The Transition to Medication Adoption in Publicly Funded Substance Use Disorder Treatment Programs: Organizational Structure, Culture, and Resources

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ABSTRACT. Objective: Medications for the treatment of substance use disorders (SUDs) are not widely available in publicly funded SUD treatment programs. Few studies have drawn on longitudinal data to examine the organizational characteristics associated with programs transitioning from not delivering any pharmacotherapy to adopting at least one SUD medication. **Method:** Using two waves of panel longitudinal data collected over a 5-year period, we measured the transition to medication adoption in a cohort of 190 publicly funded treatment organizations that offered no SUD medications at baseline. Independent variables included organizational characteristics, medical resources, funding, treatment culture, and detailing activities by pharmaceutical companies. **Results:** Of 190 programs not offering SUD pharmacotherapy at baseline, 22.6%

transitioned to offering at least one SUD medication at follow-up approximately 5 years later. Multivariate logistic regression results indicated that the employment of at least one physician at baseline, having a greater proportion of Medicaid clients, and pharmaceutical detailing were positively associated with medication adoption. **Conclusions:** Adoption of pharmacotherapy was more likely in programs that had greater medical resources, Medicaid funding, and contact with pharmaceutical companies. Given the potential expansion of Medicaid under the Affordable Care Act, patients served by publicly funded programs may gain greater access to such treatments, but research is needed to document health reform's impact on this sector of the treatment system. (*J. Stud. Alcohol Drugs*, 75, 476–485, 2014)

MEDICATIONS TO TREAT substance use disorders (SUDs) are not widely available within specialty SUD treatment programs in the United States except in those organizations that exclusively treat opioid dependence using methadone or buprenorphine (Oliva et al., 2011). This lacuna persists despite a strong base of scientific evidence supporting the effectiveness of these medications and significant federal efforts to promote their adoption (Litten et al., 2012; Martino et al., 2010; Saxon and McCarty, 2005). Low rates of adoption of SUD medications are particularly notable and have been repeatedly documented in the publicly funded sector of the U.S. treatment system (Ducharme et al., 2006; Knudsen et al., 2006, 2007, 2011). This sector consists of treatment organizations owned by state and local

governments as well as nonprofit organizations that primarily rely on governmental block grants and contracts (Roman et al., 2006).

Because these organizations deliver the majority of SUD treatment in the United States (Cartwright and Solano, 2003; Chiqui et al., 2008; Heinrich and Fournier, 2004), the limited adoption of pharmacotherapies for SUDs means that many patients have no access to these treatment alternatives that may enhance opportunities for recovery. With the public sector under greater influence from the forces supporting pharmacotherapy adoption (e.g., federal agencies), an increase in adoption might be expected, yet this has not occurred.

With the exception of methadone and buprenorphine, medications for SUDs (e.g., acamprosate, naltrexone, and disulfiram) can be freely adopted and used under physician supervision in specialty SUD treatment settings. Methadone has been tightly regulated and restricted to opioid treatment programs accredited by the federal Substance Abuse and Mental Health Services Administration (SAMHSA). Buprenorphine requires physicians to either meet credentialing requirements or complete an 8-hour training (Fiellin, 2007; West et al., 2004). Even with this regulatory requirement, rates of buprenorphine adoption in specialty SUD treatment are similar to those for the other medications, albeit still quite low (Abraham et al., 2013).

Studies on the availability of SUD pharmacotherapies in specialty treatment organizations have often focused on the

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diffusion of specific medications, such as buprenorphine, acamprosate, and naltrexone (Abraham et al., 2010, 2011; Ducharme et al., 2006, 2007; Friedmann et al., 2010; Koch et al., 2006; Oser and Roman, 2007, 2008; Roman et al., 2011; Savage et al., 2012; Thomas et al., 2003, 2008). In addition, research has considered the organizational factors associated with the availability of any type of SUD medication (Knudsen and Abraham, 2012; Knudsen et al., 2010, 2011), in part because the adoption of at least one medication is correlated with offering other pharmacotherapies (Fuller et al., 2005).

Rogers's (2003) diffusion theory offers a useful heuristic for conceptualizing the adoption of SUD medications within the specialty treatment system. Central to Rogers's theory is the concept of organizational compatibility, or the fit between an innovation and the organizational context (i.e., its organizational structure, culture, and resources). Prior research has pointed to the relevance of organizational structure, culture, and resources for the diffusion of pharmacotherapies. Organizational structure is often correlated with the quality of SUD treatment services (Alexander et al., 1998; Heinrich and Fournier, 2004; Heinrich and Hill, 2008; Rodgers and Barnett, 2000). Structural characteristics, such as location within medical settings (Abraham et al., 2013), accreditation (Knudsen and Abraham, 2012), and government ownership (Knudsen et al., 2010), tend to be positively correlated with medication availability in cross-sectional analyses.

Organizational compatibility also includes cultural elements, such as treatment philosophy, that may support or hinder the adoption of innovations (Rogers, 2003). SUD treatment organizations were once quite isomorphic in that nearly all endorsed a 12-step model of recovery (Roman et al., 2000; White, 1998), but this orientation is no longer ubiquitous (Knudsen et al., 2010). Findings regarding the relationship between endorsement of the 12-step model and medication adoption have been mixed, with some studies reporting a negative association (Friedmann et al., 2010; Oser and Roman, 2007, 2008), whereas others have found no relationship (Abraham et al., 2011, 2013; Knudsen et al., 2007). A related cultural orientation is the degree to which spirituality is emphasized as part of a program's treatment philosophy. A heavy emphasis on spirituality diverges from medicalized conceptualizations of SUDs and may be incompatible with the use of medications.

Given that integrating medications into SUD treatment has certain resource requirements, financial and human resources may enhance organizational compatibility and increase the likelihood of adoption. Funders of SUD treatment services vary in their provision of reimbursement for pharmacotherapy (Garfield et al., 2010; Kubiak et al., 2009; Thomas et al., 2011); thus, organizational compatibility is likely to be greater for organizations that are more reliant on certain types of funding, such as Medicaid, that may be

willing to support the costs associated with implementation. Organizational access to prescribing physicians is obviously essential to the use of SUD medications (Knudsen et al., 2007; Saxon and McCarty, 2005).

Even if resources are in place, medication adoption and implementation cannot occur without information dissemination (Rogers, 2003). Multiple stakeholders, including the National Institute on Drug Abuse, the National Institute on Alcohol Abuse and Alcoholism, and SAMHSA, have worked to disseminate evidence-based practices (EBPs) through websites, publications, and conferences (Martino et al., 2010; The Addiction Technology Transfer Center Network Technology Transfer Workgroup, 2011; Warren and Hewitt, 2010). State SUD authorities (SSAs; also known as single-state agencies) have been involved to varying degrees in promoting EBPs (Rieckmann et al., 2009, 2010), together with pharmaceutical companies holding active patents on these medications. Prior cross-sectional research has shown that pharmaceutical detailing is positively associated with the odds that SUD programs offer medications (Knudsen et al., 2010).

Despite the growing literature on the availability of medications in SUD treatment, there is a notable knowledge gap regarding the associations between organizational characteristics and actual adoption (i.e., the organizational transition from offering no pharmacotherapy to offering at least one medication). In this study, we specifically focused on modeling this transition using longitudinal data from a panel of publicly funded SUD treatment programs. By restricting the analysis to programs offering no medications at baseline, we are positioned to isolate the impact of baseline measures of organizational structure, financial and medical resources, culture, and reliance on different sources of information regarding treatment innovations on the likelihood that programs begin offering pharmacotherapy over time.

Method

Sampling and data collection

This panel of publicly funded SUD treatment organizations was established as part of the National Treatment Center Study in 2004–2006 using a two-stage process (Knudsen et al., 2010). First, U.S. counties were randomly selected within 10 population-based strata. All programs in those counties were identified using existing directories (e.g., SAMHSA's national directory, directories provided by SSAs). Programs were randomly selected for telephone screening within these strata to be proportionate to the U.S. population. Study eligibility was determined by three criteria: (a) being open to the general public (e.g., not being located in a Veterans Health Administration, military, or correctional facility), (b) offering a level of SUD treatment at least equivalent to structured outpatient programming

based on the American Society of Addiction Medicine's standards (Mee-Lee et al., 1996), and (c) receiving at least half of their past-year revenues from government block grants/contracts or reporting that at least half of patients' expected source of payment were from allocated public funds. Baseline data were collected in 2004–2006 during face-to-face interviews with administrators of 318 treatment organizations who consented to participate (response rate = 79.9%). Participating organizations received an honorarium of \$100. These baseline research procedures were approved by the Institutional Review Board of the University of Georgia.

In 2009–2010, this cohort of 318 treatment programs was re-contacted for follow-up data collection (Knudsen et al., 2011). Research staff attempted to contact all programs by telephone to determine whether they still delivered SUD treatment services. This process identified 27 organizations (8.5%) that no longer delivered any SUD treatment services. Administrators of the remaining 291 treatment organizations were mailed a packet containing a study description letter, informed consent forms, and the survey; a second packet was mailed after 6 weeks of nonresponse. If administrators did not respond to either mailing, they were contacted by telephone and invited to complete a telephone interview. After providing verbal consent, administrators were asked the same set of questions that had been previously mailed. Follow-up data were obtained from 250 treatment programs (response rate = 85.9%). Programs received an honorarium of \$50, regardless of mode of participation. An analysis of response bias indicated no differences in organizational characteristics between participating programs and those that refused to participate; the only detected difference was in ownership of participating programs and those that had closed between baseline and follow-up (Knudsen and Abraham, 2012). These procedures were approved by the institutional review boards of the University of Georgia and the University of Kentucky.

As described by Menard (2008), modeling change in a dichotomous outcome over time with two waves of data requires greater consideration of the type of change that is substantively of interest. Given the focus on medication adoption, the sample of programs was restricted to those that had adopted none of the SUD medications (i.e., buprenorphine, methadone, acamprosate, tablet naltrexone, or disulfiram) approved by the U.S. Food and Drug Administration (FDA) at the time of the baseline interview in 2004–2006 ($n = 243$). This subset represents those organizations for which transition to adoption was a possible outcome. Of the 243 baseline nonadopters, 22 organizations were closed at the time of follow-up, leaving 221 eligible organizations. About 86.4% ($n = 191$) of baseline nonadopters provided follow-up data; one program was excluded because of missing data on the dependent variable, leaving 190 programs for analysis.

Measures

The dependent variable of medication adoption was based on responses to two questions measured during follow-up data collection. First, administrators were asked, "Does this treatment organization prescribe or dispense any medications specifically for the treatment of substance use disorders or psychiatric conditions?" Affirmative responses resulted in a second question in which the administrator was asked to select from three mutually exclusive statements describing use of medications at the center: (a) "We prescribe medications to treat psychiatric conditions, but not substance abuse," (b) "We prescribe medications to treat substance abuse, but not psychiatric conditions," or (c) "We prescribe medications to treat both substance abuse and psychiatric conditions." For this study, medication adoption was defined as the latter two groups (coded 1). Programs that prescribed no medications or only prescribed psychiatric medications were considered nonadopters (coded 0) in this analysis. In addition, respondents were asked about the adoption of specific medications approved by the FDA for treating SUDs; medications exclusively used for detoxification (e.g., clonidine) were not measured.

All independent variables were drawn from the baseline data set. Measures of organizational structure included government ownership (1 = government owned, 0 = privately owned), location within a hospital setting (1 = hospital based; 0 = nonhospital), and accreditation by the Joint Commission, the Commission on Accreditation of Rehabilitation Facilities, or the Council on Accreditation (1 = accredited, 0 = not accredited).

Both detoxification and treatment services were measured at baseline. Administrators reported whether detoxification services were available within the treatment center (1 = offers detoxification, 0 = no detoxification services). A typology of levels of care differentiated organizations that offered only outpatient SUD treatment (reference category), exclusively offered inpatient or residential SUD treatment, or provided both outpatient and inpatient/residential SUD treatment.

Organizational culture was measured by two variables of treatment philosophy. Administrators were asked whether the treatment program was based on the 12-step model (1 = yes, 0 = no). A second measure asked administrators to rate the extent to which the program emphasized spirituality; responses to this item ranged from 0 representing *no extent* to 5 indicating *a very great extent*.

Measures of organizational resources encompassed indicators of staffing and funding sources. The number of counselors was included as an indicator of organizational size; this variable was natural log-transformed to adjust for skew. Access to physicians was measured by a typology of three mutually exclusive categories: having at least one physician on staff as an employee (i.e., on the center's pay-

roll), having no staff physicians but at least one physician on contract, or having neither staff nor contract physicians (reference category). Two indicators of program funding were measured. Administrators reported the percentage of clients for whom Medicaid was their expected primary source of payment. Then, administrators were asked about the percentage of clients covered by public funding that was not part of Medicaid or Medicare; these patients included those for whom treatment was supported by allocations from the state's federal block grant funding, contracts with criminal justice agencies, contracts with SSAs, and funding from local governments.

Three distinct sources of information about innovative treatment techniques were measured. Using a 6-point Likert scale (0 = *no extent*, 5 = *very great extent*), administrators were asked about the extent to which their program's information about treatment innovations came from pharmaceutical companies. Four items asked administrators to rate their program's reliance on information from federal agencies (e.g., National Institute on Drug Abuse, SAMHSA) to learn about treatment innovations (0 = *no extent*, 5 = *very great extent*), which were averaged to yield a mean scale (Cronbach's $\alpha = .70$). The role of the SSA in disseminating information on best practices in SUD treatment was measured by eight dichotomous indicators, which were summed (Cronbach's $\alpha = .81$).

Currently, SUD medications have been approved by the FDA to treat alcohol and/or opioid use disorders but not other substances (e.g., marijuana, stimulants). To control for the possibility that medication adoption is associated with patient diagnostic characteristics, three caseload composition measures were examined: the percentage of patients with alcohol abuse or dependence, the percentage with heroin abuse or dependence, and the percentage with prescription opioid abuse or dependence.

Statistical analysis

All analyses were conducted in Stata 12.1 (StataCorp LP, College Station, TX). Descriptive statistics were calculated for the study variables. The organizational characteristics of adopters and nonadopters were compared using chi-square and *t* tests, depending on the level of measurement.

To avoid the weaknesses of listwise deletion (Allison, 2002), multiple imputation by chained equations was used to address covariates with missing data, even though the percentage of organizations with missing data was low (4.7%). The multiple imputation command "ice" (Royston, 2005a, 2005b), was used to generate 20 imputed data sets based on the independent variables and the dependent variable of transition to adopting pharmacotherapy. By using "mi estimate" during model estimation, a single set of results was produced based on regression estimates from each of the data sets (Barnard and Rubin, 1999; Royston, 2004).

The dependent variable of transition to medication adoption was dichotomous; therefore, logistic regression was used (Long, 1997). To better establish temporal ordering (Menard, 2008), all models included independent variables measured at baseline and a lagged dependent variable of medication adoption that was measured at follow-up approximately 5 years later. The logistic regression analysis proceeded through two stages. First, each independent variable was examined in a bivariate logistic regression model. Next, all independent variables with *p* values less than .10 (two-tailed) were entered into the multivariate model. Although this study focused on organizations as the unit of analysis, states vary in their support for pharmacotherapy; this variation led to the decision to use the "cluster" option to account for the nesting of treatment organizations within states. As noted by Long and Freese (2006), the "cluster" option in Stata produces robust standard errors that correct for the impact of data clustering, reducing the likelihood of biased statistical inference.

Results

About 22.6% ($n = 43$) of 190 publicly funded SUD treatment organizations that offered no medications at baseline in 2004–2006 were offering pharmacotherapy by 2009–2010. The most commonly adopted medication at follow-up was buprenorphine (12.9% of the total; $n = 24$). Other adopted medications included tablet naltrexone (9.1%, $n = 17$), acamprosate (8.7%, $n = 16$), disulfiram (8.1%, $n = 15$), and depot naltrexone (4.3%, $n = 8$).

Baseline organizational characteristics of these 190 publicly funded SUD treatment programs appear in Table 1. Relatively few programs were owned by governmental entities or were located within hospital settings. Fewer than one in five programs offered detoxification services, and almost half exclusively offered outpatient SUD treatment. About half of the organizations had no access to physicians at the time of the baseline interview.

Table 1 also compares organizations that adopted at least one medication at follow-up with those who remained nonadopters at follow-up. There were notable differences between these two groups in their access to physicians, reliance on pharmaceutical companies for information about innovations, and reliance on Medicaid funding. Although adopters and nonadopters were similar in the percentage that were based on the 12-step model, there was a significant difference in the measure of spiritual emphasis in their treatment services, with adopters reporting a lower emphasis on spirituality at baseline than nonadopting organizations.

The first two data columns of Table 2 presents the bivariate models estimating the associations between transitioning to offering pharmacotherapy and the baseline measures of organizational structure, culture, resources, and information sources. All models adjusted for the nesting of treatment

TABLE 1. Baseline characteristics of 190 publicly funded substance use disorder (SUD) organizations that did not offer medications for SUD treatment in 2004–2006

Variable	Total sample % (n) or M (SD)	Adopters % (n) or M (SD)	Nonadopters % (n) or M (SD)
Organizational structure			
Government owned	14.7% (28)	23.3% (10)	12.2% (18)
Located in a hospital	5.8% (11)	7.0% (3)	5.4% (8)
Accredited	43.2% (82)	46.5% (20)	42.2% (62)
Offers detoxification	18.6% (35)	26.2% (11)	16.4% (24)
Levels of care			
Only outpatient	43.6% (82)	31.0% (13)	47.3% (69)
Only inpatient/residential	22.9% (43)	23.8% (10)	22.6% (33)
Mixture of outpatient and inpatient/residential	33.5% (63)	45.2% (19)	30.1% (44)
Organizational culture			
Based on 12-step model	54.3% (102)	50.0% (21)	55.5% (81)
Emphasis on spirituality ^{a,*}	3.6 (1.5)	3.1 (1.7)	3.7 (1.4)
Organizational resources			
% patients covered by Medicaid**	10.8 (20.0)	18.3 (26.6)	8.6 (17.1)
% patients covered by other public funding (non-Medicaid/Medicare)	67.7 (33.7)	60.8 (38.0)	69.7 (32.2)
Number of counselors	11.0 (14.4)	12.3 (13.6)	10.6 (14.6)
Physician typology***			
At least one MD on staff	16.9% (32)	37.2% (16)	11.0% (16)
No staff MD but at least one MD on contract	30.7% (58)	32.6% (14)	30.1% (44)
No physician employment	52.4% (99)	30.2% (13)	58.9% (86)
Information resources			
Reliance on pharmaceutical companies for information on innovations ^{a,**}	1.0 (1.3)	1.5 (1.5)	0.9 (1.2)
Reliance on NIDA/SAMHSA for information on innovations ^a	2.1 (1.2)	2.0 (1.1)	2.2 (1.2)
Receipt of information from state SUD authority ^b	3.2 (2.4)	3.3 (2.3)	3.2 (2.4)
Caseload composition			
% patients with alcohol diagnosis	61.7 (27.0)	59.0 (24.4)	62.5 (27.8)
% patients with heroin diagnosis	13.7 (17.5)	15.1 (16.9)	13.2 (17.7)
% patients with prescription opioid diagnosis	14.9 (19.7)	16.8 (20.5)	14.3 (19.6)

Notes: Chi-square tests and independent samples *t* tests compared adopters and nonadopters depending on the level of measurement. MD = medical doctor; NIDA = National Institute on Drug Abuse; SAMHSA = Substance Abuse and Mental Health Services Administration. ^aRanges from 0 = *no extent* to 5 = *very great extent*; ^bnumber of types of information received from the state, ranging from 0 to 8.

p* < .05; *p* < .01; ****p* < .001 (two-tailed tests).

programs within states. There were no differences in adoption by ownership, location in a hospital, or accreditation. Organizations offering a mixture of inpatient/residential and outpatient treatment services were significantly more likely than outpatient-only programs to adopt pharmacotherapy over time. There was a significant positive association between the percentage of patients covered by Medicaid and the adoption of pharmacotherapy, but the association for other types of public funding was not significant. Programs with at least one physician on staff at baseline were significantly more likely than those without physician access to have adopted at least one SUD medication at follow-up. Although there were no differences based on the federal or state sources of EBP information, programs that reported at baseline greater reliance on pharmaceutical companies for information about innovations were more likely to adopt pharmacotherapy over time. Finally, the clinical caseload characteristics were not associated with the adoption of SUD medications.

The variables associated with medication adoption at *p* < .10 were entered into a multivariate logistic regression model that again adjusted for the clustering of organizations within states (Table 2, second set of data columns). This multivariate model was generally consistent with the bivariate results. Of the measures of organizational structure, only the indicator of levels of care was statistically significant. Compared with outpatient-only programs, organizations that only offered inpatient or residential services were significantly more likely to adopt at least one medication at follow-up, when other variables were controlled for. The percentage of Medicaid patients was positively associated with the odds of medication adoption; a 1-*SD* increase in the percentage of Medicaid patients (*SD* = 20.0) was associated with a 52.2% increase in the odds of medication adoption ($52.2 = 100 \times [e^{(.021)(20.0)} - 1]$). The presence of at least one staff physician at baseline continued to be strongly associated with the odds of adopting pharmacotherapy at follow-up, with such programs being six times more likely to adopt at least one

TABLE 2. Logistic regression models of organizational transition to offering medications for substance use disorder (SUD) treatment in 2009–2010

Variable	Unadjusted OR [95% CI]	<i>p</i>	Adjusted OR [95% CI]	<i>p</i>
Organizational structure				
Government owned	2.17 [0.86, 5.50]	.102	—	
Located in a hospital	1.30 [0.35, 4.80]	.691	—	
Accredited	1.19 [0.61, 2.33]	.606	—	
Offers detoxification	1.80 [0.97, 3.32]	.060	1.32 [0.62, 2.83]	.468
Levels of care				
Only outpatient	ref.		ref.	
Only inpatient/residential	1.60 [0.73, 3.50]	.244	2.91 [1.01, 8.42]	.048
Mixture of outpatient and inpatient/residential	2.29 [1.19, 4.39]	.013	2.24 [0.97, 5.15]	.059
Organizational culture				
Based on 12-step model	0.82 [0.47, 1.43]	.489	—	
Emphasis on spirituality	0.79 [0.61, 1.02]	.072	0.74 [0.53, 1.03]	.078
Organizational resources				
% patients covered by Medicaid	1.02 [1.00, 1.04]	.016	1.02 [1.00, 1.04]	.046
% patients covered by other public funding	0.99 [0.98, 1.00]	.181	—	
Number of counselors (natural log-transformed)	1.24 [0.94, 1.64]	.122	—	
Physician typology				
At least one MD on staff	6.62 [2.94, 14.89]	<.001	6.29 [2.31, 17.16]	<.001
No staff MD but at least one MD on contract	2.09 [0.92, 4.71]	.077	2.34 [0.98, 5.61]	.056
No physician employment	ref.		ref.	
Information resources				
Reliance on pharmaceutical companies for information on innovations	1.46 [1.20, 1.79]	<.001	1.51 [1.18, 1.93]	.001
Reliance on NIDA/SAMHSA for information on innovations	0.92 [0.68, 1.24]	.577	—	
Receipt of information from state SUD authority	1.01 [0.88, 1.17]	.845	—	
Caseload composition				
% patients with alcohol diagnosis	1.00 [0.98, 1.01]	.446	—	
% patients with heroin diagnosis	1.01 [0.99, 1.02]	.540	—	
% patients with prescription opioid diagnosis	1.01 [0.99, 1.02]	.426	—	

Notes: Analyses adjust for the clustering of SUD treatment organizations within states. OR = odds ratio; CI = confidence interval; ref. = reference; MD = medical doctor; NIDA = National Institute on Drug Abuse; SAMHSA = Substance Abuse and Mental Health Services Administration.

SUD medication than those with no access to physicians at baseline. Pharmaceutical detailing was the only information resource associated with medication adoption; a one-unit increase in the scale regarding pharmaceutical detailing was associated with a 50.7% increase in the odds of medication adoption ($50.7\% = 100 \times [e^{(.410)} - 1]$).

Discussion

In contrast to previous studies that have focused on specific medications, this longitudinal study is novel in studying the transition among publicly funded SUD treatment programs from offering no pharmacotherapy to the actual adoption of at least one SUD medication over a 5-year period. A modest degree of medication adoption was observed, with nearly one quarter of publicly funded treatment programs making the transition from nonadoption to adoption of pharmacotherapy for treating SUDs.

The final model revealed that several organizational characteristics were associated with the transition to offering pharmacotherapy. First, adoption was facilitated by Medicaid, with those organizations serving a greater proportion of patients covered by Medicaid at baseline being significantly more likely to adopt pharmacotherapy over time. This finding is promising in the context of the Affordable Care Act of 2010 (ACA), in which a substantial expansion of the population with Medicaid coverage is expected (Holahan and Headen, 2010), including many with SUDs (Buck, 2011). If publicly funded treatment programs succeed in attracting more patients with Medicaid, our results suggest that greater patient access to pharmacotherapy may follow.

There are reasons to expect that the growth in numbers of patients may not occur unless other barriers to accessing SUD treatment are removed (Capoccia et al., 2012). The impact of Medicaid's expansion will depend in part on how states choose to define "essential benefits" as part of their

new state insurance exchanges. The ACA requires states to include the same set of essential benefits under Medicaid as those offered by the state insurance exchanges (Buck, 2011). If SUD pharmacotherapy is included as an essential benefit, this may provide a financial incentive for more SUD treatment programs to adopt these treatments. However, the Supreme Court's ruling allows states to decline to participate in the Medicaid expansion (The Henry J. Kaiser Family Foundation, 2012), which may reduce the impact of the ACA in terms of expanding treatment access and providing resources that would support greater medication adoption. Further, if the implementation of pharmacotherapy still requires substantial co-payments, the projected advantages in terms of improvement in treatment quality by providing access to more treatment options may be lost (Capoccia et al., 2012).

As expected, the employment of physicians on staff at baseline was positively associated with the likelihood that organizations made the transition to medication adoption, consistent with our prior cross-sectional research (Abraham et al., 2010; Knudsen et al., 2007, 2010). Because of our use of a lagged dependent variable, however, our data do not provide in-depth information regarding whether an expansion of medical capabilities preceded or followed the decision to adopt pharmacotherapy.

Despite the goals for mainstreaming SUD treatment into medical care, physician employment remains quite low among these treatment programs. Financial barriers and physician training loom large over this problem. Program administrators frequently note that financial barriers have limited their ability to employ physicians and that identifying physicians in the local community with expertise or interest in treating SUDs is difficult (Knudsen et al., 2011). The challenges associated with finding such physicians is perhaps not surprising, given that physicians have historically received little training specific to SUDs during their medical training (O'Connor et al., 2011; Polydorou et al., 2008). Awareness of these barriers is indicated in the 2010 National Drug Control Strategy that specifically called for increasing SUD-related training for physicians (Office of National Drug Control Strategy, 2010). The ACA seeks to facilitate integration of SUD treatment by prescribing its inclusion in primary care and reinforcing earlier legislation requiring parity in treatment reimbursements. A significant direction for future research is to continue to monitor the publicly funded SUD treatment field and to measure the impact of environmental changes, such as the ACA, on service delivery and staffing within these programs.

Contractual relationships with physicians trended toward, but did not achieve, statistical significance in this model of medication adoption. Given the often-limited resources of SUD treatment programs, it is reasonable to consider whether referral relationships may increase access to pharmacotherapy. To date, there has been little research on this

specific issue, but the broader literature suggests that referral mechanisms are not particularly effective in ensuring that patients receive needed services. Two seminal studies by Friedmann and colleagues illustrate the limited effects of referral linkages. Using program-level data, Friedmann et al. (2000) examined the effect of onsite service delivery, formal referral relationships, and ad hoc referrals on receipt of a variety of medical (e.g., HIV/AIDS treatment, tuberculosis screening, physical examination, primary medical care) and psychosocial (e.g., mental health care, employment counseling, financial counseling) services. Onsite service provision was positively associated with utilization across a range of services, relative to ad hoc referrals. Formal referral relationships generally were not significantly different from ad hoc referrals for the measures of service utilization. In a second study, Friedmann and colleagues (2003) used facility- and patient-level data to compare patient outcomes for those who attended an SUD treatment program with onsite primary medical care versus treatment in a facility that referred patients to external primary care providers. Referral to offsite medical care had no effect on either medical severity or dependence severity at the 12-month follow-up, whereas onsite medical care reduced SUD severity. These studies suggest that models of referrals may have limited value, but rigorous research focused on SUD pharmacotherapy is needed to fully address this question.

Although the average level of contact between SUD programs and pharmaceutical companies was low at baseline, there was a positive association between pharmaceutical detailing and the transition to medication adoption. This finding is consistent with analyses from the business literature on the impact of pharmaceutical detailing on prescribing behaviors (Ching and Ishihara, 2012; Fischer et al., 2009; Huddle, 2008; Katz et al., 2010; Mizik and Jacobson, 2004; Narayanan et al., 2004; Velasco et al., 2011). Although there are ethical considerations regarding the nexus of health care organizations and pharmaceutical companies (Huddle, 2008; Katz et al., 2010), important lessons might be learned from a more nuanced investigation of the detailing strategies that are being used in the context of SUD treatment. A limitation of the present study is that the "details" of detailing (e.g., promotional mailings, face-to-face meetings) were not measured. Many challenging questions remain to be answered. For example, which types of treatment organizations attract visits by pharmaceutical representatives, when are such visits met with receptivity by program leadership, and what is the content of the educational and influence process that occurs? Future research could measure these strategies in more detail. The current findings suggest that personal contact by pharmaceutical representatives may have importance in contrast to the more passive strategies of manuals and seminars that typically characterize dissemination efforts supported by federal agencies.

Although the availability of longitudinal data from a panel of SUD programs was a key strength of this research, several limitations should be noted. This sample is representative of the publicly funded treatment sector, but our findings may not generalize to other types of programs, such as those that primarily rely on private sources of funding (e.g., insurance and self-paying clients) and programs located within the Veterans Health Administration system. Another limitation is the reliance on administrators' self-reports, which may result in bias because of social desirability or inaccurate recall. An additional limitation is the reliance on quantitative research methods, which does not allow for a more nuanced analysis of how treatment organizations reach the decision to begin offering pharmacotherapy. Qualitative methods may yield particularly important information about the context surrounding such transitions that cannot be captured by traditional survey methods. Finally, the follow-up measures focused on availability of any medications but did not collect information regarding how medications are implemented across the patient populations appropriate for such treatment. Although adoption is a necessary condition for implementation, many other factors may influence processes of implementation, determination of which is an important direction for future research.

This research is unique in its use of longitudinal data to specifically focus on the organizational correlates of SUD treatment programs making the transition to delivering medications as part of their treatment services. The limited employment of medical professionals is a substantial barrier to this transition, but the potential expansion of Medicaid under the ACA may facilitate greater medication adoption. Given the evolving funding environment, additional research is needed to monitor how this largest sector of SUD treatment adapts to the impending changes in financing as health care reform is implemented, particularly with regard to the impact of these changes on treatment quality and patients' access to evidence-based treatment practices.

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