Role of State Policies in the Adoption of Naltrexone for Substance Abuse Treatment

Carolyn J. Heinrich and Carolyn J. Hill

Objective. To examine state policies associated with adoption of a pharmaceutical agent—naltrexone—by substance abuse treatment facilities to treat alcohol-dependent clients.

Data Sources. Facility-level data from the 2003 National Survey of Substance Abuse Treatment Services, and state-level data on policy and environmental factors from publicly available sources.

Study Design. We use facility- and state-level data in a cross-sectional, multilevel model to analyze state-level policies that are associated with treatment facilities' naltrexone adoption.

Data Collection/Extraction Methods. The analysis uses survey data.

Principal Findings. State Medicaid policies supporting the use of generic drugs, reducing drug costs, and permitting managed care organizations to establish policies encouraging use of generics were associated with higher odds of naltrexone adoption (by up to 96 percent). State policies limiting access to pharmaceutical technologies through Medicaid preferred drug lists, restricting access to pharmacy networks, and imposing general limitations on use of Medicaid benefits for rehabilitation for substance abuse treatment were associated with reduced odds of naltrexone adoption.

Conclusions. Policy levers that are available to state governments are associated with the adoption of pharmaceutical technologies such as naltrexone that could help meet widespread need for access to clinically proven and cost-effective treatments for substance abuse.

Key Words. State policies, multilevel modeling, alcohol dependence, pharmacotherapies, naltrexone

The development of pharmaceutical agents to quell cravings has the potential to expand access to substance abuse treatment and improve treatment quality for alcohol and drug-dependent individuals. An estimated 19 million individuals (approximately 8 percent of the U.S. population) meet standard diagnostic criteria for an alcohol use disorder, but just 2.4 million seek treatment

and only 139,000 receive medication to treat the problem (Medical News Today 2005; McLellan 2006). Because public programs account for the majority of spending on substance abuse treatment through Medicaid and block grants, the incentives these policies create are central to understanding pharmaceutical adoption decisions and usage rates.

State governments have much at stake in designing effective incentives and removing barriers to the use of proven treatments. The direct and indirect costs of alcoholism cost approximately \$185 billion per year. On average, states spend about \$1 of every \$7 of total spending on programs related to substance abuse and its consequences (National Center on Addiction and Substance Abuse 2001). Yet typically, <5 percent of these expenditures is spent on prevention, treatment, and research; the remainder is spent primarily on incarceration, hospital care, child neglect, poverty, and other social problems associated with substance abuse.

Substance abuse treatment is provided primarily through specialty sector programs that are largely funded through federal block grants to states and beget myriad reimbursement arrangements. As health care costs have risen, the efforts of governments and employers to reduce costs through managed care have disproportionately fallen on addiction treatment (McLellan 2006). States have responded to increasing drug costs by adopting policies that limit pharmaceutical use and increase cost sharing for Medicaid enrollees. In the face of declining overall budgets, both the number of substance abuse treatment programs and the number of patients have dwindled (Soumerai 2004; McLellan 2006).

Our research focuses on a pharmaceutical agent used in addiction treatment: naltrexone,¹ which was approved in 1994 by the Food and Drug Administration as an adjunct to the treatment of alcohol dependence. Naltrexone blocks alcohol-induced stimulation of endogenous opioids, dulling the “high” feeling produced by alcohol. Evidence from clinical trials has confirmed its effectiveness in reducing alcohol abuse, lowering relapse rates, and improving treatment outcomes (Fuller and Gordis 2001; Morris et al. 2001; Kosten and O'Connor 2003; Anton et al. 2006; McLellan 2006). For example, Morris et al. (2001) reported that the mean time to relapse drinking was 6.7 weeks for patients receiving naltrexone, compared with 4.2 weeks for those receiving a

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placebo. Another study (Anton et al. 2006) found that among patients receiving medical management (but no cognitive behavior intervention), patients receiving naltrexone were abstinent 80.6 percent of the days in the 16-week treatment program, compared with an abstinence rate of 75.1 percent for those receiving a placebo (an effect size of 0.22).

Importantly, naltrexone may be as effective when prescribed by physicians in primary care settings as in specialized treatment settings (O'Malley et al. 2003), and a recent randomized-controlled trial (Anton et al. 2006) found that naltrexone was equally effective alone (in the presence of medical management) as combined with behavioral therapies. An estimated 16–30 percent of primary care patients are problem drinkers (O'Malley et al. 2003); thus, the ability to expand treatment options and increase access to treatment through primary care providers is a potential benefit of naltrexone.

As a generic drug with no close therapeutic substitutes in the treatment of alcohol dependency, naltrexone should be a widely available treatment option. The formularies of most public and private sector managed care organizations (MCOs) provide blanket coverage of generics.² Yet estimates of naltrexone prescription rates are low, ranging from 2 to 13 percent among the alcohol dependent in specialty treatment settings. Even lower use rates are exhibited among the wider population of adults meeting criteria for alcohol abuse or dependence (Mark et al. 2003; Harris and Thomas 2004). The decision to prescribe naltrexone is ultimately made by a physician or other medical staff in treatment facilities with prescribing privileges. Although the supply of naltrexone may be relatively unrestricted, these treatment decisions may also be influenced by demand-side strategies for limiting use such as copayments, quantity limits, or prior authorization. Both researchers and treatment professionals have pointed to the central role that these policies likely play in the decisions of treatment facilities to integrate naltrexone into treatment programs or individual physicians to prescribe naltrexone. The National Academy of Sciences Committee on Immunotherapies and Sustained-Release Formulations for Treating Drug Addiction (Harwood and Myers 2004) advised that in addition to clinicians' acceptance of new pharmacotherapies in either specialty or primary care settings, these pharmaceutical agents will only be effective to the extent that "their use is facilitated through adequate financing, organizational structures, and community support."

With data assembled on state policies, linked with data from the National Survey of Substance Abuse Treatment Services (N-SSATS), we test hypotheses about the relationships of state- and facility-level factors to

naltrexone adoption. We focus on state strategies aimed at limiting the costs or use of pharmacotherapies and other treatment services.

LITERATURE REVIEW

In exploring the puzzling gap between naltrexone's potential for effective treatment of alcohol dependency and its low use rates, researchers have focused primarily on treatment facility characteristics and clinician attitudes.

Roman and Johnson (2002) used information obtained through interviews with administrators and clinical directors in approximately 400 private sector drug and alcohol treatment centers. Their multivariate analysis found that naltrexone adoption was positively associated with the percentage of managed care patients and relapsed patients on the caseload, facility age, administrators' years of experience in the treatment field, and the percentage of counselors who had at least a master's degree.

Forman, Bovasso, and Woody (2001) reported findings from a 1999 survey of over 300 physicians, counselors, and other staff members in 50 addiction treatment programs in three states. Almost half the respondents were "unsure" about whether they would increase the use of naltrexone in the treatment program, while 13 percent did not support its continued use. In interpreting these results, the authors noted that staff members' views could have been influenced by their lack of knowledge about naltrexone and raised the possibility that lack of exposure to naltrexone was due in part to its exclusion from local insurance formularies.

Thomas et al. (2003) distributed a mail survey to substance abuse treatment center clinicians in 1999 in three states. For physician respondents, patient characteristics and physician training experiences were significant predictors of the decision to adopt naltrexone. For nonphysician respondents, organization and financing factors played a stronger role in their decisions to recommend naltrexone.

Other surveys of physicians specializing in substance abuse (Mark, Kranzler, and Song 2003; Mark et al. 2003) found that almost all respondents had heard of naltrexone and provided a relatively accurate estimate of its effect size. Almost two-thirds of physicians indicated that insurance coverage of the medication positively influenced their decisions to prescribe naltrexone. Physicians also reported, however, that a need for additional education about medication was a potential barrier to their prescription. Miller et al. (2001) and Thomas and McCarty (2004) concluded that both cost (the lack of parity in

reimbursement) and the paucity of substance abuse-related training offered in medical schools were important factors limiting primary care physicians' treatment of alcoholism and inhibiting the integration of alcohol and drug treatment with primary care and general health services.

In summary, the existing literature on naltrexone adoption focuses on program/client-level factors and draws primarily on attitudinal data from physicians and clinicians. While these are important elements of the adoption decision, additional policy-level and program-level variables remain largely unexplored.

Public expenditures on substance abuse treatment through Medicaid and block grants and additional state spending on direct treatment and related services (National Center on Addiction and Substance Abuse 2001) account for the majority of spending on addiction treatment. Thus, incentives that state-level financing policies and regulations present for naltrexone adoption may be crucial to explaining the gap between research knowledge about the effectiveness of naltrexone and its low usage rates. States exercise their available discretion in Medicaid programs, for example, by charging copays, contracting with managed care programs, and imposing prescription limits (Harris and Thomas 2004). Further, the terms by which state Alcohol and Other Drug (AOD) agencies provide funding for substance abuse treatment for persons not covered by Medicaid or other insurance and the types of services they fund vary across states (Drake et al. 2001). Goldman et al. (2001) note that Medicaid coverage is critical to making services available, and Simpson (2002) and Galanter et al. (2000) likewise conclude that managed care and related economic pressures are heavily influencing treatment practice.

DATA

We use data on all public and private facilities that provide substance abuse treatment from the 2003 N-SSATS, which includes data on 13,623 treatment facilities (a 95.9 percent facility response rate). Our analysis is restricted to the 13,290 facilities with information on naltrexone adoption that could be matched with a state identifier. Table 1 presents descriptive statistics on the facility-level variables used in the analysis.

We have also assembled a rich array of state policy variables and other relevant data for the 50 states and the District of Columbia. Descriptive statistics for these measures and the sources of these publicly available data are shown in Table 2.

Table 1: Descriptive Statistics of Facility-Level Measures

<i>Facility-Level Measure</i>	<i>N</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Minimum</i>	<i>Maximum</i>
<i>Dependent variable</i>					
Adopted naltrexone	13,290	0.12	0.33	0	1
<i>Organizational structure/licensing/focus</i>					
For-profit	13,419	0.25	0.43	0	1
Nonprofit	13,419	0.60	0.49	0	1
Hospital in-patient SATX	13,419	0.07	0.26	0	1
No out-patient SATX	13,418	0.19	0.39	0	1
Nonhospital residential SATX	13,419	0.27	0.45	0	1
Affiliation w/hospital	13,411	0.15	0.35	0	1
Contracts w/MCOs for SATX	13,261	0.52	0.50	0	1
Licensed by Mental Health Department	12,651	0.35	0.48	0	1
Licensed by State SA Agency	13,014	0.84	0.37	0	1
Accredited by JCAHO	12,766	0.26	0.44	0	1
% of clients treated for alcohol abuse	13,419	23.01	23.19	0	100
Primary focus: general health care	13,409	0.27	0.44	0	1
Primary focus: mental health services	13,409	0.09	0.28	0	1
Primary focus: SATX/mental health mix	13,409	0.02	0.13	0	1
Primary focus: not SATX/MH/mix	13,419	0.29	0.45	0	1
<i>Financing</i>					
Does not use sliding fee scale	13,365	0.35	0.48	0	1
No fed/state/cty/local earmark funds	13,318	0.34	0.48	0	1
Does not accept state-financed health ins	12,009	0.60	0.49	0	1
Does not accept Medicaid	12,951	0.45	0.50	0	1
<i>Treatment Services</i>					
No relapse prevention groups	13,297	0.20	0.40	0	1
No aftercare counseling	13,317	0.22	0.42	0	1
No individual therapy	13,367	0.05	0.23	0	1
No case management services	13,419	0.31	0.46	0	1
No comprehensive SATX assess/diagnosis	13,386	0.07	0.25	0	1
No other social service assistance	13,339	0.45	0.50	0	1
Offers employment counseling and/or housing assistance	13,356	0.52	0.50	0	1
Operates an opioid treatment program	13,414	0.08	0.27	0	1

Note: Data from the National Survey of Substance Abuse Treatment Services (N-SSATS), 2003 (accessible from Inter-University Consortium for Political and Social Research).
MCO, managed care organization; SATX, substance abuse treatment.

METHODOLOGY

Researchers such as Etheridge et al. (1999) and Heinrich and Lynn (2002) have made the case for using multilevel modeling techniques to estimate the separate and combined influences of policy and program factors on treatment

Table 2: Descriptive Statistics of State-Level Measures

<i>State-Level Measure</i>	<i>Valid n</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Minimum</i>	<i>Maximum</i>
% of Medicaid enrollees in managed care	51	60.01	22.47	0	100
Medicaid enrollees per capita	51	0.14	0.04	0	0
Medicaid benefits for rehab—copay required	51	0.11	0.31	0	1
Medicaid benefits for rehab—SA limitations	51	0.61	0.68	0	2
Medicaid prescription drugs coverage limitations—quantity supplied	51	0.56	0.50	0	1
Medicaid prescription drugs—other coverage limitations	51	0.45	0.50	0	1
Medicaid policy: state preferred drug list	48	0.57	0.50	0	1
Medicaid policy: number of refills limited	48	0.54	0.50	0	1
Medicaid policy: fail first requirement	48	0.60	0.49	0	1
Medicaid policy: lower generic copays	48	0.38	0.48	0	1
Medicaid policy: generic rate paid for brand	48	0.62	0.48	0	1
Medicaid policy: generics on PDL/formulary	48	0.37	0.48	0	1
Capitated/MCO delivers Medicaid benefits	47	0.88	0.32	0	1
State includes Rx cost in MCO capitation rate	47	0.70	0.46	0	1
State permits MCO/PCCM to set policies regarding formulary/PDL	47	0.72	0.45	0	1
State permits MCO/PCCM to set policies regarding prior authorization	47	0.72	0.45	0	1
State permits MCO/PCCM to set policies encouraging generics	47	0.66	0.47	0	1
State permits MCO/PCCM to set policies restricting access to pharm network	47	0.38	0.49	0	1
Medicaid policy: MCO delivers Rx	47	0.66	0.47	0	1
Federal Medicaid assistance % (2002)	51	56.67	7.09	50	76
Medicaid benefits fee for service delivery	47	0.77	0.42	0	1
State discretionary funding for substance abuse treatment (per capita)	48	0.96	1.65	0	22
Substance abuse prevention and treatment block grant funding per capita	48	5.75	0.92	4	12
State discretionary funding for substance abuse prevention (per capita)	48	0.56	0.90	0	9
Number of state health care and public assistance firms per capita	51	2.51	0.26	2	4
% counties w/no primary care physician shortage	51	23.74	16.41	0	68
% counties w/no MH professional shortage	51	47.72	23.54	0	100

continued

Table 2. *Continued*

<i>State-Level Measure</i>	<i>Valid n</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Minimum</i>	<i>Maximum</i>
State public welfare expenditures per capita	51	0.22	0.35	0	3
% ages 26+ w/alcohol abuse/dependence	51	6.19	0.80	5	8
% ages 26+ needing but not receiving treatment for alcohol problems in past year	51	5.78	0.75	4	8
State population median age	51	36.14	1.93	28	40
% of state population in poverty, 2002– 2004 average	51	12.02	2.51	6	19
% of households with cash assistance income	51	2.67	0.86	1	8
Employment—population ratio	51	62.48	3.34	51	71
Mean number of weeks worked (past 12 months)	51	44.21	0.55	42	45
Unemployment rate (2003)	51	6.01	0.89	4	8
% of state population with high school education	51	84.14	3.62	77	91
% of state population uninsured, 2002–2004 average	51	14.95	3.65	8	25
State health care expenditures per capita	50	0.04	0.06	0	1
State hospital expenditures per capita	50	0.02	0.03	0	0

Data sources: Centers for Medicaid and Medicare Services (CMS), Substance Abuse and Mental Health Services Administration (SAMHSA), National Conference on State Legislatures, Kaiser Commission on Medicaid and the Uninsured, Bureau of Labor Statistics, National Center for Health Workforce Analysis, U.S. Census Bureau, Clinical Trials Network, National Institute on Drug Abuse, and the PhRMA Pharmaceutical Industry Profile.

MCO, managed care organization; PCCM, primary care case management.

processes or outcomes. We model the facility-level decision to adopt naltrexone as a function of facility characteristics at a first level (“level one”), and the variation between facilities in the decision to adopt naltrexone as a function of the state-level policy and environmental factors at a second level (“level two”).

We estimate generalized linear mixed models for a binomial outcome (where the adoption of naltrexone by a facility is coded as a “success”) using a random-intercept model specification. The *level-one submodel*, shown in equation (1), is estimated for the binomial outcome³ η_{ij} , where X_{1ij} – X_{nij} are n facility-level characteristics for facility i in state j :

$$\eta_{ij} = \beta_{0j} + \beta_{1j}X_{1ij} + \dots + \beta_{nj}X_{nij} \quad (1)$$

A *level-two submodel* is estimated simultaneously, using k state-level variables W_{1j} – W_{kj} for state j that are hypothesized to explain the variation in naltrexone adoption between states (as captured by the intercept of the

level-one submodel, β_{0j}):

$$\beta_{0j} = \gamma_{00} + \gamma_{01} W_{1j} + \dots + \gamma_{0k} W_{kj} \quad (2)$$

In the random-intercept model specification, all other coefficients in equation (1) are assumed to be fixed (i.e., the effects of these facility-level factors on naltrexone adoption do not vary across states $\beta_{1j} = \gamma_{10}, \dots, \beta_{nj} = \gamma_{n0}$).

Because multiple measures are available for some state-level constructs (e.g., health care capacity, poverty, and need), we used factor analysis to guide our initial level-two model specifications. We first identified conceptually related sets of variables, then used factor analysis to empirically confirm the intercorrelations and to identify distinct underlying constructs.⁴

Finally, we also control for other state characteristics (such as median age of the population, the extent of conservative versus liberal ideology in state government, and economic characteristics) that may be important to hold constant in discerning the effects of the key policy variables.

HYPOTHESES

Our hypotheses are based on theory and prior empirical work. Regarding facility-level factors, facilities that treat a higher percentage of patients for alcohol abuse; focus on substance abuse treatment, mental health, and/or general health care; or are affiliated with hospitals (i.e., with medical staff) will be more likely to adopt naltrexone. Facilities offering hospital in-patient or nonhospital residential substance abuse treatment should be more likely to adopt naltrexone than those facilities without the provision for more intensive treatment or privileges for writing pharmaceutical prescriptions. Facilities that do not accept state-financed health insurance or Medicaid will be less likely to adopt naltrexone. Prior research suggests that privately owned organizations are less encumbered by government prescription drug policies, yet private facilities (particularly for-profits) might also be more likely to limit payment arrangements compared with public providers. Because the concurrent provision of behavioral therapies is recommended with use of naltrexone, facilities offering various types of other therapies, counseling, aftercare, and supportive services (e.g., transitional and social services) will be more likely to prescribe naltrexone.

Regarding state-level factors, facilities will be more likely to adopt naltrexone as a pharmacotherapy if they are located in states with generics on the preferred drug list/formulary; with lower generic copayments; that allocate

greater shares of state discretionary budgets to substance abuse treatment; that have higher levels of expenditures on public welfare, health care, and hospitals; and that have higher levels of health care organizational capacity. Facilities will be less likely to adopt naltrexone if they are located in states with more restrictive preferred drug lists and other limitations on substance abuse treatment benefits (e.g., refills/quantity limits) or reimbursement, and with higher percentages of poor or uninsured. Many states control access to substance abuse treatment services through contracts with MCOs or primary care case management (PCCM). Because the implications of these contracts for access to pharmacotherapies are likely to be mixed depending in part on the policies they specify, we do not have specific expectations for the effects of utilizing these types of contracts.

RESULTS

In the 2003 N-SSATS, only 12.4 percent of the substance abuse treatment facilities had adopted naltrexone. Considerable variation exists across states in the percentage of facilities that adopted naltrexone, from 3.2 percent (Oklahoma) to 32.4 percent (Vermont). Furthermore, 16.2 percent of the total variation in facility-level decisions to adopt naltrexone is explained by their grouping within states ($p < .0001$), confirming the importance of modeling both facility- and state-level factors to explain facilities' naltrexone adoption.

Facility-Level Effects

Table 3 shows the results of the multilevel model estimation. Model 1 estimates equation (1) only, while Model 2 simultaneously estimates both equations (1) and (2). Facilities with a general health care focus or substance abuse/mental health mix in treatment are significantly more likely to adopt naltrexone than facilities focusing only on substance abuse treatment (odds ratios of $e^{(1.008)} = 2.74$ and $e^{(0.924)} = 2.52$, respectively) (top panel, Model 2, Table 3); in other words, the odds of prescribing naltrexone are 174 percent higher in facilities with a general health care focus than those focusing only on substance abuse treatment, and 152 percent higher for those with a substance abuse/mental health mix focus (*ceteris paribus*). Facilities with a hospital affiliation and those offering hospital in-patient substance abuse treatment also have higher odds of prescribing naltrexone (125 and 59 percent, respectively) than those without this type of access to medically trained staff. As expected, facilities that do *not* offer behavioral therapies and supportive services such as

Table 3: Multilevel Model Findings on Facilities' Adoption of Naltrexone

<i>Dependent Variable: Facility Adopted Naltrexone as Pharmacotherapy</i>						
<i>Independent Variables</i>	<i>Model 1 (N1 = 13,290)</i>			<i>Model 2 (N1 = 12,439, N2 = 47)</i>		
	<i>Coefficients</i>	<i>Standard Error</i>	<i>p-Value</i>	<i>Coefficients</i>	<i>Standard Error</i>	<i>p-Value</i>
<i>Facility-level variables</i>						
Intercept	-2.596	0.158	<.0001	-2.616	1.404	.073
Primary focus: general health care	0.949	0.311	.002	1.008	0.328	.002
Primary focus: mental health services	0.306	0.117	.009	0.428	0.121	.000
Primary focus: SATX/mental health mix	0.931	0.164	<.0001	0.924	0.173	<.0001
Primary focus: not SATX/MH/mix	-0.524	0.309	.090	-0.590	0.326	.071
Affiliation w/hospital	0.778	0.093	<.0001	0.811	0.096	<.0001
Hospital in-patient SATX	0.516	0.101	<.0001	0.465	0.106	<.0001
No out-patient SATX	-0.452	0.099	<.0001	-0.477	0.103	<.0001
Nonhospital residential SATX	0.238	0.084	.004	0.242	0.087	.005
No relapse prevention groups	-0.626	0.089	<.0001	-0.612	0.092	<.0001
No aftercare counseling	-0.227	0.082	.006	-0.251	0.084	.003
No individual therapy	-0.453	0.151	.003	-0.448	0.155	.004
No case management services	-0.167	0.069	.016	-0.197	0.071	.006
No comprehensive SA assess/diagnosis	-0.332	0.153	.029	-0.368	0.160	.021
No other social service assistance	0.004	0.072	.951	0.021	0.074	.775
Offers employment counseling and/or housing assistance	0.329	0.069	<.0001	0.344	0.071	<.0001
Accredited by JCAHO	0.622	0.078	<.0001	0.637	0.079	<.0001
For-profit	-0.242	0.103	.019	-0.250	0.106	.018
Nonprofit	-0.646	0.083	<.0001	-0.651	0.086	<.0001
Does not accept state-financed health insurance	-0.183	0.072	.011	-0.201	0.074	.007
Does not accept Medicaid	0.104	0.078	.180	0.143	0.080	.073
Contracts w/MCOs for SATX	0.556	0.067	<.0001	0.551	0.069	<.0001
Does not use sliding fee scale	0.240	0.067	.000	0.262	0.069	.000
No fed/state/cty/local earmark funds	0.288	0.071	<.0001	0.289	0.073	<.0001
Licensed by mental health Department	0.237	0.072	.001	0.233	0.074	.002
Licensed by state SA agency	-0.401	0.082	<.0001	-0.387	0.084	<.0001
% of clients treated for alcohol abuse	0.005	0.001	.000	0.005	0.001	.001
Operates an opioid treatment program	0.264	0.106	.013	0.230	0.108	.033
<i>State-level Medicaid/managed care policies</i>						
Medicaid benefits for rehab—SA limitations				-0.178	0.078	.031

continued

Table 3. Continued

<i>Dependent Variable: Facility Adopted Naltrexone as Pharmacotherapy</i>						
<i>Independent Variables</i>	<i>Model 1</i> (<i>N1 = 13,290</i>)			<i>Model 2</i> (<i>N1 = 12,439, N2 = 47</i>)		
	<i>Coefficients</i>	<i>Standard Error</i>	<i>p-Value</i>	<i>Coefficients</i>	<i>Standard Error</i>	<i>p-Value</i>
Medicaid policy: generics on PDL/formulary				0.365	0.115	.004
State permits MCO/PCCM to set policies encouraging generics				0.671	0.201	.003
Medicaid policy: state preferred drug list				− 0.241	0.118	.050
State permits MCO/PCCM to set policies restricting access to pharm network				− 0.647	0.175	.001
Capitated/MCO delivers Medicaid benefits				0.568	0.194	.007
Medicaid policy: MCO delivers Rx				− 0.665	0.202	.003
Medicaid policy: lower generic copays				0.122	0.120	.315
Medicaid policy: generic rate paid for brand				0.044	0.104	.678
<i>State-level capacity/financing and environment</i>						
Federal Medicaid assistance % (2002)				0.010	0.011	.378
State discretionary funding for substance abuse treatment (per capita)				− 0.007	0.029	.821
State public welfare expenditures per capita				0.690	0.232	.006
State health care expenditures per capita				− 2.359	1.139	.048
% counties w/no MH professional shortage				0.013	0.003	<.0001
% counties w/no primary care physician shortage				− 0.008	0.003	.012
State population median age				− 0.048	0.033	.159
% ages 26+ w/alcohol abuse/dependence				0.189	0.063	.006
% of state population in poverty, 2002–2004 average				− 0.040	0.023	.089
State government ideology index				− 0.004	0.002	.104
Goodness of fit: − 2 residual log likelihood	72,649.3			68,169.9		

MCO, managed care organization; PCCM, primary care case management; SATX, substance abuse treatment.

individual therapy, relapse prevention, case management, and aftercare have significantly lower odds of adopting naltrexone (a range of 18–46 percent lower odds). Facilities offering employment counseling and/or housing assistance and accredited by JCAHO have higher odds of adoption (41 and 89 percent, respectively), reflecting their more comprehensive care and services.

Private (for-profit or nonprofit) facilities are less likely to adopt naltrexone compared with public (federal, local, county, or community government) organizations in treating addiction; nonprofits have 48 percent lower odds and for-profits have 22 percent lower odds of adopting naltrexone compared with public organizations. Consistent with the findings on facility ownership, facilities that do not accept state-financed health insurance also have significantly lower odds (18 percent) of adopting naltrexone.

State-Level Effects

Among the nine state-level variables that measure state Medicaid and managed care policies limiting or facilitating the use of pharmaceutical technologies (or substance abuse treatment services/benefits more generally), seven have statistically significant associations with facilities' adoption of naltrexone ($p < .05$) (middle panel, Model 2, Table 3).⁵ The effects are consistent with the hypothesized relationships.

In general, state limitations on Medicaid benefits for rehabilitation services to support substance abuse treatment are associated with a 16 percent reduction in the odds of facilities' naltrexone adoption. State policies specifically addressing pharmaceutical use in addiction treatment have significant associations with naltrexone adoption: facilities in states that include generics on their preferred drug list/formulary, or that allow MCOs or PCCM providers to set policies encouraging the use of generic drugs have significantly higher odds of adopting naltrexone (44 and 96 percent higher odds, respectively). Conversely, those states that establish a preferred drug list, or that allow MCOs or PCCMs to restrict access to pharmaceutical networks have significantly reduced odds of adoption (by 21 and 48 percent, respectively). Although the delivery of Medicaid benefits more generally by MCOs is associated with increased odds of naltrexone adoption (by 76 percent), a specific role for MCOs in delivering pharmaceutical benefits is associated with reduced odds of adoption by 49 percent. These results suggest that the details of state–MCO contractual relationships and states' allowances for discretion in setting policies are crucial for understanding their implications for pharmaceutical technology adoption in addiction treatment.

As noted, approximately 16 percent of the total variation in facility-level adoption of naltrexone is due to facilities' grouping within states. An intermediate model (not presented here) using the base facility-level model (Model 1 in Table 3) and adding the nine state Medicaid/managed care policy variables just discussed explained 27.6 percent of the total variation between states in naltrexone adoption but between-state variation remained to be explained ($p = .0018$).

Measures of state-level capacity/financing of health care and substance abuse treatment services delivery and other state characteristics were included in the multilevel model as controls (last panel, Model 2, Table 3). Although state-level financing covariates (the share of Medicaid Assistance paid by the federal government and state discretionary funding per capita for substance abuse treatment) were not significant, higher state public welfare expenditures (in \$1,000) per capita were associated with a 99 percent increased odds of naltrexone adoption. The converse relationship was observed, however, for state health care expenditures per capita. Likewise related to capacity for delivery of substance abuse treatment services, adequate mental health professional staffing in counties was associated with naltrexone adoption: a one percentage point increase in counties with no mental health professional shortage was associated with a one percent increase in the odds of naltrexone adoption. The converse relationship emerges for primary care physician staffing.

A final set of variables in the multilevel model controlled for state-level environmental factors and population characteristics. One notable finding was the prevalence of alcohol abuse or dependence among adults age 26 and older: a one percentage point increase in adults with abuse or dependency problems was associated with 21 percent increased odds of facility naltrexone adoption. Together, the 19 state-level variables included in Model 2 explained 85.3 percent of the total between-state variation in naltrexone adoption; no statistically significant between-state variation in naltrexone adoption remained to be explained ($p = .1244$).

DISCUSSION

In attempting to explain the underutilization of clinically effective pharmaceutical agents in the treatment of alcohol and drug dependence, prior research has primarily focused on physician and treatment facility characteristics. Indeed, our multilevel analysis using the 2003 N-SSATS

data substantiated the importance of a number of structural and treatment focus/service characteristics of treatment facilities—including their focus on general health care, substance abuse, or mental health; affiliation with a hospital; the provision of hospital in-patient treatment and supportive services; licensing and accreditation; ownership and financing—on their likelihood of adopting naltrexone. For example, the larger association for nonprofits might reflect their lesser willingness (particularly those that are community-based, religiously affiliated, and/or staffed by ex-addicts) to employ pharmaceutical agents along with or instead of behavioral therapies or 12-step programs/support groups (Succi and Alexander 1999; Anderson and McDaniel 2000). The results confirming the role of organizational ties to hospitals, access to hospital in-patient substance abuse treatment, and foci on general health or mental health in increasing naltrexone adoption also lend support to prior research findings on the importance of access to medically trained staff and on-site prescribing privileges for the use of pharmaceutical technologies (Roman and Johnson 2002; Thomas et al. 2003; Harwood and Myers 2004; Thomas and McCarty 2004). Recent research employing a randomized controlled trial (Anton et al. 2006) reported that naltrexone was equally effective with or without combined behavioral interventions (such as intensive counseling delivered by treatment specialists). Yet our findings show that facilities that offer other behavioral interventions and comprehensive care services (individual therapy, aftercare counseling, relapse prevention groups, case management, and other support services) are significantly more likely to adopt naltrexone as a pharmacotherapy in addiction treatment.

Our multilevel model estimates indicate that both contracts with MCOs for substance abuse treatment (at the facility level) as well as contracts with MCOs to deliver Medicaid benefits (at the state level) were associated with the likelihood that treatment facilities adopted naltrexone. Perhaps the most important finding of this analysis, however, is that the particular specifications in these state contracts concerning the allocation of discretion to set policy details and the details of policies governing pharmaceutical use themselves were associated with facility naltrexone adoption. For instance, state Medicaid policies that support the use of generic drugs and reduce their costs and that also permit MCOs to establish policies that encourage the use of generics were associated with significantly higher odds of naltrexone adoption (by up to 96 percent). Conversely, state policies limiting access to pharmaceutical technologies through Medicaid preferred drug lists, restricting access to pharmacy networks, and imposing general limitations on the use of Medicaid benefits for rehabilitation for substance abuse treatment were associated with significantly

reduced odds of treatment facilities' adoption of naltrexone. Other aspects of state capacity for financing and supporting substance abuse treatment were also important predictors of naltrexone adoption, including state public welfare expenditures and adequate mental health professional staffing in counties. Overall, our analysis suggests that states do have at their disposal valuable policy levers for more aggressively promoting the adoption of pharmaceutical technologies such as naltrexone in addiction treatment.

CONCLUSIONS

A recent survey (Medical News Today 2005) by the Community Anti-Drug Coalitions of America (CADCA), including over 1,000 adults, 300 general practitioners, and 500 persons in recovery, reported that although the general public recognizes the serious impact of alcoholism on the daily lives of Americans, only a third of the CADCA survey respondents viewed alcoholism as a disease (rather than a moral deficiency). Consistent with this finding, a survey by the National Institute on Alcohol Abuse and Alcoholism found that just 5.8 percent of those who are diagnosed as alcohol dependent receive medication during treatment (NIH News 2004). Furthermore, approximately 33 percent of those who needed treatment (and recognized this need) but did not receive it cited cost or insurance problems as a barrier (U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Office of Applied Studies 2004). Thus, the potential for addressing an unmet need for access to a clinically proven and cost-effective treatment for alcohol abuse and dependence is considerable. Our research indicates that policy levers available to state governments may increase the adoption of pharmaceutical technologies such as naltrexone that would help to meet this need.

Rising state Medicaid costs (now the largest line item in many state budgets) are likely impediments to states' efforts to remove policy barriers to pharmaceutical technology adoption, however. One-third of the states instituted new or increased Medicaid copays in FY 2005 or FY 2006, and one half expanded their Medicaid managed care policies (Kouri and Dovey 2006). At the same time, the federal Deficit Reduction Act of 2005 has allowed states greater flexibility for modifying and managing their Medicaid programs, and as Kouri and Dovey point out, there is considerable room for improving Medicaid program administration and for eliminating skewed incentives. Given that federal officials have typically been reluctant to tread on

physicians'/clinicians' autonomy in determining the services made available to patients (Gerber and Patashnik 2006), increased discretion for states in managing these programs could allow for more substantive policy changes. In this regard, state policy makers may benefit from awareness of research findings showing that it is cost-effective for state health plans to cover comprehensive substance abuse treatment; for every \$1 invested in treatment, \$4–\$7 are returned in reduced drug-related crime and criminal justice costs, and adding health care-related savings increases this ratio of savings to costs to \$12:1 (U.S. Department of Health and Human Services, National Institutes of Health, National Institute on Drug Abuse 1999). In other words, contrary to recent state policy changes which have sought to limit pharmaceutical use and access to Medicaid benefits for substance abuse treatment and to increase cost sharing for Medicaid enrollees, states may achieve greater spending reductions if they increase access to comprehensive substance abuse treatment and pharmaceutical technologies such as naltrexone.

Finally, it is important to acknowledge some limitations of this research. First, this is a cross-sectional study that uses the natural variation across states to identify the effects of state policies on facilities' naltrexone adoption. If unobserved state characteristics are correlated both with included explanatory measures as well as with naltrexone adoption, then our estimates may be biased. Thus, the estimated effects should be viewed as associations (conditional on a number of facility and state characteristics), not as causal effects. Further, although the N-SSATS data are rich in terms of the substance abuse treatment facility characteristics, they do not include measures of staff education, training, tenure, and treatment philosophies, which have been shown by other research to be important to pharmaceutical adoption. It also would be ideal to have data on substance abuse treatment clients, although obtaining these data for the population of substance abuse treatment facilities in the N-SSATS would likely be impossible. Thus, an analysis that would bring in client-level information would likely limit the number of facilities and states that would be represented, implying a tradeoff in the study of the relationships at one level versus another. We also recognize that in some states, the county may also be a meaningful unit of analysis in terms of the role of policy and management factors, and we do not include county-level measures in this study. Acknowledging these limitations, the current study contributes new information to understanding levers that state policy makers may use to encourage the use of a clinically proven and cost-effective treatment for alcohol abuse and dependence.

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NOTES

1. ReVia was the brand name first approved for treating alcoholism by the FDA in 1994. The first generic equivalent, under the name "naltrexone," was approved in 1998.
2. Harris and Thomas (2004) report that three of the four largest pharmaceutical benefit managers include naltrexone on their standard formularies, and employers typically adopt these same provisions in their employee health plans.
3. The log of the odds of success for a binomial outcome variable is η_{ij} (the logit link function), defined as $\log[\phi_{ij}/(1 - \phi_{ij})]$.
4. For example, we identified seven variables that were related to Medicaid benefits for rehabilitation in each state, and two underlying factors (based on the variances and rotated factor loadings): rehab reimbursement methodology and rehab coverage limitations.
5. Other policy variables (e.g., copay requirements, quantity supply limits, and fail first requirements) tested in the models had estimated effects or *t*-ratios close to zero and reduced the model goodness of fit (assessed primarily by the covariance parameter estimates and -2 residual log likelihood values); these variables were not retained in the model.

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