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The Evidence Doesn't Justify Steps By State Medicaid Programs To Restrict Opioid Addiction Treatment With Buprenorphine

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ABSTRACT **Many state Medicaid programs restrict access to buprenorphine, a prescription medication that relieves withdrawal symptoms for people addicted to heroin or other opiates. The reason is that officials fear that the drug is costlier or less safe than other therapies such as methadone. To find out if this is true, we compared spending, the use of services related to drug-use relapses, and mortality for 33,923 Massachusetts Medicaid beneficiaries receiving either buprenorphine, methadone, drug-free treatment, or no treatment during the period 2003–07. Buprenorphine appears to have significantly expanded access to treatment because the drug can be prescribed by a physician and taken at home compared with methadone, which by law must be administered at an approved clinic. Buprenorphine was associated with more relapse-related services but $1,330 lower mean annual spending than methadone when used for maintenance treatment. Mortality rates were similar for buprenorphine and methadone. By contrast, mortality rates were 75 percent higher among those receiving drug-free treatment, and more than twice as high among those receiving no treatment, compared to those receiving buprenorphine. The evidence does not support rationing buprenorphine to save money or ensure safety.**

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With overdose deaths from heroin and prescription pain medications increasing in the United States,[1] opioid addiction is an important concern for Medicaid programs. Medicaid beneficiaries have higher rates of opioid addiction than other insured groups,[2] and Medicaid programs are the largest purchasers of methadone and buprenorphine, the leading forms of opioid substitution therapy nationally. Both treatments are more effective than drug-free treatment alone.[3,4]

Methadone is a well-established, highly regulated treatment,[3] but access to licensed methadone clinics varies widely across the country. Additionally, many potential users find the stigma and daily demands of methadone maintenance difficult. One alternative is buprenorphine, a medication for opioid addiction that received Food and Drug Administration approval in 2002.[5] Clinical trials indicate that it is somewhat less effective than methadone in eliminating opioid abuse,[4,6] but early treatment data suggest that it attracts a somewhat different clientele than methadone: patients who are likely to be male prescription drug abusers and who enter treatment at earlier stages of addiction.[7,8] Early entry into treatment may improve outcomes, partially compensating for buprenorphine's lower efficacy.

Buprenorphine treatment offers several potential advantages over methadone therapy. It

carries a lower risk of overdose than stronger opioids such as methadone, and the tablets—which are dissolved under the tongue—are formulated with naloxone, an opioid receptor blocker that removes the benefit from crushing and injecting the pills to achieve a greater opioid effect.[9] Buprenorphine is also more tightly bound to the opioid receptor than other opioids and therefore may protect patients by blocking out other opioid drugs.

The structure of buprenorphine treatment delivery also offers advantages. Federal law restricts methadone treatment to licensed programs that are often concentrated in urban areas and whose staff members are required to observe dosing of most patients daily. By contrast, the Drug Addiction Treatment Act of 2000 allows certified physicians to prescribe buprenorphine in any medical office setting, which has greatly expanded the availability of treatment.[10] Patients have been more willing to participate in treatment because they can take the medication themselves at home, increasing privacy and flexibility in travel and work schedules.[5]

The cost of buprenorphine is a major concern. Average spending for the medication alone is typically more than $300 per month—roughly $100 more than average Medicaid payments for methadone maintenance. In several states buprenorphine is among the most expensive medications covered by Medicaid. Citing both cost and safety concerns, most Medicaid programs now require prior authorization to fill prescriptions, limit treatment duration, or impose other requirements.[11] For example, Washington's Medicaid program limits prescriptions to fourteen days and requires drug screening before reauthorization of prescriptions.

There is little research to guide policies about access or that assesses the impact of buprenorphine on overall Medicaid spending. This is a concern because policies focused only on the cost of a particular treatment may overlook the treatment's effects on other health care use. For example, there is ample evidence that substance abuse treatment can lower use of emergency care and hospitalization, saving money in some cases.[12,13] Furthermore, higher treatment costs may be justified if there is a corresponding benefit from better outcomes.

To provide better information for Medicaid administrators and policy makers, we analyzed Massachusetts Medicaid (MassHealth) claims for all beneficiaries with a diagnosis of opioid addiction during the five years following the introduction of buprenorphine in 2003. Our analysis compared the impact of the alternatives of methadone maintenance, buprenorphine, drug-free treatment, and no treatment on Medicaid spending for all health care, on use of relapse-related services (such as hospitalization or emergency department visits related to resumption of substance abuse), and on mortality.

We found that buprenorphine was associated with more relapses but lower overall spending than methadone. Patients receiving drug-free treatment or no treatment had higher relapse rates and greater mortality than patients receiving either of the two opioid substitution treatments. Enrollment patterns suggest that buprenorphine expanded treatment access.

Study Data And Methods

Using MassHealth claims and enrollment data, we identified members ages 16–65 who had at least one diagnosis of opioid dependence between January 1, 2003, and December 31, 2007. We constructed a longitudinal database with monthly measures of total medical expenditures; service use and diagnosis-based variables for all types of health care; type of treatment received (buprenorphine maintenance, methadone maintenance, drug-free treatment, or no treatment); MassHealth eligibility status; and an indicator of whether the member died during the month. Mortality is recorded in the MassHealth eligibility file. We used Chronic Disease Payment System scores as a measure of illness burden.[14]

TREATMENT GROUPS We defined *buprenorphine treatment* as having an opioid diagnosis and a prescription for the medication or for the more commonly used combination of buprenorphine and naloxone. We used procedure codes to identify methadone maintenance. Patients with opioid dependence who received outpatient or residential behavioral treatment and no buprenorphine or methadone treatment were classified as receiving drug-free treatment. MassHealth members with a primary opioid diagnosis but no evidence of opioid substitution therapy or behavioral treatment throughout the study period were considered to have had no treatment.

OUTCOME MEASURES Spending included MassHealth payments for all types of care: treatment for medical conditions, psychiatric disorders, and addiction. These multiple types of care reflect the broad impact that addiction can have on medical costs through drug overdoses, higher rates of accidents and illness, poor self-care, and more complicated treatment of chronic illness.[15]

We adjusted spending to 2007 dollars using the Medical Care Component of the Northeast Region Consumer Price Index. We combined outpatient detoxification, inpatient, and emergency

department events with a primary diagnosis of a substance use disorder into a single outcome measure of relapse-related service use for a given month. We assumed that a treatment was more effective if it was associated with fewer relapse-related events. We calculated mortality rates within treatment episodes.

ANALYSIS To assess differences between treatment groups in spending, relapse events, and mortality, we adopted an intent-to-treat approach that began a treatment episode during the first month in which there was evidence of a particular treatment. Intent to treat, typically used in clinical trials, attributes all patient outcomes to their original treatment, even if patients switch to another treatment or drop out of treatment altogether. Our procedure was similar to a clinical trial without random assignment: Individuals were assigned to distinct treatment groups and followed for a defined period of time. Thirty-eight percent of members had more than one episode of treatment. All episodes were included in the study, except those that were already under way in January 2003.

Some physicians use buprenorphine only for detoxification, which takes about fourteen days.[16] Because these cases could not be distinguished from those where longer-term opioid substitution therapy was intended but terminated shortly after treatment began, we conducted separate analyses with different beginning dates. The first analysis, combining short-term-only and maintenance patients, began in the month in which treatment started. The second analysis, eliminating short-term patients, began in the month following treatment initiation (month 2).

Both analyses followed MassHealth members for a full six months. We chose a six-month observation period because the average buprenorphine and drug-free treatment episodes were three months and two months, respectively. Cumulative spending and outcomes would be larger if patients were followed for a longer period; however, we would be less confident in attributing these outcomes to the original treatments.

We experimented with various solutions to the problem of biased selection, which may occur in the absence of random assignment. Controlling for a number of potential differences that could be measured with available data, we used propensity score matching,[17] repeated measures regression, and generalized estimating equations—all of which yielded similar results. For simplicity, we report findings from generalized estimating equations.

Access to data was granted by the Massachusetts Executive Office of Health and Human Services. The study was approved by the University of Massachusetts Medical School's Institutional Review Board.

LIMITATIONS A key consideration in this study is whether any unobserved differences in the characteristics of buprenorphine, methadone, and drug-free treatment users influenced spending and outcome measures. We were able to control for a number of important factors, such as various comorbidities, overall illness burden, and prior treatment, but it is conceivable that unmeasured factors such as motivation or family support were different across treatment groups. We cannot rule out the possibility of selection bias. However, results of our treatment comparisons are largely consistent with randomized clinical trials comparing buprenorphine, methadone, and drug-free treatment, which suggests that any remaining bias is minimal.

The administrative data used for this analysis did not allow us to define precisely the type of drug-free treatment received. It is likely that some forms may have been more effective than others. Also, our analysis was limited to Medicaid expenditures. A small number of members may also have accessed services funded separately by the Massachusetts Bureau of Substance Abuse Services; if so, this spending was not captured in our data. Finally, several studies have shown that treatment for opioid addiction reduces criminal justice involvement and spending.[18–21] From a societal perspective, our analysis almost certainly underestimates the economic benefits of effective treatment in this larger sense.

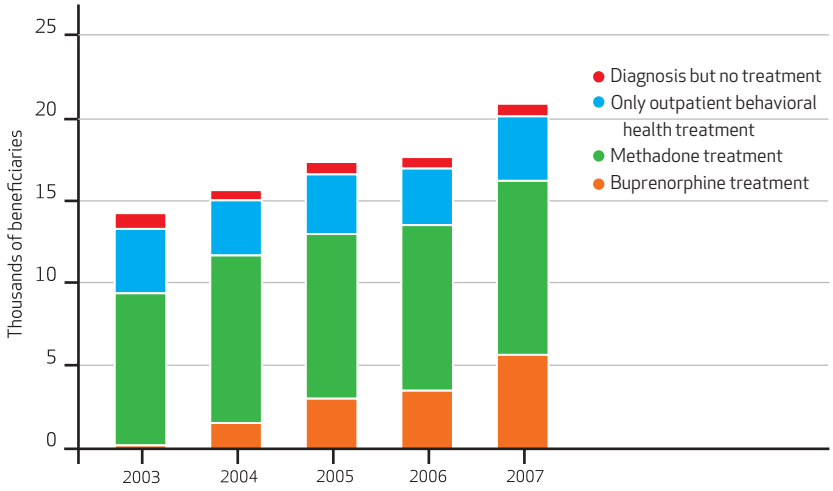
Study Results

We identified 33,923 MassHealth members who had a diagnosis of opioid dependence between January 1, 2003, and December 31, 2007, representing 53,557 treatment episodes. During that period the number of members with opioid dependence grew by 6,601: from 14,237 in 2003 to 20,838 in 2007. We found no evidence of Medicaid-funded addiction treatment for 1,955 (5.8 percent) of the 33,923 members with an opioid dependence diagnosis.

An increasing number of MassHealth members received buprenorphine treatment in the years following its introduction in 2003 (Exhibit 1). By 2007, 27.3 percent of the 20,838 members with opioid dependence were treated with buprenorphine at some point during the year. The numbers of members using other modalities remained approximately constant, with a small increase in methadone maintenance. Thus, most of the growth in opioid addiction treatment appears to be related to buprenorphine availability.

EXHIBIT 1

Opioid Addiction Treatment Among MassHealth Beneficiaries, 2003–07



SOURCE Authors' analysis of MassHealth claims. **NOTES** Each bar indicates the total number of individuals with an opioid dependence diagnosis during a given year. Individuals may be counted in multiple years.

Exhibit 2 describes characteristics of each treatment group. Those receiving opioid substitution therapy had a slightly higher overall illness burden than those who used only drug-free treatment, which suggests that more high-cost conditions are present in the opioid substitution group.

SPENDING Unadjusted results including the month of treatment initiation showed slightly higher spending for buprenorphine than methadone (Exhibit 3). Total expenditures associated with both forms of opioid substitution therapy were lower than those for drug-free treatment but slightly higher than for no treatment. Results were similar when short-term cases were eliminated. When episodes began in the second month, spending was lower for all groups, but particularly for the no-treatment group.

After adjusting for differences in characteristics of patients who entered the various treatments (Exhibit 4), spending for methadone patients was not significantly higher than for buprenorphine patients when episodes included short-term use ($29 more per month, $p = 0.07$). Methadone patients were significantly more

EXHIBIT 2

MassHealth Patients' Characteristics, By Types Of Treatments For Opioid Dependence At Initial Enrollment

	Treatments for opioid dependence			
Characteristics	**Buprenorphine (*n* = 10,248)**	**Methadone (*n* = 16,691)**	**Drug-free (*n* = 13,768)**	**None (*n* = 1,955)**
Sex				
Female	43%	42%	43%	34%
Male	57%	58%	57%	66%
Age in years, mean (SD)	33.6 (9.9)	33.9 (9.7)	34.0 (9.9)	34.6 (10.6)
White race	66%	64%	63%	50%
Dual-eligibility	7%	2%	<1%	0%
Plan type				
Managed care	25%	28%	24%	38%
Primary care clinician plan	58%	64%	66%	45%
Fee for service	17%	8%	10%	17%
Overall Illness Burden, CDPS score, mean (SD)	0.79 (0.90)	0.82 (0.91)	0.65 (0.79)	0.64 (0.77)
No. of mental health comorbidities, mean (SD)	1.26 (1.37)	1.02 (1.28)	1.68 (1.50)	0.54 (1.01)
No. of physical comorbidities, mean (SD)	0.56 (0.91)	0.58 (0.93)	0.68 (0.99)	0.51 (0.96)
Percentage receiving other treatments, 2003–07[a]				
Methadone	34%	100%	24%	0%
Buprenorphine	100%	21%	21%	0%
Drug-free	28%	20%	100%	0%
Medicaid coverage in the 12 months prior to treatment initiation				
12 months continuous	66%	56%	66%	62%
9–11 months	18%	20%	17%	14%
1–8 months	15%	21%	16%	24%
0 months	<1%	3%	<1%	<1%

SOURCE Authors' analysis of MassHealth claims. **NOTES** Statistical tests for differences were not conducted, as these are partially overlapping groups. Total number of patients including overlap is 42,662; total unique patients is 33,923; total number of treatment episodes is 53,557. SD is standard deviation. CDPS is chronic illness and disability payment system. [a]"Other treatment" categories are not mutually exclusive.

EXHIBIT 3

Medicaid Spending, Number Of Relapse Events, And Death Within Six Months Of Treatment Initiation Among MassHealth Patients

	Including short-term use				Maintenance treatment			
Characteristics	**Buprenorphine**	**Methadone**	**Drug-free**	**None**	**Buprenorphine**	**Methadone**	**Drug-free**	**None**
No. of patients	10,248	16,691	13,768	1,955	9,927	16,458	13,513	1,402
No. of episodes	12,528	20,062	19,012	1,955	12,098	19,721	18,553	1,402
Monthly Medicaid expenditure per person[a]	$1,220	$1,159	$1,516	$1,087	$1,101	$1,135	$1,292	$734
No. of relapse events[b]	46	28	71	140	33	19	57	29
No. (percent) of deaths	29 (0.28%)	55 (0.33%)	83 (0.60%)	14 (0.72%)	31 (0.31%)	54 (0.27%)	84 (0.45%)	12 (0.86%)

SOURCE Authors' analysis of MassHealth claims. [a]Inflation-adjusted to 2007 dollars using the Medical Care Component of the Northeast Region Consumer Price Index. [b]Per 1,000 member-months.

costly when episodes began in the second month ($111 more per month, $p < 0.001$). Spending was significantly higher for methadone patients when dollar values were logarithmically transformed to reduce the influence of unusually expensive cases on overall results.

Results of the comparison between buprenorphine and drug-free treatment were mixed, with significantly higher spending for drug-free treatment using raw dollars and a nonsignificant trend toward lower expenditures in log-transformed models. No treatment was significantly more expensive than buprenorphine when episodes included short-term use and was less expensive in the model excluding short-term use. (Exhibit 4).

RELAPSE-RELATED EVENTS Frequency of relapse events, such as hospitalizations, emergency department visits, and detoxifications, was lower for methadone than buprenorphine, regardless of whether an episode included short-term use of buprenorphine. Patients enrolled in drug-free treatment experienced significantly more relapse events than either opioid substitution treatment group. Relapse events were highest in the no-treatment group when the observation period began during the month in which the index diagnosis first appeared, but were lower than in the buprenorphine group when the period began with the month after identification.

Multivariate findings were consistent with the unadjusted results. As shown in Exhibit 5, odds of relapse-related events were 28 percent lower for methadone than for buprenorphine patients (0.72 compared to 1.00), 25 percent higher for drug-free patients (1.25 compared to 1.00), and almost three times higher for the no-treatment group than for buprenorphine patients. Differences between buprenorphine and no treatment were reversed in the model excluding short-term use of buprenorphine. Members receiving no

EXHIBIT 4

Medicaid Spending Per Person Per Month For Different Treatment Groups Within Six Months Of Treatment Initiation, MassHealth Patients

	Total Medicaid spending					
	Including short-term use (*n* = 53,544)			Maintenance treatment (*n* = 51,362)		
Number of episodes, by treatment group	**Expenditure per person per month ($)[a]**	**95% CI**	***p* value**	**Expenditure per person per month ($)[a]**	**95% CI**	***p* value**
Buprenorphine (reference)	1.0	—	—	1.0	—	—
Methadone	28.7	(−2.6, 60.1)	0.07	110.8	(77.9, 143.7)	<0.001
Drug-free	50.0	(12.7, 87.3)	0.01	−14.8	(−53.6, 24.0)	0.45
None[b]	148.5	(46.3, 250.8)	<0.001	−137.3	(−250.8, −23.7)	0.02

SOURCE Authors' analysis of MassHealth claims. **NOTE** CI is confidence interval. [a]Beta coefficients from regression analysis on total Medicaid spending using generalized estimating equations. Adjusted for age; sex; illness burden; race; number of co-occurring mental disorders and physical disorders; dual Medicare coverage; Medicaid plan type (fee-for-service, managed care, primary care clinician plan); and previous treatment episodes with buprenorphine, methadone, and drug-free modalities. All coefficients are in comparison to buprenorphine; for example, 28.7 = 28.70 more spending per month than buprenorphine. [b]For the no-treatment (none) group, maintenance treatment refers to the six-month period beginning one month after diagnosis. Patients did not receive maintenance treatment. Full results of the model are available in the online Appendix. (To access the Appendix, click on the Appendix link in the box to the right of the article online.)

EXHIBIT 5

Deaths And Relapse-Related Service Use For Different Treatment Groups Within Six Months Of Treatment Initiation, MassHealth Patients

No. of episodes, by treatment group	Relapse-related use						Deaths					
	Including detoxification-only use (*n* = 53,544)			Maintenance treatment (*n* = 51,385)			Including detoxification-only use (*n* = 53,544)			Maintenance treatment (*n* = 51,385)		
	Odds ratio	95% CI	*p* value	Odds ratio	95% CI	*p* value	Odds ratio	95% CI	*p* value	Odds ratio	95% CI	*p* value
Buprenorphine (reference)	1.0	—	—	1.0	—	—	1.0	—	—	1.0	—	—
Methadone	0.72	0.67, 0.78	< 0.001	0.68	0.62, 0.74	< 0.001	0.91	0.60, 1.38	0.65	0.83	0.55, 1.26	0.39
Drug-free	1.25	1.17, 1.34	< 0.001	1.3	1.20, 1.40	< 0.0001	1.75	1.14, 2.67	0.01	1.52	1.00, 2.30	0.05
None[a]	2.97	2.63, 3.35	< 0.001	0.77	0.62, 0.96	0.02	2.25	1.12, 4.52	0.02	2.52	1.22, 5.24	0.01

SOURCE Authors' analysis of MassHealth claims. **NOTES** Adjusted for age; sex; illness burden; race; number of co-occurring mental disorders and physical disorders; dual Medicare coverage; Medicaid plan type (fee-for-service, managed care, primary care clinician plan); and previous treatment episodes with buprenorphine, methadone, and drug-free modalities. [a]For the no-treatment (none) group, maintenance treatment refers to the six-month period beginning one month after diagnosis. Patients did not receive maintenance treatment. Full results are available in the online Appendix. (To access the Appendix, click on the Appendix link in the box to the right of the article online.)

treatment had about 23 percent lower odds than buprenorphine patients of relapse in analyses beginning in the month after the initial diagnosis.

MORTALITY Six-month mortality rates were 23–26 per 10,000 buprenorphine patients, 26–27 per 10,000 methadone patients, 44–45 per 10,000 drug-free patients, and 72–86 per 10,000 patients who received no treatment.

After adjustment for confounders, odds of death were 75 percent higher among drug-free treatment patients than buprenorphine patients when short-term use was included and 52 percent higher ($p < 0.05$) in long-term use. Members without treatment had 2.2 to 2.5 times higher odds than buprenorphine patients of dying during the six months after identification. There was no significant difference in odds of death between buprenorphine and methadone patients.

Discussion

After adjustments for confounding factors, total health care spending for patients using buprenorphine treatment were slightly lower than for methadone, despite more frequent relapse events for buprenorphine. Longer and more expensive hospital stays among methadone patients accounted for the largest portion of the difference. Spending for the drug-free and no-treatment groups were highly skewed but significantly less than for buprenorphine after logarithmic transformation to approximate a normal distribution.

Patients using drug-free treatment had relapse events more often than those using buprenorphine. Also, patients entering either type of opioid substitution therapy were less likely to die during the six-month observation period than patients using drug-free treatments. Patients who received no treatment were at the greatest risk of death in the six months following identification.

Inconsistent findings for the no-treatment group in the analyses including and excluding short-term treatment may be due to a number of factors. For example, some patients could have become abstinent after a life-threatening relapse or overdose event, thus using less treatment. Others may have spent time in prison, where services are not Medicaid reimbursable. Still others may have become homeless. The lower spending and relapse rates observed in this group do not necessarily mean that its members fared better than those receiving treatment. The substantially higher death rates suggest that many in this group were in poor health and, possibly, underusing health care.

These findings were robust to various model specifications and statistical approaches. Trends remained the same when the observation period was extended to twelve months.

During the period covered by this study, buprenorphine/naloxone (Suboxone) was under patent protection. Patent protection for Suboxone has expired, but no generic version has been introduced to date. If one were introduced in the future, it would be likely to lower the cost of buprenorphine treatment, making the drug significantly less expensive than methadone and, possibly, less costly overall than drug-free treatment.

Policy Significance

BUPRENORPHINE VERSUS METHADONE Annual spending per person for buprenorphine was

$1,330 lower than methadone when both were used in maintenance treatment and was not significantly different when short-term use was included. Thus, the perception that savings can be obtained by restricting access to buprenorphine is not supported by this analysis. Further, unrestricted access to buprenorphine treatment does not seem to increase Medicaid enrollment, because the majority of patients receiving buprenorphine treatment were already MassHealth members in the twelve months prior to treatment initiation.

The fewer relapse events observed for methadone patients than for buprenorphine patients is consistent with clinical trials. This suggests that methadone has some clinical advantages, including the greater likelihood that patients will stay in treatment.[4,6] These advantages must be weighed against the additional expense and, perhaps more important, the feasibility of switching from one treatment to another. Given differences in the underlying characteristics of buprenorphine and methadone users and the increased likelihood of relapse during a treatment transition, it may be difficult or even risky to induce buprenorphine patients to switch to methadone or vice versa. Only 15 percent of patients switched from one form of opioid substitution therapy to another during the study period.

BUPRENORPHINE VERSUS DRUG-FREE TREATMENT Average spending in the drug-free treatment group was lower than in the buprenorphine or methadone groups after adjusting for confounders; however, higher relapse and death rates suggest that it was less effective and riskier than opioid substitution therapy. These differences are consistent with other studies[21,22] and may be partially explained by shorter duration of treatment—most drug-free patients dropped out of treatment in the first two months—compared with buprenorphine, for which the average length of treatment was three months (including short-term cases), and methadone, for which average treatment length extended to eleven months.

Given the potential cost in human life, drug-free treatment does not appear to be a viable alternative for opioid dependent patients, although it is effective for other forms of substance abuse.

OPIOID SUBSTITUTION THERAPY VERSUS NO TREATMENT The no-treatment group was at significantly greater risk of death during the six-month follow-up period than patients using buprenorphine or methadone. Other studies have found significantly higher mortality rates for opioid-dependent individuals who drop out of treatment.[23]

Findings for relapse were mixed due to the concentration of relapse events during the first month of the observation period. Many relapse events in the no-treatment group occurred as the result of a hospitalization or emergency department visit during the first month, which suggests the existence of a crisis related to an overdose or similar life-threatening event. Afterward, spending was significantly lower than for the opioid substitution therapy groups. This suggests that the no-treatment group was not firmly engaged with the health care system. However, relapses after the first month were more frequent in the no-treatment group than in medication-assisted groups.

Conclusions

Evidence does not support the belief that restricting access to buprenorphine lowers Medicaid expenditures or reduces mortality. Spending could actually increase if treatment shifted from buprenorphine to methadone, while a similar shift to drug-free treatment might increase relapse events and deaths. The relatively small proportion of patients who switched from one type of treatment to another suggests that patients and providers have distinct treatment preferences, or that barriers such as fear of experiencing withdrawal or difficulty in finding an alternative provider impede easy transitions from one treatment to another. Patients who find it difficult to access buprenorphine might not readily shift to methadone or drug-free treatment.

Although further studies measuring the impact of policies that restrict access to buprenorphine are needed, this analysis suggests that significant reductions in its use could have the unintended effect of increasing costs. Also, if it reduces overall use of opioid substitution therapy, a policy restricting buprenorphine use might also contribute to higher mortality among Medicaid beneficiaries with opioid addiction.

Finally, this analysis shows the importance of considering a broad range of costs and outcomes when attempting to implement targeted cost reductions. Failing to consider the impact of medications or other expensive treatments on total health care spending and outcomes could have the unintended effect of increasing costs and placing patients at greater risk. ■

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In *Health Affairs* this month, Robin Clark and colleagues report on how they mined Massachusetts Medicaid data to explore the relative costs and benefits of buprenorphine. The drug is a relatively new treatment for opioid addiction that, under federal law, may be prescribed to patients on an outpatient basis and taken at home. In contrast, methadone must be taken in clinics, an arrangement that some patients find inconvenient and stigmatizing.

Many states have restricted the use of buprenorphine for Medicaid patients out of the belief that it is more expensive than methadone. Yet Clark's team found that although buprenorphine costs more per dose, it is actually cheaper than methadone in the long run because its use leads to shorter and less frequent hospitalizations. The two medications had similar mortality rates and were both far better options than drug-free treatment.

"Our paper shows that the cost concerns aren't so valid if you look at everything you're spending," says Clark, adding that buprenorphine has expanded access to treatment by drawing large numbers of working people.

Clark is an associate professor of family medicine and community health and of quantitative health sciences at the University of Massachusetts (UMass) Medical School. He is also director of research and evaluation at UMass's Center for Health Policy and Research, where he studies the economic aspects of health care interventions and policies. He focuses mainly on underserved populations, analyzing treatment patterns and costs of mental illness and substance abuse disorders among Medicare beneficiaries. Before coming to UMass in 2003, he was an associate professor of psychiatry and community and family medicine at Dartmouth Medical School.

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