lowest rates of preventable hospitalizations for both CalWORKs and disabled Medi-Cal beneficiaries. Conversely, Inland Empire Health Plan-San Bernardino had among the highest rates for both populations during the same year. In 2002, the correlation between a health care plan's rank among plans serving CalWORKs beneficiaries and its rank among those serving disabled Medi-Cal beneficiaries was highly significant.[26]

County-Level Preventable Hospitalization Rates

In 2002, there was an approximately two-fold difference in the adjusted preventable hospitalization rates across counties for Medi-Cal (Table 3). There was marked county-level variation in preventable hospitalization rates for both CalWORKs and disabled Medi-Cal beneficiaries. The total preventable hospitalization rates at the county level were higher for Medi-Cal beneficiaries than the uninsured. This most likely reflects the categorical need for care that contributes to a low-income person's qualifying for Medi-Cal. As expected, the differences in the rates between CalWORKs-eligible Medi-Cal beneficiaries and the uninsured were closer, as CalWORKs-eligible Medi-Cal beneficiaries are on average healthier than disabled Medi-Cal beneficiaries and have an average health status that is more similar to the uninsured.

There was an approximately three-fold variation in adjusted preventable hospitalization rates for the uninsured across California counties. In general, counties that had high rates of preventable hospitalizations for their Medi-Cal population had high rates for their uninsured as well.[27] The correlation in adjusted preventable hospitalization rates between the uninsured and Medi-Cal beneficiaries was true for CalWORKs and disabled beneficiaries.[28, 29]

In general, Medi-Cal beneficiaries and uninsured people living in counties in the northern-most part of the state and along the eastern border tended to have lower preventable hospitalization rates than those in other regions of the state (Figure 7). This finding may reflect differences in the health of individuals living in these counties, or differences in the available health care resources.

Table 1: Average Adjusted* Annual Preventable Hospitalization Rates among Health Care Plans Serving Non-Elderly CalWORKs-Eligible Medi-Cal Beneficiaries (2002) with 95 Percent Confidence Interval

California County	Plan(s)	2002 Preventable Hospitalization Rate/1,000	(95% Confidence Interval)
Alameda	Alameda Alliance for Health Blue Cross of California	9.5 10.6	(8.4 – 10.6) (9.4 – 11.9)
Contra Costa	Blue Cross of California Contra Costa Health Plan	5.5 6.5	(4.9 – 6.2) (5.7 – 7.3)
Fresno	Blue Cross of California Health Net	5.9 6.9	(5.2 – 6.5) (6.1 – 7.7)
Kern	Blue Cross of California Kern Health Systems	6.7 5.1	(5.9 – 7.5) (4.5 – 5.7)
Los Angeles	Health Net L.A. Care Health Plan	5.4 5.8	(4.8 – 6.1) (5.1 – 6.5)
Monterey	Central Coast Alliance for Health	8.5	(7.5 – 9.5)
Napa	Partnership HealthPlan of California	5.0	(4.4 – 5.6)
Orange	CalOptima	6.2	(5.5 – 7.0)
Placer	Placer County Managed Care Network	6.7	(5.9 – 7.5)
Riverside	Inland Empire Health Plan Molina Medical Centers	8.8 7.6	(7.7 – 9.8) (6.7 – 8.4)
Sacramento	Blue Cross of California§ Health Net Kaiser Foundation Health Plan Molina Medical Centers Western Health Advantage	4.2 3.6 5.4 3.3 5.4	(3.7 – 4.7) (3.1 – 4.0) (4.7 – 6.0) (2.9 – 3.7) (4.8 – 6.0)
San Bernardino	Inland Empire Health Plan Molina Medical Centers	10.5 8.4	(9.3 – 11.7) (7.4 – 9.4)
San Diego	Blue Cross of California Community Health Group Health Net Kaiser Foundation Health Plan Sharp Health Plan Universal Care	6.3 9.4 8.2 5.4 6.4 7.9	(5.6 – 7.1) (8.3 – 10.4) (7.2 – 9.2) (4.8 – 6.0) (5.7 – 7.1) (7.0 – 8.8)
San Francisco	Blue Cross of California San Francisco Health Plan	3.7 6.6	(3.2 – 4.1) (5.8 – 7.4)
San Joaquin	Blue Cross of California Health Plan of San Joaquin	7.8 6.8	(6.9 – 8.7) (6.0 – 7.6)
San Mateo	Health Plan of San Mateo	6.8	(6.0 – 7.6)
Santa Barbara	Santa Barbara Health Initiative	6.0	(5.3 – 6.8)
Santa Clara	Blue Cross of California Santa Clara Family Health Plan	4.4 5.7	(3.9 – 4.9) (5.0 – 6.3)
Santa Cruz	Central Coast Alliance for Health	4.2	(3.7 – 4.7)
Solano	Partnership HealthPlan of California	6.1	(5.4 – 6.9)
Sonoma	Sonoma Partners for Health Managed Care	5.9	(5.2 – 6.5)
Stanislaus	Blue Cross of California	4.4	(3.9 – 5.0)
Tulare	Blue Cross of California HealthNet	5.6 5.3	(5.0 – 6.3) (4.7 – 5.9)
Yolo	Partnership HealthPlan of California	5.2	(4.6 – 5.8)

*Controls for age and sex † Health care plans with average monthly Medi-Cal enrollment >1,000 ‡ Formerly known as Omni Healthcare
§ Acquired membership of Omni Healthcare in 1999
Source: California Office of Statewide Health Planning and Development/Department of Health Services

Table 2: Average Adjusted* Annual Preventable Hospitalization Rates among Health Care Plans Serving Non-Elderly for Disabled Medi-Cal Beneficiaries (2002) with 95 Percent Confidence Interval

California County	Plan(s)	2002 Preventable Hospitalization Rate/1,000	(95% Confidence Interval)
Alameda	Alameda Alliance for Health Blue Cross of California	58.2 66.7	(41.0 – 75.5) (46.9 – 86.4)
Contra Costa	Contra Costa Health Plan	60.2	(42.4 – 78.0)
Fresno	Blue Cross of California	45.4	(32.0 – 58.9)
Kern	Blue Cross of California Kern Health Systems	69.3 56.8	(48.8 – 89.9) (39.9 – 73.6)
Los Angeles	Health Net L.A. Care Health Plan	60.2 59.2	(42.4 – 78.1) (41.6 – 76.7)
Monterey	Central Coast Alliance for Health	67.0	(47.1 – 86.8)
Napa	Partnership HealthPlan of California	42.1	(29.6 – 54.6)
Orange	CalOptima	52.9	(37.2 – 68.6)
Riverside	Inland Empire Health Plan	73.2	(51.5 – 94.9)
Sacramento	Blue Cross of California§ Health Net Kaiser Foundation Health Plan Molina Medical Centers Western Health Advantage	31.4 9.8 44.3 23.5 35.1	(22.1 – 40.6) (6.9 – 12.8) (31.2 – 57.4) (16.6 – 30.5) (24.7 – 45.5)
San Bernardino	Inland Empire Health Plan Molina Medical Centers	72.1 48.1	(50.8 – 93.5) (33.9 – 62.4)
San Diego	Community Health Group Sharp Health Plan	33.3 47.7	(23.5 – 43.2) (33.6 – 61.8)
San Francisco	San Francisco Health Plan	53.2	(37.4 –69.0)
San Joaquin	Health Plan of San Joaquin	42.2	(29.7 – 54.7)
San Mateo	Health Plan of San Mateo	38.5	(27.1 – 49.9)
Santa Barbara	Santa Barbara Health Initiative	43.2	(30.4 – 55.9)
Santa Clara	Santa Clara Family Health Plan	40.4	(28.4 – 52.3)
Santa Cruz	Central Coast Alliance for Health	40.4	(28.5 – 52.4)
Solano	Partnership HealthPlan of California	50.6	(35.6 – 65.6)
Sonoma	Sonoma Partners for Health Managed Care	37.4	(26.3 – 48.4)
Stanislaus	Blue Cross of California	44.1	(31.0 – 57.2)
Tulare	Blue Cross of California	58.1	(40.9 – 75.4)
Yolo	Partnership HealthPlan of California	47.0	(33.1 – 61.0)

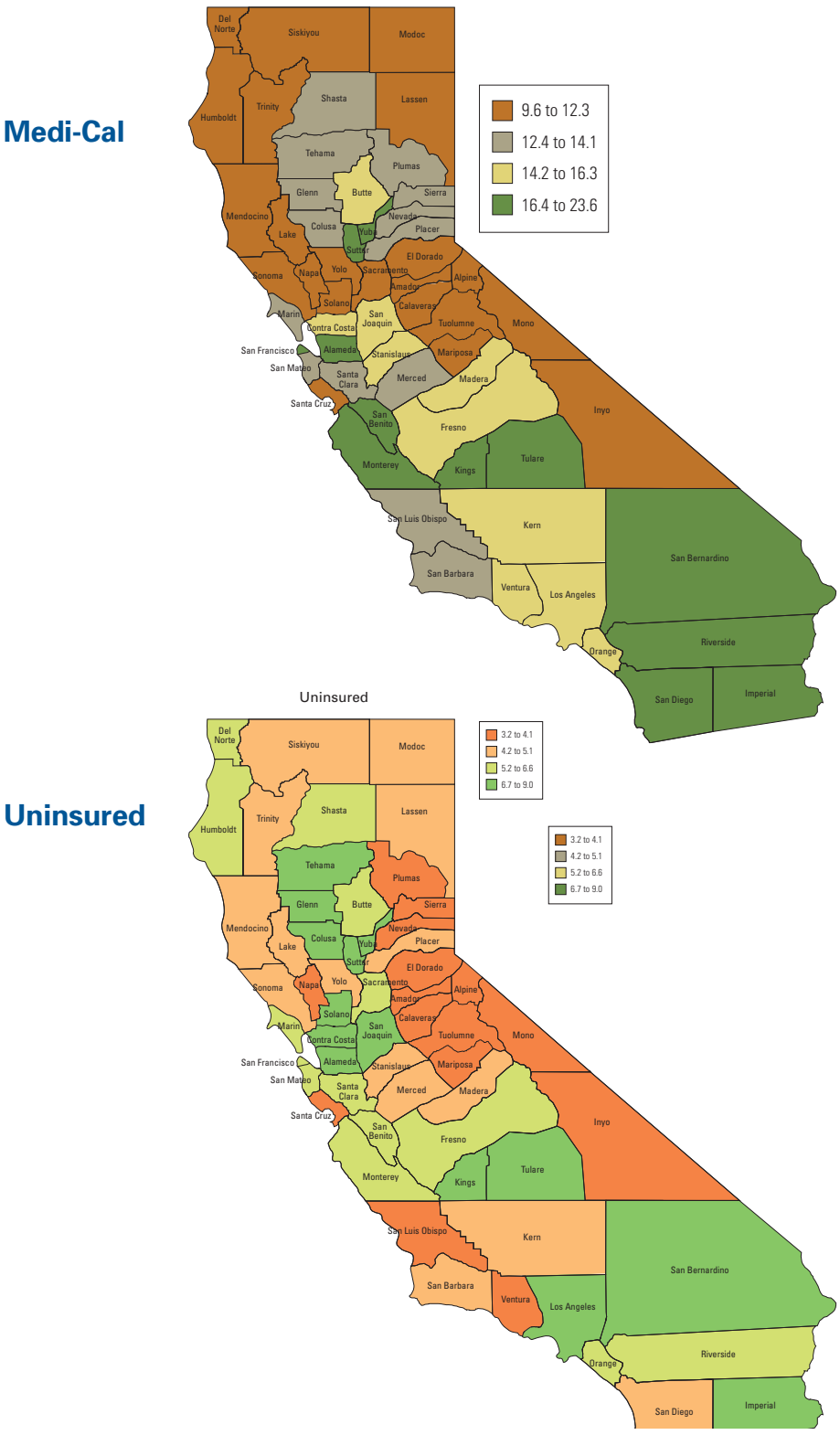
*Controls for age and sex † Health care plans with average monthly Medi-Cal enrollment >1,000 ‡ Formerly known as Omni Healthcare
§ Acquired membership of Omni Healthcare in 1999
Source: California Office of Statewide Health Planning and Development/Department of Health Services

Table 3: Adjusted Rates of Preventable Hospitalizations by County for the Uninsured Population and Medi-Cal, CalWorks, and SSI Beneficiaries, 2002.

California County	*Medi-Cal Preventable Hospitalization Rate per 1,000	†CalWorks Preventable Hospitalization Rate per 1,000	‡Disabled Preventable Hospitalization Rate per 1,000	§Uninsured Preventable Hospitalization Rate per 1,000
Alameda	18.0	10.4	64.7	7.3
Alpine, Amador, Calaveras, Inyo, Mariposa, Mono, Tuolumne	12.3	7.3	56.8	3.5
Butte	16.2	9.3	70.4	5.8
Colusa, Glen, Tehama	12.6	7.7	50.3	7.1
Contra Costa	15.7	6.6	56.5	6.8
Del Norte, Humboldt	9.7	5.5	40.5	5.1
El Dorado	12.1	8.6	47.9	3.2
Fresno	14.9	7.4	55.0	6.1
Imperial	23.6	14.1	59.0	9.0
Kern	16.2	6.5	68.4	4.8
Kings	17.9	8.7	66.4	7.2
Lake, Mendocino	11.9	6.8	42.8	4.2
Lassen, Modoc, Siskiyou, Trinity	9.6	5.8	44.5	4.1
Los Angeles	16.2	6.4	79.3	7.3
Madera	16.3	7.7	72.9	4.8
Marin	14.1	9.0	35.1	5.7
Merced	13.6	5.5	59.1	4.1
Monterey, San Benito	18.2	8.4	67.3	6.3
Napa	12.2	4.9	42.6	3.6
Nevada, Sierra, Plumas	13.1	8.8	47.7	3.7
Orange	15.0	6.8	57.7	5.5
Placer	12.4	5.6	43.6	4.0
Riverside	21.6	9.8	80.1	6.2
Sacramento	10.0	4.8	42.1	5.1
San Bernardino	20.0	10.2	74.3	8.1
San Diego	16.4	7.2	57.3	4.3
San Francisco	17.5	6.6	63.0	6.1
San Joaquin	16.2	8.1	57.2	6.9
San Luis Obispo	13.1	5.7	46.6	3.6
San Mateo	13.0	6.9	37.8	6.0
Santa Barbara	13.5	6.1	44.6	4.0
Santa Clara	12.4	6.5	44.7	6.3
Santa Cruz	12.0	4.2	42.0	3.9
Shasta	13.2	7.5	50.0	4.9
Solano	12.3	5.7	49.1	8.0
Sonoma	12.0	6.0	39.3	4.9
Stanislaus	15.2	6.3	65.9	4.6
Sutter, Yuba	18.8	12.5	72.9	6.6
Tulare	16.4	6.4	72.0	7.0
Ventura	14.5	6.8	49.0	3.7
Yolo	11.3	5.3	48.3	4.2

* Controls for age, sex, race/ethnicity, and Medi-Cal eligibility code
† Controls for age, sex, and race/ethnicity, standardized to the CA TANF population
†† Controls for age, sex, and race/ethnicity, standardized to the CA SSI population
§ Controls for age, sex, and race/ethnicity
Source: California Office of Statewide Health Planning and Development/Department of Health Services

Figure 7. 2002 Preventable Hospitalization Rates per Thousand by California County: Medi-Cal and Uninsured



IV. Conclusions

THE PREVENTABLE HOSPITALIZATION RATES AMONG non-elderly Medi-Cal beneficiaries are significantly lower in managed care than in fee-for-service. These differences, which are similar for both CalWORKs and disabled beneficiaries, increased with the expansion of Medi-Cal managed care and have persisted as the growth in Medi-Cal managed care has slowed in recent years. Reduced rates of preventable hospitalizations are indicative of better health status for patients and are associated with lower hospital costs, the most expensive portion of the Medi-Cal budget.

Although preventable hospitalization rates are lower in Medi-Cal managed care than in fee-for-service as a whole, there is wide variation across health care plans serving Medi-Cal beneficiaries. Similar county-level differences in preventable hospitalization rates were found among the uninsured population, indicating that a sizeable share of the variation in preventable hospitalization rates across managed care plans reflect unmeasured county-level differences in patient characteristics, such as their disease prevalence, and in available health care resources, such as the supply and characteristics of physicians who care for Medi-Cal beneficiaries and other low-income populations.

These findings have several implications for state policy. Combining an examination of preventable hospitalization rates with other assessments of quality and beneficiaries' experiences would provide a more complete measure of Medi-Cal performance, as well as the safety and effectiveness of Medi-Cal for various subgroups of beneficiaries. It would also be helpful to develop a more robust understanding of the benefits and costs of Medi-Cal managed care.

A second implication is that effective quality improvement strategies to support better decision-making among providers and patient self-management should be used to decrease the variation in care provided to Medi-Cal beneficiaries. Medi-Cal managed care plans are actively engaged in a variety of approaches to improve the quality of care that they provide. Attempts should be made to rigorously evaluate the success of these programs and to disseminate successful models. Methods are available to do this through measures such as preventable hospitalizations. The timeliness and relevance of these evaluations could be improved

through more rapid use of the necessary data from DHCS and OSHPD.

A third implication of these findings is that mechanisms that improve transparency and accountability for performance in both fee-for-service and managed care may help close the quality gap. Aligning financial incentives for high-quality care through pay-for-performance is appealing, but requires a sustained commitment to provide meaningful financial resources to reward performance and an adequate supply of providers and health plans willing to participate in such a program.

Finally, these findings suggest that greater collaboration may be needed, particularly in counties with the highest rates of preventable hospitalizations, such as Alameda and San Bernardino. Individual competing health plans working alone are unlikely to effectively address the local factors that drive much of the variation in preventable hospitalization rates. To close the quality gap and improve access to ambulatory care, plans participating in Medi-Cal will need to collaborate with each other, with plans serving the commercial population, with physicians and other health care providers, and with consumer groups.

Appendix: Methodology

To conduct the analysis of preventable hospitalization rates among California's Medicaid population, the annual California hospital discharge data available from the California Office of Statewide Health Planning and Development (OSHPD) was linked with the Medi-Cal eligibility file from the California Department of Health Care Services (DHCS). A deterministic match was done with social security numbers available in both files. Social security numbers were more successfully linked for Medicaid managed care than fee-for-service beneficiaries (98 percent versus 90 percent). Therefore, a probabilistic match using other variables, including date of birth and hospitalization dates, was done on the residual of the deterministic match to enhance the links between OSHPD discharge data and Medi-Cal fee-for-service beneficiaries. This resulted in linked records of more than 98 percent for both managed care and fee-for-service beneficiaries. Furthermore, the majority of records lacking a social security number needed for a deterministic match were for newborns, and for this reason children less than 1 year were excluded from the analysis.[30]

The annual California hospital discharge record includes information about admission month and year, patient demographics, and diagnoses and procedure codes. This file also contains a field indicating the expected source of payment. By linking the information available in the annual California hospital discharge file with that available from DHCS, it was possible to enhance the accuracy of whether a hospitalized individual was in fact a Medi-Cal beneficiary and to capture additional information for the entire year on patients' month-by-month Medi-Cal enrollment status, aid category, and health plan (where applicable). Although the determination of whether a Medi-Cal beneficiary is in managed care is highly dependent on the county of residence, not all Medi-Cal beneficiaries within a county will have the same delivery system status (fee-for-service versus managed care). Therefore, this study classified Medi-Cal beneficiaries as being in managed care based on health plan numbers that also allowed for the aggregation of beneficiaries to specific plans. It did not prove possible to correct for out-of-state hospitalizations for Medi-Cal beneficiaries. The error is likely to be quite small, as hospitalizations of California residents in bordering states of Oregon, Arizona, and

Nevada was estimated to be less than 0.2 percent of all California hospitalizations.[31]

To identify and count the number of preventable hospitalizations, this analysis used the Agency of Health Care Research and Quality (AHRQ) definition of Ambulatory-Care-Sensitive Conditions. The AHRQ lists of diagnostic codes rely on the primary diagnosis.

Because this analysis used hospitalizations as an indicator of ambulatory care prior to the hospitalization, only those Medi-Cal hospitalizations in which an individual had Medi-Cal coverage in the month before hospitalization were counted. In this way, misclassification of an uninsured individual who gained Medi-Cal coverage as a result of the hospitalization was avoided. However, the approach required that January admissions be excluded from the analysis, because information about an individual's Medi-Cal eligibility in the previous December could not be linked to hospitalizations occurring in the following year for four of the nine study years. Also, because the hospital discharge and enrollment files were linked to a calendar year, this study excluded hospitalizations in which discharges were in a different year. Previous estimates had indicated that less than 1 percent of the admissions had discharges in a different year.[32]

Data about number, demographics, eligibility category and health plan of the entire Medi-Cal population (not just those hospitalized) were obtained from the DHCS Medi-Cal Monthly Eligibility File. The enrollment files for the years prior to 1996 contained information only as of the first month of each quarter (January, April, July, and October). A linear interpolation method was used to obtain the estimates for the other eight months of the year.

The analysis was limited to individuals who were younger than 65 because older individuals were likely to also have Medicare insurance. The analysis of preventable hospitalization rates among Medi-Cal beneficiaries included those below age 65 who are eligible for both Medi-Cal and Medicare. These "dual eligible" patients accounted for 15 percent of non-elderly Medi-Cal beneficiaries in the linked file. For these Medi-Cal beneficiaries, Medicare was the primary payer for hospital and ambulatory care services.

Recognizing that Medi-Cal eligibility categories reflect differences in beneficiaries' health status, preventable hospitalization rates for Medi-Cal beneficiaries who were eligible through CalWORKS (primarily low-income women and children) versus those who were eligible through SSI (seniors and other people with disabilities) were analyzed separately. The linking of Medi-Cal eligibility codes to these categories was done using previously described algorithms.[33] Eligibility codes that did not correspond to CalWORKs or to SSI were excluded from the analysis. Consideration was given to further adjustment for potential differences in comorbidities between those in Medi-Cal managed care versus fee-for-service. Applying APR-DRGs to secondary conditions captured in the hospital discharge data did not appreciably alter the observed differences in hospitalization rates between Medi-Cal managed care and fee-for-service. To simplify the presentation, this information is not included in the displayed results.

The numerator of the rate was the count of hospitalizations for ambulatory-care-sensitive conditions in a given month belonging to beneficiaries in a particular delivery model or health plan. Through re-admissions, an individual could potentially contribute more than one hospitalization to the counts. Alternative analyses using the counts of individuals who had one or more admissions for ambulatory-care-sensitive conditions revealed very similar relationships between Medi-Cal managed care and fee-for-service analyses in which all hospitalizations were counted. Therefore, only the data on total hospitalizations is displayed. The denominator population for calculating the admission rate for each delivery model and health care plan was obtained from the Medi-Cal Eligibility Files.

Recognizing that nonrandomly distributed patient and county characteristics could confound our results, multivariate Poisson regression analysis was used to model the monthly preventable hospitalization rates as a function of the Medi-Cal delivery model (fee-for-service versus managed care), controlling for admission month, admission year, patient age (1-17 versus 18-64), sex, race/ethnicity (African American, Asian and Pacific Islander, Latino and Non-Latino White and Other), and county of residence. The use of appropriate scale factors corrected for any remaining over-dispersion in the model.[34] Such an approach can accommodate changes in individual characteristics over time, such as the health plan held by a beneficiary. The denominator population for calculating the admission rate was obtained from the Medi-Cal Eligibility File, which had detailed information about each of the independent variables. The coefficient estimates from the Poisson regression model were used to obtain predicted rates standardized for differences in group composition. To facilitate comparison of preventable hospitalization rates from different sources, monthly admission rates were converted to annual rates.

Following the criterion established by NCQA in performing evaluations with HEDIS, plans which had greater than 1,000 beneficiaries in a month were included for in-depth analysis of plan-level variation in preventable hospitalization rates. The plans were ranked according to the age-sex standardized preventable hospitalization rates. Consistency in plan performance was measured by the Spearman's correlation between the ranks of the same plan across the three years, 2000 to 2002. The correlation between plan rankings of the CalWORKS and seniors with disabilities groups was also calculated.

Because health plans (identified by a unique health plan number) operate within a county, the research for this report used an analysis of variance method for nested classifications to examine whether the variation in preventable hospitalization among plans was attributable to county or health plan characteristics. This analysis was limited to counties that had a minimum of two health plans providing Medi-Cal managed care. To facilitate comparisons between the health plan data presented in this report with performance data from the NCQA's HEDIS reports, the approach used here mirrored the methods used by the NCQA and adjusted our data only by age and sex.

The preventable hospitalization rates for Medi-Cal beneficiaries were aggregated to the county level for 2002. Rates were adjusted for age, sex, race/ethnicity and eligibility code (TANF, disabled, other) differences of the Medi-Cal populations across counties. The preventable hospitalization rates for the uninsured population were calculated at the county level for the same year using interpolated estimates of a county's uninsured population derived from the 2001 and 2003 California Health Interview Survey. The uninsured preventable hospitalization rates were adjusted for differences across counties in the age, sex, and race/ethnicity of the uninsured population. The correlation between a county's 2002 adjusted Medi-Cal preventable hospitalization rates and its uninsured preventable hospitalization rate was also calculated.

To calculate the savings in hospital costs that would be generated if all beneficiaries had been in managed care, it was necessary to first calculate the expected number of hospitalizations by multiplying the total number of beneficiaries in a Medi-Cal aid category by the hospitalization rate associated with managed care beneficiaries in that eligibility group. The result was then multiplied by the average charge reported in the OSHPD Patient Discharge Date for a managed care hospitalization for an ambulatory-care-sensitive condition with that aid category. Because the charges reported in the Patient Discharge Data might overstate the true amount paid by a payer such as Medicaid, we adjusted hospital charges downward based on the ratio of the calculated average per diem rates in the Patient Discharge Data with a separately available list of Medicaid negotiated hospital per diem rates for medical admissions for the same time period.[35] On average, Medicaid's costs were 19 percent of the Medicaid charges reported

in the OSHPD Patient Discharge Data. This was averaged across the nine-year study period to obtain the annual hospitalization charges for ambulatory-care-sensitive conditions if all beneficiaries had been in managed care. This number was subtracted from a similarly calculated hypothetical charge that would be incurred if all beneficiaries in that aid category had been in fee-for-service. For beneficiaries with disabilities enrolled in both Medicaid and Medicare, Medicare is the primary payer for hospital care. Savings from reducing preventable hospitalization for these beneficiaries would accrue to Medicare.

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25. Correlation: r = 0.73 and 0.68, respectively; p values ≤0.0001.
26. Correlation: r = 0.53; p value <0.005.
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