Managed Care, Networks and Trends in Hospital Care for Mental Health and Substance Abuse Treatment in Massachusetts: 1994-1999

Elaine Fleming[1], Hsienming Lien[2], Ching-To Albert Ma[3], Thomas G. McGuire[4]

[1]M.A., Department of Economics, Boston College, Boston, MA, USA
[2]Ph.D., Department of Finance, Cheng-Chi University, Taiwan
[3]Ph.D., Department of Economics, Boston University, Boston, MA, USA
[4]Ph.D., Department of Health Care Policy, Harvard Medical School, Boston, MA, USA

Abstract

Background: Rates of inpatient care for mental health and substance abuse treatment have been reported to fall after the introduction of managed care, but the actual decline may be overstated. Almost all managed care impact studies are based on pre-post comparisons, which have two drawbacks: secular downward trends may be attributed to a managed care effect and self-selection may exaggerate the impact of managed care. Therefore it is useful to examine long-term population-based trends in use associated with the growth of managed care.

Aims of Study: This paper examines trends in inpatient care for mental health and substance abuse treatment in Massachusetts between 1994 and 1999 by service provider and payer. We analyze how managed care impacts the trends in mental health and substance abuse care.

Methods: We provide an overview of the health market in Massachusetts and compare trends in mental health and substance abuse services with all inpatient services. To analyze the impact of managed care, we compare the per discharge cost of managed care and fee for service plans in Medicare and Medicaid. Finally, we examine the role played by hospital networks in managed care.

Results: The reduction in service costs for mental health and substance abuse, about 25% in six years, is mostly due to the decline in the average cost per inpatient episode. This is only slightly greater than the decline in costs for all inpatient care. Managed care has reduced both the quantity (average length of stay) and intensity of health care (expenditure per day). Simulations suggest that the creation of hospital networks by managed care accounts for around 50% of the differential between the average costs of the HMO and FFS sectors.

Discussion: We find that the cost reductions in mental health and substance abuse services are larger than for physical health, but not by much. The average length of stay and average day cost is lower for managed care plans than for FFS plans, and much of this difference is attributable to the hospitals managed care plans select to participate in their networks. The data are limited to inpatient discharges from Massachusetts and therefore our conclusions may not be readily extended to other places. Furthermore, our analysis is based on the estimated cost rather than the actual payments to hospitals.

Implication for Health Care Provision and Use: The analysis highlights the importance of hospital selection and networks in affecting the cost of care.

Implications for Health Policies: Contrary to popular belief, the analysis shows that the experience of mental health and substance abuse and non-mental health and substance abuse services is similar. Creation of networks is an important strategy in managed care.

Implications for Further Research: This paper provides the groundwork for extending the analysis to areas with market characteristics different to those of Massachusetts. Further research should focus on the long-term trends in health outcomes between managed care and fee for service patients.

Introduction

Inpatient care for mental health and substance abuse (MH/SA) has been significantly affected by managed care. Rates of inpatient treatment have been reported to fall dramatically after the introduction of managed care (Frank and McGuire,[1] Huskamp[2]); for review, see Grazier and Eselius.[3] There are reasons to believe, however, that these studies might have overstated the actual decline in inpatient care associated with managed care. First, almost all the managed care impact studies are based on pre-post comparisons; with this methodology, secular downward trends must be accounted for to isolate a managed care effect. In research on outpatient care in Massachusetts, Ma and McGuire[4] found very strong downward trends in use prior to managed care. Unless these trends are accurately accounted for, managed care might look to have more of an effect than it really does. Second, if beneficiaries can choose plans, people who anticipate using higher cost services might choose to avoid managed care for

---
* **Correspondence:** Thomas G. McGuire, Ph.D., Department of Health Care Policy, Harvard Medical School, 180 Longwood Ave., Boston, MA 02115, USA
Tel.: +1-617-432 3536
Fax: +1-617-432 2905
E-mail: mcguire@hcp.med.harvard.edu

another insurance option; that is, self-selection may exaggerate the apparent impact of managed care. As a complement to the typical managed care study, it is useful therefore to examine long-term population-based trends in use.

This paper studies trends in the rates of use in inpatient MH/SA care in Massachusetts, a state with high managed care penetration in Medicaid, Medicare, and other payers. By combining information from several data sources, including specialty hospitals not included in discharge abstract data bases, we put together a comprehensive picture of the trends in inpatient care for MH/SA between 1994 and 1999, a period of growth in managed care. We compare, first, the overall trends of inpatient use with the experience in MH/SA services. Moreover, we compare the experiences of Medicaid, Medicare, and other payers. To analyze the impact of managed care, we compare the per discharge costs of managed care and fee-for-service plans in Medicare and Medicaid. In this last analysis, we estimate how much the creation of provider networks contributes to a managed care effect.

Our analysis focuses on two public payers: Medicaid and Medicare. This choice is made because these payers are important for public policy, but also for other reasons. First, their experiences of managed care are different. Medicaid managed care coverage came quickly in Massachusetts and is extensive. Managed care has come to Medicare slowly, and its coverage rate is the lowest among major payers. Second, their contracting practices for managed care are different. While each Medicare plan is allowed to provide MH/SA services, Medicaid contracts with a separate management group to oversee MH/SA services for its enrollees.* Finally, the population size is available for Medicare and Medicaid; similar figures are not readily available for private payers.

The paper is organized as follows. We provide an overview of the health market in Massachusetts, focusing on Medicare and Medicaid, as well as a description of the data sets used in the analysis. Next we present a summary of the aggregate use for MH/SA services in Massachusetts, comparing trends in MH/SA services to trends for non MH/SA inpatient services. We find a clearly declining trend in MH/SA service cost over the sample period. Moreover, a large portion of the cost reduction (about two thirds) is due to a decrease in the cost per discharge. We explore how managed care affects average cost by comparing the cost per discharge of managed care and fee-for-service plans in Medicare and Medicaid. Our results show that managed care reduces both the quantity (average length of stay) and intensity of health use (expenditure per day). Simulations indicate that creation of a network, a practice widely adopted by managed care, accounts for approximately half of the cost differential between managed care and fee-for-service plans. Finally we draw some conclusions.

Background and Data

Background

Before we describe our data, it is useful to give a brief background of the health markets in Massachusetts. We focus on the two largest public payers: Medicare, the health program for the aged and the disabled,* and Medicaid, the health program for children and the poor.†

Medicare is a federally financed health program for people of 65 years of age and older, some disabled people under 65 years of age and people with end-stage renal disease. It is by far the nation's largest health program, covering about 40 million Americans, and is administrated by the Centers for Medicare & Medicaid Services (CMS).* Medicare consists of two different health insurance plans: hospital insurance (referred to as Part A) and medical insurance (referred to as Part B). Part A covers most inpatient services, including some nursing facilities, and is free to the beneficiary. Part B covers outpatient services and inpatient services not covered in Part A, but requires a monthly premium of around $50. In both Parts A and B, there are two types of plans for each enrollee: a traditional fee-for-service plan (FFS) administered by the federal government and managed care plans (HMO) operated by private companies. For instance, in 1999, there were 15 Medicare HMO plans in Massachusetts. Among them, Tufts' Senior Horizon, Harvard Pilgrim's First Seniority and Fallon's Senior Plan were the three largest Medicare HMO plans in the state.

Medicaid is a program jointly funded by the federal and state governments to assist states in the provision of adequate medical care to eligible needy persons. It is the largest program providing medical and health-related services to the poor. Within broad guidelines set by the federal government, each state can establish its own eligibility standards, determine the type, amount, duration and scope of services and set the rate of payment for services. Medicaid eligibles with serious mental illness frequently qualify for Medicare coverage by virtue of disability. The inpatient MH/SA costs of these ''dual eligibles'' are primarily paid by Medicare, with Medicaid paying the portion that would otherwise have been paid out-of-pocket or by supplementary insurance.

In Massachusetts, the Division of Medical Assistance (DMA) is the state agency that administers Medicaid and the Children's Health Insurance Program (CHIP). Medicaid and CHIP are combined into one program called MassHealth that pays for health care for certain low- and medium-income people living in Massachusetts. MassHealth also pays Medicare Part B premiums for eligible seniors.

The DMA assigns the coverage of each Medicaid enrollee to one of seven coverage plans according to which selection

---

* Medicaid currently contracts with the Massachusetts Behavioral Health Partnership to oversee the MH/SA services.

* For a detailed description of the eligibility requirements for Medicare, see http://www.medicare.gov/Basics//Eligibility.asp.

† For a detailed description on the eligibility for Medicaid, see http://www.state.ma.us/dma/masshealthinfo/applmemb_IDX.htm.

* Centers for Medicare & Medicaid Services (CMS) was previously the Health Care Financing Administration (HCFA).

E. FLEMING *ET AL.*

Table 1: Enrollment and Managed Care Penetration in Medicaid and Medicare, and Total Population in Massachusetts: 1994-1999

Year	Population*	Medicaid** Enrollment	Managed Care %	Medicare** Enrollment	Managed Care %
1994	6,031,352	700,449	67.0	918,000	5.3
1995	6,062,335	686,056	65.5	939,000	6.5
1996	6,085,393	696,550	65.6	936,000	11.3
1997	6,115,476	764,228	66.6	943,000	16.3
1998	6,144,407	884,548	66.5	946,000	20.4
1999	6,175,169	929,757	66.7	951,000	24.3

* We obtain the MA population from the website of the U.S. Census Bureau (www.census.gov).
** Medicare and Medicaid enrollment are obtained from Division of Medical Assistance and Center for Medicare and Medicaid Services (CMS), respectively.

criteria are met.* Each Medicaid enrollee can choose from a number of insurance plans, depending on his coverage plan.† In addition to FFS and HMO (paid by capitation), Medicaid enrollees have a third option: the Primary Care Clinician (PCC) plan—a fee-for-service type plan where the primary care clinician receives an enhanced reimbursement for managing the health care of the enrollee. The PCC plan is administrated by the DMA.

A significant difference between Medicare and Medicaid for MH/SA services is that Medicaid uses a carve-out program, the Massachusetts Behavioral Health Partnership (MBHP).* The DMA contracts with the MBHP to cover MH/SA services for all Medicaid enrollees in the PCC plan and some enrollees in HMO plans.† The contract for the carve-out is rebid about every four years. Below, we categorize the insurance of Medicaid enrollees into three types: FFS, MBHP and HMO.

Table 1 shows the total population of Massachusetts, as well as Medicare and Medicaid enrollment in Massachusetts between 1994 and 1999. As seen in **Table 1**, the total population grew very slowly from 1994 to 1999 (2.4%), as did Medicare enrollment (3.6%). Approximately 15% of the Massachusetts' population was enrolled in Medicare throughout the sample period. By contrast, Medicaid enrollment increased substantially within six years, from seven to nine hundred thousand enrollees.* The 33% increase in Medicaid enrollment was largely due to welfare expansions in 1997.†

Table 1 also displays the penetration of managed care in Medicare and Medicaid. Despite the fact that the number of Medicaid enrollees increased substantially from 1994 to 1999, the penetration rate of managed care remained almost unchanged over the sample years, due to a stable state policy promoting Medicaid managed care - over 65% of Medicaid enrollees have been covered by managed care since 1994 (the national average was 23% in 1994 and 56% in 1999).* By comparison, the rate of managed care penetration for Medicare has been much lower but increases over time: from 5.3% in 1994 to 24.3% in 1999.

Data

This paper incorporates two different data sources on general and specialty care hospitals in Massachusetts to provide a comprehensive view of inpatient care for MH/SA between

---

* The coverage plans are MassHealth Basic, MassHealth Standard, MassHealth Prenatal, MassHealth Limited, MassHealth Basic Buy-in and CommonHealth. MassHealth Basic and MassHealth Standard are the two largest coverage plans.
† The number of available insurance plans, however, depends on one's category of coverage.
* Fisher et al[5] present a case study of how one selective hospital network was formed for Medicaid beneficiaries in Massachusetts during the early nineties.
† For instance, DMA requires all HMO enrollees in MassHealth Basic to enroll into MBHP.

---

* The enrollment figure for Medicaid includes dual-eligibles - that is, enrollees who are qualified for both Medicare and Medicaid. While these patients are primarily covered by Medicare, they are also partially supported by Medicaid. For instance, in 1999, 18% of Medicare discharges in acute hospitals are sponsored partly by Medicaid. Given that Medicare patients who are also qualified for Medicaid are usually disabled and use more health care, the actual proportion of enrollees covered by Medicare and Medicaid is likely smaller.
† In April 1995, the federal government approved a five-year Medicaid research and demonstration project for Massachusetts, which expanded the insurance coverage for the needy and placed greater reliance on managed care. A publicity campaign that raised awareness about the availability of free/affordable health care for qualifying families and children was embarked upon in July 1997. Total enrollment of Medicaid increased by almost 10% from 1996 to 1997, and continued to grow in the next two years.
* See *http://cms.hhs.gov/medicaid/managedcare/trends99.pdf* for the national summary of Medicaid.

Table 2: Discharges and Cost per Discharge for MH/SA and Non-MH/SA in Massachusetts: 1994-99

		1994	1995	1996	1997	1998	1999
MH/SA	Discharges	80878	77848	76735	74658	81800	75202
		(100.0)	(96.3)	(94.9)	(92.3)	(101.1)	(93.0)
	Average Cost	6034.6	5619.1	5593.0	5037.4	4604.1	4833.0
		(100.0)	(93.1)	(92.7)	(83.5)	(76.3)	(80.1)
Non MH/SA	Discharges	811348	762192	738139	745267	753689	754218
		(100.0)	(93.9)	(91.0)	(91.9)	(92.9)	(93.0)
	Average Cost	6506.3	6249.1	6285.3	5816.5	5773.0	5782.2
		(100.0)	(96.0)	(96.6)	(89.4)	(88.7)	(88.9)

Note: The average cost is in dollars and deflated using the medical component of the CPI (base year 1994). The number in parenthesis compares the figure in the current year with the figure in 1994 (1994 is set equal to 100). All persons included.

1994 and 1999. Data are maintained by the Division of Health Care Finance and Policy (DHCFP), a state agency of Massachusetts. Our data source for general hospitals is the ''Hospital Case Mix & Charge Data Base;'' these data provide reliable and detailed information on case mix and charges for each discharge in every general hospital.* The data include clinical information, such as diagnosis and reason for admission, treatment and services provided to a patient and status of a patient's stay in the hospital, along with a description of patient characteristics, such as demographics, expected payer and zip codes. For both Medicare and Medicaid, psychoses (DRG 430) accounts for 70% of the mental health discharges from general hospitals. Organic disturbances (DRG 429) is the next largest category for Medicare, accounting for 16%, whereas for Medicaid, depressive diagnoses in DRGs 426 and 427 account for 18%. Two-thirds of Medicare discharges for substance abuse are alcohol-related, whereas for Medicaid more than half of the substance abuse discharges from general hospitals are drug-related. The charge element provides the full, undiscounted total and service charges a hospital billed. More importantly, the data allow us to identify the specific type (e.g. managed or non-managed) and name (e.g. Tufts' Senior Horizon) of the patient's payer, a key piece of information for our analysis.

Our data source for specialty hospitals (e.g. specialty psychiatric hospitals) is the ''DHCFP-403 Cost Report;'' these data provide information on inpatient statistics and expenses of a hospital between 1994 and 1999. Compared with data on general hospitals, the 403 Cost Report has two drawbacks. First, the data are less reliable, particularly in 1994 and 1995. Second, the data are less detailed - information is collected at the hospital level. As a result, we

only know the total charges and services at the hospital level.* No demographic or clinical information is available at the individual level.

As is widely known, hospital charges do not represent payments by Medicare, Medicaid or private managed care plans.† Nonetheless, charges can be used to estimate the costs incurred by each payer by converting charges to costs using the ''Cost to Charge Ratio (CCR),'' information maintained by DHCFP. These data provide information on the ratio of total costs to charges for each hospital on a yearly basis. Although the CCR is a hospital-wide figure that covers services other than MH/SA, it at least provides a way to approximate MH/SA costs. In the following, we estimate costs by applying hospital-year specific CCR's to the charge data.

Aggregate Utilization

This section provides an overview of aggregate inpatient use for MH/SA services in Massachusetts, comparing trends for MH/SA services to non-MH/SA hospital services.

Provision of MH/SA Services

Table 2 displays the number of discharges and cost per discharge for MH/SA and non-MH/SA services from all hospitals between 1994 and 1999.* The cost figures for all

---

* DHCFP requires each general hospital to submit its report on a quarterly basis. The quarterly reports are then edited for compliance with regulatory requirements using a one percent standard: a hospital's report is rejected and asked for re-submission if more than one percent of discharges are disqualified. A discharge is disqualified if one of type A or two of type B variables were entered with errors. The detailed lists of Type A and Type B variables are available in the documentation manual of ''Hospital Case Mix Charge Data Base.''

* For some service measures, like discharges and inpatient days, we are able to identify major payers that use the services, such as Medicaid and Medicare.

† The nominal charge that a hospital bills is different from the actual cost that a payer pays, usually a 30-40% difference (Cutler, McClellan, Newhouse and Remler).[6]

* Services of MH and SA for general hospitals are identified from the major disease category (MDC) of patients, where mental health and substance abuse are coded as 19 and 20, respectively. MH services in specialty hospitals are listed as psychiatric acute care services under routine inpatient services. It is not possible to separately identify SA services in specialty hospitals.

E. FLEMING *ET AL.*

Table 3: Per Enrollee Cost for MH/SA Services by Major Payers in Massachusetts: 1995-99

Payer	1995	1996	1997	1998	1999
Medicare	185.6	171.0	152.8	139.4	138.6
Medicaid	136.0	121.9	109.0	96.9	104.8
Other	38.3	41.3	33.7	36.9	31.2

Note: The service cost in a specific year is deflated using the medical component of the CPI (base year 1994). The ''Other'' group is all non-Medicare or Medicaid enrollees in the state.

years are deflated using the medical component of the Consumer Price Index (CPI), base year 1994, obtained from the Bureau of Labor Statistics.

According to **Table 2**, the number of discharges for MH/SA and for non-MH/SA services both fell modestly during 1994-1999, about 7.0%.* The cost per discharge also declined over the same period: 11.1% for non-MH/SA and 19.9% for MH/SA services. The drop in average cost per discharge accounts for about two thirds of the drop in MH/SA cost. In real terms, resources going to hospital care fell in both the MH/SA and general health sectors, with the fall being somewhat greater in MH/SA.

Who Pays for Care?

From 1995 to 1999,† the cost shares for MH/SA services for Medicare, Medicaid and all others payers (Others)* are around 37% for Medicare, 23% for Medicaid and 40% for all other payers. The two public payers, Medicaid and Medicare, account for approximately 60% of total MH/SA cost, although they make up for less than 30% of the Massachusetts population. Medicare's share of MH/SA service costs has slowly declined over time, from approximately 40% of all costs in 1995 to 36% in 1999, a decrease of approximately 11%. By contrast, Medicaid's share of total costs has increased over time from 21% in 1994 to 27% in 1999, an increase of 29%. Medicaid's increasing share of total costs can largely be explained by the federal government's approval of an expansion of the Massachusetts Medicaid program in 1995.

As each payer has a different enrollment base, **Table 3** presents the per enrollee cost of Medicare, Medicaid and a residual category, Others.* On average, an enrollee of ''Other Payers'' costs less than one-quarter the cost of a Medicare enrollee and less than one-third the cost of a Medicaid enrollee.† Interestingly, in spite of the perception that managed care has drastically reduced inpatient use among the privately insured, average costs for this large group fall the least over the period. Medicare and Medicaid per enrollee costs in real terms fall about 25% in the four years whereas the large Other group's costs fall by only 19%. As is evident from **Table 3**, most of the cost reduction for MH/SA services originates in the public sector.

Managed Care and Networks in Medicare and Medicaid

In this section, we explore the impact of managed care on MH/SA services by comparing the average discharge cost in general hospitals for patients enrolled in managed care and fee-for-services plans of Medicare and Medicaid.* We focus on general hospitals because the data allow us to identify the specific plan type for each discharge. We concentrate on Medicaid and Medicare payers because they are responsible for most of the cost reduction over the sample years, and because of their differences in managed care experiences and contracting practices. We next review the proposition that managed care networks may be used for cost control, and then simulate its effect using our data.

---

* While the trend of discharges for MH/SA service in our data is quite close to the national average, the number for overall services is a little different. Bao and Sturm[7] find that the number of discharges for MH/SA services decreased about 5% between 1994 and 1997 (their data covers from 1988 to 1997). The discharge number for overall services, however, was almost unchanged in the same period. The increase in MH/SA discharges in 1998 is due to a reported increase in discharges from specialty hospitals.

† The 1994 figure is problematic because few non-acute hospitals report costs by payers that year, so we do not report it.

* The database for non-acute hospitals does not report the total cost by each payer. We calculate the total cost of each payer for non-acute hospitals using the total service cost of a hospital times its shares of inpatient days for each payer. Therefore, the reported cost shares are an approximation and must be interpreted accordingly.

* Due to data limitations, we are unable to show per episode cost for each payer. Data on psychiatric hospitals are collected on a hospital basis, preventing us from breaking down the number of discharges for each payer.

† The number of dual eligibles appear in the denominator for both Medicare and Medicaid in this table, but the costs for the dual eligibles are figured for Medicare only. Thus, the Medicaid per eligible cost for the dual eligibles is assigned to Medicare.

* Lindrooth Norton and Dickey[8] employ a regression-based approach in a similar spirit to the analysis here. They use data from part of Medicaid managed care for 1991-1995.
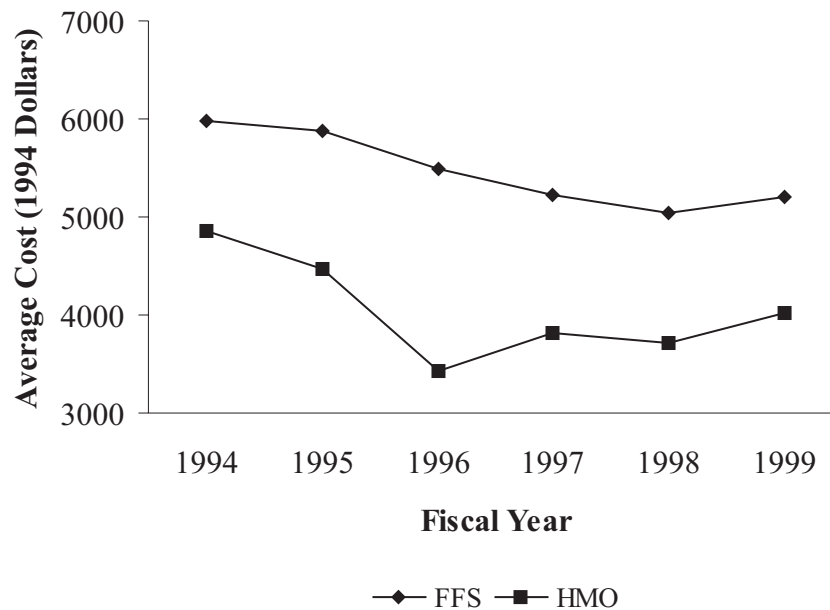
Figure 1. The Average Cost of a Medicare Discharge in 1994 Dollars, 1994-1999

Per Discharge Cost Comparisons – FFS versus Managed Care

Medicare

We display in **Figure 1** the average cost of discharges of Medicare managed care and fee-for-service plans. (Note that the Y-axis on all figures is truncated above the zero point for clarity). Compared with FFS, the average cost for HMOs is consistently lower over the sample years. For both FFS and HMOs, the average cost first decreases and later increases. The minimum average for FFS occurs in the year 1998. For HMOs, it is 1996; it increases for the year after that, but decreases somewhat the year after. Towards the end of the sample period, both FFS and HMO average costs have begun to rise. Over the sample period, managed care penetration increases four fold.

The average cost per discharge can be further decomposed into the product of average length of stay (ALOS) and average day cost (ADC);* the first one can be regarded as the ''quantity'' of treatment; the second one, the ''intensity'' of treatment. Over the sample years, managed care plans cost less than FFS, with lower ALOS and ADC. In 1999, for instance, the ALOS and ADC for HMOs are approximately 10% lower than the corresponding figures for FFS. While ALOS for both FFS and HMOs declines over time, ADC is relatively stable. The reduction in ALOS is primarily responsible for the reduction in per discharge cost over the sample years.†

Without properly accounting for the severity difference, a simple cost comparison between managed care and FFS plans is likely to be misleading. Patients admitted to general hospitals in FFS plans and from HMOs for MH/SA services may have different health conditions on average. Some evidence suggests the presence of self-selection (Rossiter and Wilensky);[9] that is, patients with worse health conditions are attracted to FFS for its generous coverage.* It is not obvious what this means at the level of a hospital discharge. If criteria for admission are ''stricter'' in an HMO context, the average severity of patients admitted from an HMO plan could well exceed the average severity in a FFS plan. The expected direction of any bias due to different severity in the underlying populations may be unsigned, but nonetheless, caution is necessary in interpreting average cost differences or trends in those differences. As one check, we adjust cost by diagnosis as captured by DRG.† Doing so has little effect on the observed average cost differences between HMO and FFS groups, and we do not show these results. If such a finding were to hold as a more complete set of severity adjusters was employed, the cost differences could be more confidently attributed to cost management methods in managed care. We are not able to pursue such a comprehensive adjustment here.

---

* In this analysis we compare the relative change of ADC and ALOS by plan with each being normalized by the 1994 FFS figure.

† Bao and Sturm[7] also shows a declining trend for the average length of stay using the national data. Nevertheless, they find a much smaller size of reduction, about 5% within 1994 and 1997.

---

* In addition to self-selection from patients, the selection may be also induced by the managed plan. For an empirical study on the service level selection, see Cao and McGuire[10].

† The adjusted average cost is estimated by summing over the product of the overall Medicare DRG distribution and the average cost of every DRG for each payer:

$$\text{Adjusted Average Cost} = \sum_{DRG}(\text{Average DRG Distribution} \times \text{Average Cost}_{DRG \ Payer})$$

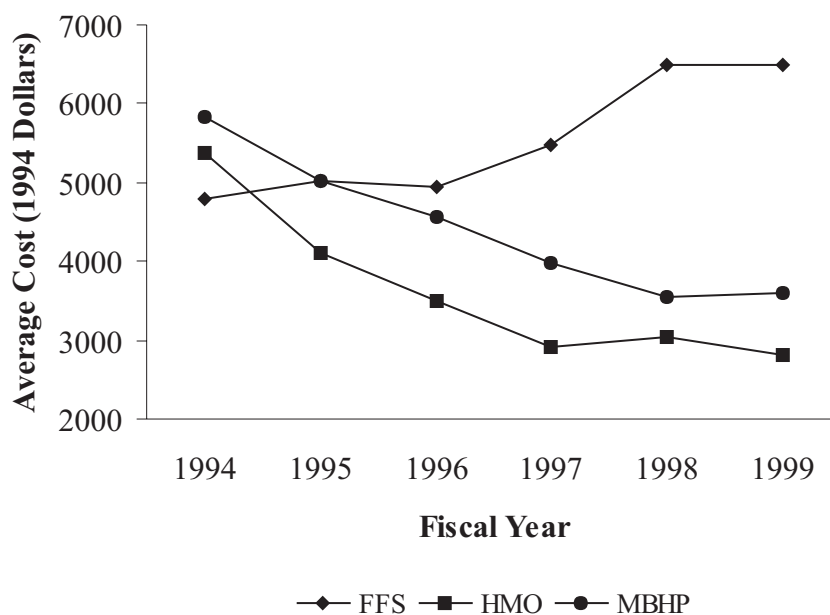We include only DRGs that have at least one hundred discharges in a year.

E. FLEMING *ET AL.*

Figure 2. The Average Cost of a Medicaid Discharge in 1994 Dollars , 1994-1999

Medicaid

Figure 2 displays the average MH/SA cost by insurance type for Medicaid discharges. Compared with FFS, the average cost for the managed care groups, HMOs and the MBHP, is lower, though in the early periods, the averages were about the same. Similar to Medicare, there is a downward trend in the average cost of managed care, which has contributed to the overall decline in average cost during the sample period.*

Some cost patterns are unique to Medicaid. First, the cost trend for FFS is increasing over time, while that for other payers are declining; this may indicate continued selection. Second, throughout the sample period, MBHP always has higher average costs than HMOs, even though they follow similar declining trends. This suggests that the two managed care groups have taken different approaches to reduce costs. We investigate this hypothesis further below.

We decompose average cost into ADC and ALOS, and follow the same normalizations used in the Medicare analysis. We find that the ADC for FFS increases over time, while the ADC for the managed care groups decreases, or increases by a much smaller magnitude. The ALOS for both managed care groups decreases, while that for FFS is almost unchanged over time. These observations differ from the Medicare findings.

The MBHP and HMOs take different strategies in controlling their average costs. The ALOS for HMOs has

been approximately 20% lower than that for the MBHP over the sample years. MBHP, however, appears to perform better in containing ADC. The ADC for MBHP in 1994 is almost identical to that of HMOs. By 1996, MBHP has managed to attain the lowest ADC among the three insurance types, and maintains its ADC about 10% lower than HMOs. This implies that the carve-out program may be better in reducing the intensity, rather than the quantity of the treatment.

We investigated whether DRG differences, one measure of severity, account for observed differences in average costs. Similar to the Medicare case, we find that the adjustments had very small effects on the estimated average cost differences among the insurance types. However, it must be noted that the DRG distribution may not be sensitive enough to capture the underlying severity of enrollees in different insurance plans. A better measure of the severity level of patients may be necessary to further investigate the presence of selection.

Network Effects

Besides the usual practices that a managed care organization uses to control costs (such as utilization, gatekeeping, second opinion, and preapproval requirements), creation of a network of providers has been a common but less understood component of managed care.* In some services, networks are

---

* Another cause for the decline in the overall average cost is the shift of discharges from FFS to managed care groups. Examination of discharges shows that fee-for-service discharges have decreased by approximately 25%, or around two thousand. By contrast, managed care discharges have grown significantly, in particular PCC discharges. Discharges have increased by about six thousand, or discharges have trebled over the time period.

* Cutler, McClellan, and Newhouse[11] compares the treatment of heart attacks and newly diagnosed chest pain in HMOs and traditional plans and finds that HMOs have 30 to 40 percent lower expenditures than traditional indemnity plans. Actual treatments and health outcomes differ little; virtually all the difference in spending comes from lower unit prices. Ma and McGuire[4] use data on outpatient treatment for mental illness patients and find an even larger effect—both the price and quantity reduced about 30-40%.
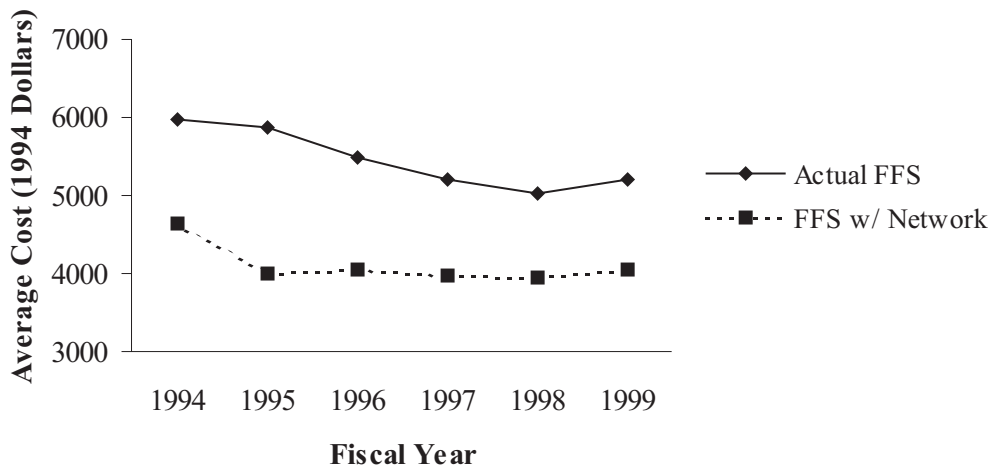
Figure 3. Network Effects for Medicare: Predicted FFS Average Cost using HMO Hospital Discharge Distribution for FFS plan, 1994-1999

formed when carveouts occur as, for example, in mental health and substance abuse services.* By implementing these practices, it is reported that managed care significantly reduces its service cost, either by controlling the quantity of health care (Ma and McGuire)[4] or by bargaining for lower supply prices (Cutler, McClellan, and Newhouse).[11]

How are networks supposed to help managed care companies reduce costs? First, to join a network to supply services to enrollees, a provider may have to reduce prices (Ma and McGuire;[4] Town and Vistnes.[12]) Second, networks are exclusionary: a provider can serve a plan's patients only if it belongs to a network. By excluding providers that tend to use an excessive amount of services, the managed care plan can reduce cost. Third, a managed care plan may even have some power in directing patients to preferred providers within a network. This idea is "redirection."

Redirection can be implemented in several ways. First, networks often require referrals for specialty care. By asking network primary care physicians to follow a gatekeeping protocol, a managed care plan affects patients' choices of primary care and specialty physicians. Second, many patients depend on a recommendation for a provider. A managed care plan may choose to recommend only its preferred providers. Finally, a managed care plan can use the above as a threat to move patients away from providers who are not cost effective. Providers may anticipate this and respond to the threat by changing their practice style, recommending less treatment or shortening the inpatient length of stay.

In this section, we conduct a preliminary analysis of how important the adoption of networks have been to the observed

cost reductions in managed care in Medicare and Medicaid. We make the assumption that hospitals have a fixed "practice style;" in other words, we do not credit managed care with affecting the manner and cost of hospital care. We use the data on hospital discharges to answer a limited question: by moving patients to the hospitals in the network, how much of the savings is due to the more prevalent use of hospitals with a more economical practice style?

Medicare

Table 4 presents the share of discharges represented by the top five hospitals for each major Medicare HMO plan for each year. To compute this share, we ranked all hospitals with Medicare discharges during a year and summed the shares of the largest five. We focus discussion on the discharges for 1998 and 1999 because there are very few HMO discharges prior to 1997. As **Table 4** shows, the discharge shares of HMOs are more concentrated than FFS. For instance, in 1999, the combined shares of the top five hospitals in FFS is less than a quarter, while the number is 53.9% for Tufts' Senior Horizon, 59.7% for Harvard Pilgrim's First Seniority and even 97.8% for Fallon's Senior Plan. Obviously, managed care plans use networks to concentrate discharges in fewer hospitals.

How effective is the network? We address this question by estimating how much of the cost differential between FFS and HMO plans could be explained if FFS used the same hospitals as HMO plans. Given that the number of discharges for each managed plan is quite small, we combine all HMO plans into one "non-FFS" plan. The simulated average cost for FFS is calculated by assuming that FFS has the same discharge distribution over hospitals as the non-FFS plan. In the simulation we do not change the hospital's average cost for FFS patients. Thus, the simulation assesses only the effect of a network on where patients go, and not on how the hospital might change if it were in a network. The dashed-line (labeled FFS w/ Network) in **Figure 3** is the simulated

---

* A "carve-out" program refers to the case when an insurer, instead of contracting with a service vendor to offer a full range of services, carves out the benefits of some services and diseases by offering a separate plan or by contracting separately with other service vendors for the management of risks. For a complete description of carve-out programs, see Frank and McGuire[13] and Grazier and Eselius[3].
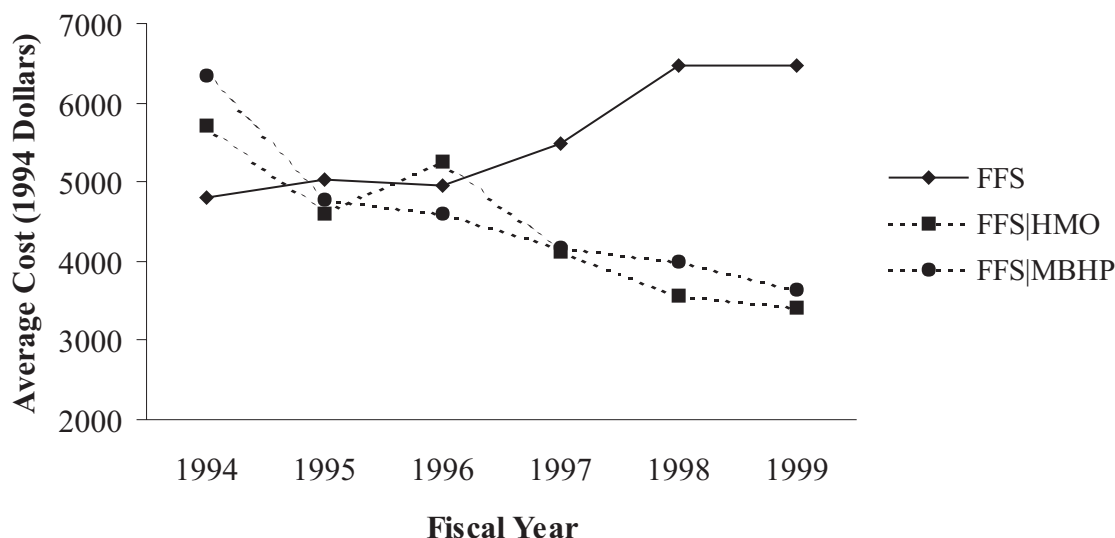
Figure 4. Network Effects for Medicaid: Predicted FFS Average Cost using Non-FFS Hospital Discharge Distributions at FFS plan, 1994-1999

result, and suggests that more than 50% of the cost differential between HMOs and FFS can be accounted for simply by the change in health providers. In other words, the HMO networks are composed of hospitals that have lower average cost for FFS discharges as well as HMO discharges. In practice, the network will be even more effective from the plan's point of view if the HMO can negotiate better discounts with providers in the network, or affect the practice style directly.

Medicaid

We now turn to examine networks of hospitals in Medicaid managed care. **Table 5** presents the share of discharges from the top five hospitals over the sample period by payer. As most of MH/SA discharges in managed care are from the

carve-out program (MBHP), we do not disaggregate HMO discharges by health plans. In 1999, 58.7% of HMO and 44.6% of MBHP discharges came from the top five hospitals. By contrast, only 13.4% of FFS discharges were from these hospitals. We conclude that Medicaid managed care, both HMOs and the MBHP, have higher concentrations amongst these top five hospitals. Compared with MBHP, HMOs have a higher concentration of discharges. This may explain in part why HMOs have lower cost levels than the MBHP.

The next step is to see how much of the cost differential between FFS and managed care can be explained by the creation of networks. We repeat the simulation for Medicaid, following the method in **Figure 3** for Medicare, except that now there are three payers. The dashed lines are the simulated AC for FFS where FFS discharges are fixed to the

Table 4: Discharge Shares of Top Five Hospitals for MH/SA Services in Medicare Plans in Massachusetts: 1994-99

Medicare Plans	1994	1995	1996	1997	1998	1999
FFS (%)	20.3	21.2	21	19.7	20.7	21.5
Fallon Senior (%)	100	100	100	100	99.6	97.8
Tufts Senior Horizon (%)	0	0	0	100	56.2	53.9
Harvard First Senority (%)	0	0	0	0	66.1	59.7
Other HMOs (%)	88.5	65.1	54.7	44.5	60.7	65.6

Note: For each plan, the percentage shown is the sum of the shares of the five largest hospitals in terms of discharges for that year.

Table 5: Discharge Shares of Top Five Hospitals for MH/SA Services in Medicaid Plans in Massachusetts: 1994-99

Medicaid Plans	1994	1995	1996	1997	1998	1999
FFS (%)	29.1	30.2	27.2	24.3	14.2	13.4
MBHP (%)	21.5	19.4	24.5	35.3	45.2	44.6
HMO (%)	69.2	68.6	66.4	58.6	43.5	58.7

Note: For each category, the percentage shown is the sum of the shares of the five largest hospitals in terms of discharges for that year.

HMO and MBHP distribution of discharges, respectively (the dashed lines labeled FFS|HMO and FFS|MBMH). The results are consistent with the findings from Medicare: FFS would have lower average costs if it allocates its discharges similar to HMOs or the MBHP. With the exception of 1996, predicted AC for FFS discharges follows actual costs for MBHP very closely. The simulation exercise for Medicaid returns even stronger results than those found for Medicare. **Figure 4** suggests that almost all of the cost differential between the MBHP and FFS can be attributed to the change in health providers. The result is not so strong for HMOs, with approximately 80% of the cost differential explained by changing service providers. We found that HMOs tends to focus on reducing quantity while MBHP focuses on reducing the intensity of treatment. In order for FFS to reduce its costs to the level of HMO costs, it would also need to reduce the quantity of treatment provided.

Discussion

This paper examines the trends in MH/SA inpatient care in Massachusetts between 1994 and 1999. We first compare the trends in MH/SA services with overall inpatient services and by major payers (Medicaid, Medicare and all other payers). We then analyze how managed care practices impact the cost of MH/SA services using Medicare and Medicaid discharges from general hospitals. Though Medicare and Medicaid differ in their contracting practices, they share the feature that a large majority of the hospital care they pay for is for schizophrenia. Specifically, we focus on two practices: networks and carve out programs.

There are a number of findings in our analysis. First, we find that the trends for total cost between MH/SA services and all other inpatient services are quite similar, though the cost savings from MH/SA services are somewhat larger. Despite the conventional view that MH/SA services are very different from overall services, the analysis shows that the experience of MH/SA and non-MH/SA services is similar. At the system level, the impact of managed care on resource use seems to be less than found in some studies of particular plan changes

Second, we find that the cost reduction in MH/SA services is largely due to a decrease in the average cost per discharge. Although specialty hospitals care for more severe and chronically ill patients, all hospitals experience similar

reductions in their per discharge costs. Furthermore, our analysis shows that the decrease in average cost is mostly from a reduction in length of stay.

Third, we find that managed care plans have a smaller average length of stay (ALOS) and a smaller average day cost (ADC); both contribute to a lower average cost per inpatient episode. In addition, differences in the cost between managed and non-managed plans cannot be easily explained by differences in the case mix of different plans. Our simulations suggest that the creation of a network, a practice widely used by managed care, explains at least 50% of the cost differential between managed and non-managed plans.

References

1. Frank RG and McGuire TG. Savings from a Carve-Out Program for Mental Health and Substance Abuse in Massachusetts Medicaid. *Psych Serv* 1997; **48**(9), 1147-1152.
2. Huskamp HA *The Impact of a Managed Behavioral Health Care Carve-Out and Benefit Expansion on Outpatient Spending for Mental Health and Substance Abuse Services*. Doctoral dissertation, Harvard University, 1997.
3. Grazier KL and Eselius LL. Mental Health Carve-Outs: Effects and Implications. *Med Care Res Rev* 1999; **56**(suppl. 2): 33-59.
4. Ma CA and McGuire TG. Network Effects in Managed Health Care. *Journal of Economic Management and Strategy* 2002; **11**(1): 1-35.
5. Fisher WH, Lindrooth RC, Norton EC and Dickey B. How Managed Care Organizations Develop Selective Contracting Networks for Psychiatric Inpatient Care: A Massachusetts Case Study. *Inquiry* 1998; **35**(4): 417-431.
6. Cutler D, McClellan M, Newhouse JP and Remler DK. Are Medical Prices Declining? Evidence from Heart Attack Treatments. *The Quarterly Journal of Economics* 1998; **113**(4): 991-1024.
7. Bao Y and Sturm R. How do Trends for Behavioral Health Inpatient Care Differs from Medical Inpatient Care in U.S. Community Hospitals? *J Ment Health Policy Econ* 2001; **4**(2): 55-63.
8. Lindrooth RC, Norton EC and Dickey B. Provider Selection, Bargaining, and Utilization Management in Managed Care. *Economic Inquiry* 2002, **40**(3): 348-365.
9. Rossiter L and Wilensky G. Patient Self-Selection in HMOs. *Health Affairs*; 1986, **5**(1): 66-80.
10. Cao Z and McGuire TG. Service Level Selection by HMOs in Medicare. *J Health Econ*, forthcoming.
11. Cutler D, McClellan M and Newhouse JP. How Does Managed Care Do It? *Rand Journal of Economics* 2000; **31**(3): 526-548.
12. Town R and Vistnes G. Hospital competition in HMO networks. *J Health Econ* 2001; **20**(5): 733-753.
13. Frank RG and McGuire TG. Economics and Mental Health. In Newhouse JP and Culyer AY (eds). *Handbook of Health Economics*. Amsterdam: North Holland Press, 2000.