Adoption of Medications in Substance Abuse Treatment: Priorities and Strategies of Single State Authorities†

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Abstract—Research has confirmed the effectiveness of medications, when used in conjunction with ongoing counseling, to treat substance abuse disorders. This article describes a national, mixed-methods research project designed to investigate single state authorities' (SSAs) perceptions of adoption of evidence-based practices in substance abuse treatment. Results are focused specifically on medication-assisted treatment, one of five evidence-based practices defined by the National Quality Forum. Medication-assisted treatment (MAT) is an important and effective part of comprehensive care options available to clients who are chronically ill with alcohol and other drug disorders. Despite mounting clinical evidence and increased availability, overall rates of implementation and sustained adoption of medications to treat addiction remain limited. The results illustrate that the SSA representatives who fund public treatment programs believe MAT is a priority and worthy of system-wide implementation. Current strategies utilized by SSAs to support the adoption of MAT are detailed, as are barriers to adoption and implementation.

Keywords—barriers to adoption, evidence-base practices, facilitative factors, medication-assisted treatment, National Quality Forum, single state authority (SSA)

Drug abuse is a chronic disease associated with significant adverse social, medical, economic, and psychiatric impacts (McLellan et al. 2005, 2000). The costs of abuse and addiction include increased mortality and morbidity (Bailey, Campagna & Dart 2009; Rehm et al. 2009; Ziedonis et al. 2008; Birnbaum et al. 2006; McGinnis & Foege 1999) and increased health care expenditures (Clark, Samnaliev & McGovern 2009; Rehm et al. 2009; Mark et al. 2007, 2001; White et al. 2005). Given the slow rates of adoption of new practices (Marinelli-Casey, Domier & Rawson 2002; Balas & Boren 2000), increasing rates of abuse (SAMHSA 2009a, b), and the gap between the number of people who need treatment and those actually receiving treatment (Sullivan et al. 2005), the field of addiction treatment must continue to evolve to ensure access to efficacious, cost-effective services that promote long-term recovery. One such intervention is medication-assisted treatment (MAT).

MEDICATION-ASSISTED TREATMENT (MAT)

Ample evidence exists to suggest that MAT, especially when combined with psychosocial counseling, improves treatment outcomes for clients struggling with addictive disorders (Monti et al. 2001; Anton et al. 1999; Ling et al.

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1998; Johnson et al. 1995; O'Malley et al. 1992; Volpicelli et al. 1992). For example, several pharmacotherapies found to be effective in treating opioid abuse, such as methadone and buprenorphine, are economically viable and beneficial in facilitating recovery for clients in substance abuse treatment (Kovas et al. 2007; Doran et al. 2003; Barnett, Rodgers & Bloch 2001). Research also suggests that the use of MAT results in reductions in mortality rates and criminal activity (Woody et al. 2008; Saxon & McCarty 2005; Greenfield & Fountain 2000).

Although the number of effective pharmacotherapies continues to increase with time, several medications are currently available and are frequently used in the treatment of alcohol and opioid dependence. Four medications are the focus of this article: two medications for the treatment of opioid dependence – methadone (marketed as Methadose® and Dolophine®, among others) and buprenorphine (Subutex® and Suboxone®) – and two medications for the treatment of alcohol dependence – naltrexone (ReVia® and Depade®) and disulfiram (Antabuse®).

Methadone is a full mu-opioid agonist that reduces the symptoms of withdrawal and stifles drug cravings without invoking the euphoric feeling associated with illicit opioids (CDC 2002; Donny et al. 2002). It is the standard opioid-replacement treatment and is usually well tolerated by patients (Mattick et al. 2003; NIH Consensus Panel 1998; Farrell et al. 1994). Buprenorphine is a partial mu-opioid agonist that provides an alternative opioid-agonist replacement treatment that can be offered through community office-based settings. Approved by the U.S. Food and Drug Administration in 2002, buprenorphine is an emerging pharmacotherapy that offers a significant advancement in treatment of opioid dependence. As compared to methadone, buprenorphine provides a reduced risk of abuse, overdose, and toxicity; it diminishes withdrawal symptoms, and it does not require daily dosing (Bell et al. 2009; Ling et al. 2009, 1998; Amass et al. 2004; Kakko et al. 2003; Fiellin et al. 2002; O'Conner et al. 1998).

Naltrexone is a mu-opioid receptor antagonist that is approved for the treatment of alcohol dependence (Chick et al. 2000; Garbutt et al. 1999). The most effective application of naltrexone has been when the medication is used in conjunction with psychosocial therapies, such as coping skills therapy (CST) (Leavitt 2002; O'Malley et al. 1992) and supportive therapy (O'Malley et al. 1992). Naltrexone also has been used for opioid dependence, including rapid detoxification, although research regarding its use is limited (Krampe & Ehrenreich 2010). Finally, disulfiram is an acetaldehyde dehydrogenase inhibitor that creates an undesirable physiological reaction when alcohol is consumed, therefore deterring an individual from drinking (Fuller et al. 2005; Brewer, Meyers & Johnsen 2000; Chick et al. 2000).

MAT is an important treatment option for clients with chronic alcohol and other drug disorders, yet despite the solid clinical evidence and its availability, overall rates of adoption remain low. This disparity between availability and actual use prompted several investigations that examined factors that influence adoption and implementation of pharmacotherapies in substance abuse treatment services.

IMPLEMENTATION OF MEDICATION-ASSISTED TREATMENT

The substance abuse treatment system comprises a multitude of intricate regulatory and funding streams, limited integration of services, an underdeveloped workforce, and many chronically ill patients (McCarty & Rieckmann In press; Chriqui et al. 2007; McLellan 2002). Thus, the treatment environment is dynamic, often underfunded, and fraught with complexities. In the context of such systems-wide challenges, initial implementation research has concluded that several factors influence use of medications, including counselor characteristics, organizational factors, and (though less commonly explored) environmental and regulatory issues and client factors (Garner 2009; Knudsen et al. 2009, 2005; Chriqui et al. 2007; Ducharme et al. 2007; Fuller et al. 2005; McCarty et al. 2004; Mulvey, Hubbard & Hayashi 2003; Rawson et al. 1998).

Specific diffusion, implementation, and technology transfer theories and frameworks that are helpful in understanding mechanisms available to increase the use of medications include insights from implementation science (Fixsen et al. 2005), classical diffusion theory, and organizational readiness for change literature (Rogers 2003; Thomas et al. 2003; Simpson 2002). Substance abuse treatment research also supports the effects of organizational factors on adoption and utilization of evidence-based practices (Garner 2009; Knudsen et al. 2009, 2005; Knudsen, Ducharme & Roman 2006; Stirman, Cris-Christoph & DeRubeis 2004; Rogers 2003; Brown & Flynn 2002; Lehman, Greener & Simpson 2002; Roman & Johnson 2002). In a review of the literature on implementation of evidence-based practices (EBPs) including pharmacotherapy, Garner (2009) reports that specific organizational factors related to the adoption of buprenorphine include: availability of detoxification services, use of naltrexone, for-profit status as an organization, and accreditation status. Having a physician on staff, accreditation, larger size, hospital affiliation, inpatient care, and detoxification services also increase the likelihood of adoption of medications (Knudsen et al. 2007). More specifically, a comparison of opioid treatment programs found that structural characteristics of treatment programs (profit status, size, and staff) were more influential in terms of adoption of buprenorphine than were client and staff characteristics (Ducharme & Roman 2009). To date, however, there remains a paucity of research that addresses the environmental or economic factors and the interorganizational relationships (Ducharme et al. 2007) that may influence use of medications. Specifically, the roles of single state authorities, provider networks, and integrative care efforts are not well understood.

SINGLE STATE AUTHORITIES AND MAT

The single state authority (SSA) for substance abuse treatment in each state (and the District of Columbia) works to provide services at state and substate (regional, county) levels. The organizational structure, financing, regulation, and overall environment for treatment services within each state is diverse, even confusing at times, and this often serves to complicate adoption of new practices (Rieckmann et al. 2009; Chriqui et al. 2006; Gold, Glynn & Mueser 2006). Nevertheless, state and local governments are the largest source of funding for substance abuse treatment (Mark et al. 2007), and all programs that receive federal funds as part of the federal Substance Abuse Prevention and Treatment (SAPT) block grant must adhere to specified program requirements (Chriqui et al. 2007). Thus, publicly-funded treatment programs are accountable to their SSA, and state officials may influence service delivery by linking funding to the provision of medication-assisted treatment (Capoccia 2006). State governments also have the opportunity to stipulate their expectations about the use of MAT through policy mandates, contracting, infrastructure development, and administrative law changes (NQF 2005). In spite of SSAs' position at the vortex of service delivery, there is a dearth of research on what state initiatives, policies, and procedures are used, what their impact is on outcomes, and how such mechanisms influence the use of interventions such as MAT. This article describes a national study of single state authorities' attitudes, implementation strategies, and perceived barriers to adoption of medication-assisted treatment.

METHODS

Data featured in this article were collected as part of a three-year longitudinal study that was initiated in 2007. Data on specific MAT pharmacotherapies were collected in 2008 as part of the second phase (wave) of the project. Data from the first wave (2007) are shown for select comparison purposes.

Design and Methodology

This study employed a concurrent mixed-methods approach in which both qualitative and quantitative data were collected and analyzed simultaneously, allowing for a comprehensive assessment of strategies aimed at increasing adoption and implementation of EBPs (Creswell & Plano Clark 2007). A mixed-methods design provides quantitative and qualitative results that, when merged, mutually reinforce or clarify findings that would not be evident with only one method of data collection (Creswell 2009; Creswell & Plano Clark 2007). The choice to incorporate a substantial qualitative component in this study was based on three factors. First, qualitative methodologies are particularly well suited for exploratory studies for which previous literature is limited (Ambert et al. 1995; Lincoln & Guba 1985), such as research on SSAs and policy implementation. Second, allowing participants the flexibility to explain and expand upon their responses provides for an in-depth understanding of MAT implementation processes (Crabtree & Miller 1999; Miles & Huberman 1994). Finally, qualitative methods are most appropriate for research that, as Marshall and Rossman (2006: 53) state, "seeks to explore where and why policy and local knowledge and practice are at odds."

Participants and Procedures

Participants included SSA directors and/or representatives from each of the 50 states and Washington, D.C. (N = 51). This type of expert purposive sampling was selected to obtain information from individuals whose particular job role dictates a unique understanding of the topic matter (Trochim & Donnelly 2006). Participants interviewed for wave two of this study (2008) included the state director or an assistant/deputy director (71% of SSAs), or a manager, supervisor, or treatment services director (29%). The high proportion of directors interviewed was an increase from baseline data collected in 2007, in which state directors or assistant/deputy directors constituted 61% of participants. Efforts were made to interview the same SSA representative in both study years. When the previous year's representative was not available to interview, that person was asked to recommend a knowledgeable colleague who could represent the SSA. Comparing participants from baseline to year one, 35 (69%) of representatives in 2007 were re-interviewed in 2008. In the remaining 16 states, eight (50%) SSAs were represented by directors in both years, reflecting a change in SSA leadership. In three (19%) of the remaining 16 states, a higher-ranking representative was interviewed in 2008. In the final five (31%) remaining states, the 2008 participant was referred by the 2007 participant. Qualitative interviews and quantitative surveys were completed between April and October 2008.

A trained research team with experience in interviewing, qualitative methods, and policy research related to substance abuse treatment completed the 60 to 90 minute telephone interviews. Data collection from wave one (described in Rieckmann et al. 2009) yielded a comprehensive contact list of state substance abuse directors and staff with expertise in EBPs. Using this contact list, SSA representatives were contacted to reintroduce the study, thank them for their previous participation, and ask them to schedule an interview to answer questions about strategies to encourage the use of EBPs. Interviews were audio recorded and transcribed for analysis. This project was reviewed and approved by the Oregon Health and Science University Institutional Review Board.

Instruments and Analysis

Quantitative data. The quantitative survey included Likert-type scales (1 = not at all to 5 = extensively) that SSA

representatives used to rate the extent to which their state had prioritized and implemented access to MAT statewide. SSA representatives also rated the extent of statewide implementation of specific medications, including methadone (e.g. Methadose®, Dolophine®), buprenorphine (Subutex® and Suboxone®), naltrexone (e.g. ReVia®, Depade®), and disulfiram (e.g. Antabuse®). Use of specific strategies to increase the use of EBPs, including MAT, was assessed using the Likert-type scale. These strategies included education and training (e.g. supervision, training, fidelity); financial incentives and mechanisms (e.g. parity, insurance coverage, funding for EBPs, performance-based incentives); regulation and accreditation (e.g. accreditation, licensure, mandates, and contract language); and infrastructure development (e.g. enhanced data systems, retention of qualified staff, increased research and provider collaborations, and process improvement strategies) (NQF 2005).

Qualitative data. Open-ended interview questions addressed organizational structure, authorization/licensure, treatment provider funding, regulations and legislation, staff functions related to EBPs, and implementation of EBPs, with an additional emphasis on medication-assisted treatment. Consistent with phase one of this ongoing indicator project, questions were adapted from the National Quality Forum's (2007) five categories of substance abuse EBPs (screening and brief intervention, psychosocial interventions, use of medications, use of wraparound services, and aftercare and recovery management) and recommended implementation strategies. The interview included both broad questions that allowed participants to shape their responses based solely on their subjective interpretations of the topic and additional probes to draw out detailed information. When appropriate, documentation was requested regarding EBPs related to legislation, contract language, and administrative rule and regulatory changes.

Analysis

For this mixed methods study, quantitative data were analyzed for frequencies, mean, modal, and median values using SPSS v.17® for Windows. Independently transcribed digital audio files of qualitative interviews were coded and analyzed using Atlas.ti v5.2®, a qualitative data management program.

Quantitative data analysis. Data entry in SPSS was validated by a research assistant familiar with the instrument. After generating frequency tables and descriptives, Chi-square crosstab analysis, independent samples t-tests, and correlations were used to examine relationships between variables of interest. Counts were used to determine the number of states offering each specific medication, based on Likert-type implementation scale responses of 2 (slightly) or higher. Correlational analysis was performed to examine relationships between medication implementation scale responses and strategy scale responses. To further assess relationships between strategies and medication implementation, states were stratified into two groups: states with reportedly high implementation of addiction medications in general (rating 4, for considerably, or 5, for extensively), and states with reportedly low implementation (rating 3, for moderately, or lower). Independent t-tests were used to compare mean use of each strategy between the high and low implementation groups. This process was repeated for each specific medication (buprenorphine, methadone, naltrexone, and disulfiram).

Qualitative data analysis. Preparation and analysis of qualitative interviews were facilitated with ATLAS.ti qualitative software for searching and coding text. To prepare interviews for analysis, audiotapes were transcribed verbatim into individual computer text files. These represent the core qualitative "textbase" for analysis.

To ensure inter-rater reliability, a four-step strategy was utilized in the analysis of the qualitative data for each of the three years. *First*: The study team met to review project goals and to develop and refine the coding scheme. *Second*: All staff independently coded transcripts, and then met to compare, review, and discuss differences in coding decisions and rationale, until the investigators were assured of a shared understanding of codes and consistent coding decisions. *Third*: After all staff had been assigned a selection of documents for coding and had completed the coding of two transcripts, the principal investigator and qualitative analysis leader met with the coders to review consistency. *Fourth*: Twenty-five percent of documents were selected for "check-coding." These documents were coded by a separate analyst or auditor (Lincoln & Guba 1985). Code choice was then compared for inter-rater/check-rater consistency. To calculate inter-rater/check-rater consistency, discrepancies were tallied for each document, and individual rater to check-rater agreement ratios were calculated by dividing the total number of analyst recommended changes to code choice (e.g. 3) by the total number of codes applied (e.g. 121) and then subtracting the resulting percentage (e.g. 2.5%) from 100% (e.g. 97.5% agreement). After calculating percent of rater/check-rater agreement for each rater's documents individually, the resulting percent rater-to-check-rater agreements were added together and the sum was divided by the number of documents examined. Results of this analysis showed a strong coder/rater to check-coder/rater mean value of percent consistency (73%). The final steps of the analysis included extracting themes, or specific recurring and compelling points made across the material (Lofland et al. 2006; Luborsky 1994) and illustrative quotations from the coded transcripts.

RESULTS

Quantitative results are first presented from this complete national sample of SSAs for substance abuse treatment, followed by qualitative results.

TABLE 1

Access to Medications: Prioritization, Implementation, and State Availability

	N	Mean	S.D.	State Availability
Access to Medications has been Prioritized	50	3.70	1.02	
Access to Medications has been Implemented	50	3.13	0.99	
Methadone	49	3.90	1.05	47 states
Buprenorphine	49	2.67	1.01	45 states
Naltrexone	49	2.31	0.85	42 states
Disulfiram	48	2.19	1.10	36 states

Note: Likert-type scales, where "1 = not at all" and "5 = extensively".
State availability counts include data from the District of Columbia.

Medications for Substance Abuse Treatment

SSA representatives reported that access to medication is a priority (M = 3.70, SD = 1.02 on a 1–5 Likert-type scale, where 1 = not at all prioritized and 5 = extensively prioritized), but there is a slight lag in implementation (M = 3.13, SD = 0.99, where 1 = not at all implemented and 5 = extensively implemented). Of the medications offered, methadone had the highest mean implementation, followed by buprenorphine, naltrexone, and disulfiram, respectively (see Table 1).

Notably, comparative data from an almost identical sample of 50 SSAs interviewed in 2007 (data not shown) suggest that progress has been made to increase access to medication for those in substance abuse treatment. Prioritization of MAT increased 8.19% from 2007 (M = 3.42, SD = 1.14) to 2008 (M = 3.70, SD = 1.02). Moreover, mean implementation of MAT increased significantly, by 19.47%, from 2007 (M = 2.62, SD = 0.99) to 2008 (M = 3.13, SD = 0.99) (t (49) = 3.13, $p < 0.01$).

In 2008, mean implementation ratings corresponded with state counts of medication availability. Access to methadone was most widespread (47 states), followed closely by buprenorphine (45 states), naltrexone (42 states), and lastly, disulfiram (36 states).

Strategies for Adopting EBPs

Data suggest that states are using specific strategies to promote EBPs, including addiction medications. Prioritization of MAT was significantly correlated with use of infrastructure development to promote EBPs (r = 0.35, p = 0.01). Similarly, MAT implementation was also significantly correlated with use of infrastructure development strategies (r = 0.35, p = 0.01), as was the implementation of two specific medications: buprenorphine (r = 0.41, $p < 0.01$) and naltrexone (r = 0.31; p = 0.03). States also appear to be using financial incentives and mechanisms to promote naltrexone implementation, as suggested by significant correlation between the two (r = 0.29, p = 0.05). No correlations were observed between implementation of methadone or disulfiram and strategies to promote EBPs.

States that reported high implementation of addiction medications in general (n = 18) had significantly higher mean ratings of infrastructure development strategy (M = 3.78, SD = 0.65) than states that reported low implementation (n = 31, M = 3.29, SD = 0.82) (t (47) = 2.15, p = 0.04). In particular, states that reported high implementation of buprenorphine (n = 11) had significantly higher ratings of mean infrastructure development strategy (M = 4.00, SD = 0.63) than states that reported low buprenorphine implementation (n = 37, M = 3.35, SD = 0.75) (t (46) = 2.59, p = 0.01). Similar analysis of naltrexone implementation and financial incentives and mechanisms did not find a significant correlation, despite the significant correlation reported above. However, states that reported high implementation of methadone (n = 35) had significantly higher mean financial strategy ratings (M = 3.03, SD = 1.15) than states that reported low methadone implementation (n = 13, M = 2.31, SD = 1.03) (t (46) = 1.98, p = 0.05).

Adoption of Medications: Barriers and Facilitating Factors

Qualitative data expands and clarifies the quantitative data, providing an in-depth understanding of state officials' perspectives on barriers and facilitative factors related to the adoption of MAT. Overall, thematic analysis of the 51 interviews confirmed that increased use of MAT is a priority at the state level, and SSA staff are engaged in examining the multiple factors that prevent widespread use of MAT. Although interviews did not include questions regarding barriers to implementing specific medications, several key challenges were discussed repeatedly across states and medications. First, numerous participants commented on the importance of provider, public, and even client attitudes and beliefs about MAT. Second, the need to enhance the infrastructure for providing medications, including funding, shifts in organizational procedures, and staff development

were common and intense themes across the interviews. Finally, legislation, policies, and regulations were noted as areas needing attention, review, and adaptation. The three themes were overlapping and results indicated that they also crossed all treatment subsystems including the state offices (SSAs), treatment providers, agency directors, and policy makers. Each emergent theme is discussed below and illustrative comments are presented.

Attitudes and beliefs about medication-assisted treatment. According to state officials who participated in this study, the prevailing public attitude that drug addiction should not be treated (or substituted) with another "drug" was a common and significant barrier to use of MAT across the nation. Most concerning was that respondents reported that these attitudes are prevalent in all components of the system including the public officials' domain, among clients in treatment, and among the treatment practitioner workforce, where, notably, the resistance is especially influential. Many states noted that stigmas and lack of knowledge seemed to have resulted in a self-selecting dichotomy, or parallel split, of both providers and patients into abstinence-only treatment versus MAT programs. This self-selection then serves to limit treatment options and services over the course of provider careers and client experiences in treatment. Several SSAs reported that most of their treatment programs were rooted in an abstinence-only philosophy that creates barriers, including client-level discomfort about "swapping addictions" and potential shame from the public and other patients about being a client of a clinic that offers medication-assisted treatment.

One Midwestern SSA representative described the abstinence approach as a "cultural belief . . . that medications are not effective when interjected into therapy, in spite of the preponderance of evidence-based practice to the contrary." The respondent further elaborated that their state recognized itself as a "very strong 12-Step facilitation state" and that there was "a big pocket of resistance to medication-assisted therapy." Representatives of ther states described this philosophical battle as a matter of strong support and belief in the efficacy of social detoxification versus medical detoxification programs, and several enforced this point by referencing the fact that several states do not offer methadone for opioid-dependent clients.

Barriers in terms of lack of buy-in from providers were clear from the following SSA representative's comment: "Well [barriers] are mostly cultural with some of the substance abuse providers . . . in terms of, well, people saying clients should just quit and shouldn't have to be on naltrexone . . . or people should just quit and not be on methadone and buprenorphine." Another SSA representative noted:

> The biggest barrier we have, and it's very difficult to overcome, is that we require that when you have an opiate treatment program, you must have compliance. You have to have approval from the community—the treatment community, the political community, and the law enforcement community. We would have at least three programs now if law enforcement would have agreed to sign off on it. But they all rejected it very forcefully . . . to the point where it would not have been feasible to go in and set up a program. So, that is a basic deterrent right now.

The process of changing treatment philosophies and actual implementation is long and arduous, despite a wealth of evidence for the long-term effectiveness of medication-assisted therapies for substance abuse recovery. While resistance to methadone programs still lingers, a Northeastern SSA representative emphasized that this may be changing. This respondent stated that the two most critical activities the SSA has accomplished to increase access to medications has been extensive education within state programs regarding the use of MAT and changes in their contract language to stipulate that there should not be any barriers to a person receiving medications when their treatment plan requires their use.

Other examples of progress toward increasing access to MAT include efforts to shift attitudes and reduce the stigma of medications. For example, a respondent from a Midwestern state commented about an extensive and ongoing conversation with providers, state officials, and other stakeholders about the philosophical divide among clinicians over MAT. The respondent noted that this discussion has increased significantly in the last two years. A Southern SSA representative stated that there appears to be a lesser degree of stigma attached to buprenorphine-based treatment than previously, which has provided an opening for all treatment options. Additionally, a Northwestern respondent supports increasing efforts to educate clients about the value of medications in drug abuse recovery, stating "Clinicians need to educate clients regarding [their] use and how [they] might be a valuable part of an individual's recovery program." Finally, a Northeastern representative echoed this sentiment, emphasizing that research suggests that when MAT is offered in conjunction with other types of services it is likely to result in improved outcomes.

Infrastructure. In terms of infrastructure, funding to cover the cost of the medications was a significant and recurrent theme across interviews. Many SSAs reported that implementation was greatly reduced due to the cost of the medications and complexities with reimbursement. As one Southeastern respondent stated, "Many of us are ready and willing, have the medical protocols and infrastructure in place, but don't have the funds [to pay for the medications]." Another Southern SSA representative stated explicitly that the lack of access to buprenorphine was first due to a lack of funding, followed by two other factors: "Barriers are, again, finances to support the medication for the client. The second barrier is lack of trained physicians and the third is capacity of treatment providers to implement medical protocols for drugs." Providing greater detail, this respondent noted that there have been seven programs in the state that were interested in offering buprenorphine-based services combined

with therapy, but the cost of the drug was preventing that from happening, thus limiting access to evidence-based services. Furthermore, another respondent pointed out that there is ongoing discussion about how to save money and how saving money may conflict with pursuing best practices. This tension was described by the respondent as a challenge because "policy making and fiscal regulations are the primary drivers" of treatment rather than the use of evidence-based practices. Similarly, another respondent explained that recent budget cuts have had a "Chilling effect on innovation and new approaches with a focus on maintaining . . . core services, and standard traditional services." In other words, some evidence-based practices such as MAT may not fit under "standard" services, especially when standards are not as up-to-date as research results.

Workforce challenges are another critical part of the limited infrastructure in terms of expanding access to MAT. Specifically, results point to great concern about the dearth of trained physicians who are authorized to prescribe medications and implement MAT protocols. The data also suggest that many therapists are not educated about MAT, limiting access to clients as these providers do not even consider medications for their clients. These barriers reflect workforce and community ideology and attitudes about medications, as well as funding issues.

Geography was also a factor in terms of infrastructure challenges and workforce issues. One SSA respondent commented, "You've got to have doctors. There's a huge shortage of doctors. So, it really is a tough one. We operate three state substance abuse hospitals and we use all the best medications. But when the patients get discharged and go back to some little town somewhere, things tend to fall apart." Other respondents reported disparities in access, with major limitations in specific states and rural communities. When asked how extensively buprenorphine has been implemented, one respondent from a Western state commented, "There are places where it's readily available in some of the population centers; it's in the outlying areas it's not as available." Another respondent stated, "Take, for example, methadone. We have 14 methadone clinics in our state, but we have one clinic with an annual admission of about thirty-two to thirty-three hundred people because they serve clients from two other neighboring states that don't offer those services."

In terms of building the workforce infrastructure through the development of providers (counselors and physicians) who are prepared to prescribe or support the use of medications, several respondents reported that their SSA was working to provide trainings or linking their providers to trainings. This effort to facilitate and expand access to MAT is reflected in the following comment from a Midwestern respondent, "One [strategy] is working with providers to encourage partnering with physicians in private practice who are able to prescribe buprenorphine, and also the trainings that we've sponsored or cosponsored around medication-assisted treatment."

Legislative policies and regulations. In addition to the public, providers, and clients harboring negative attitudes toward the use of medications to facilitate the recovery process, several states reported that policy makers and legislators do not support MAT. In some states, legislative resistance to MAT has created substantial barriers to treatment, including difficulty in getting methadone into correctional facilities, and many residential programs were not allowing "any substances" and therefore not taking clients on MAT. One SSA representative commented that programs "will work with people who abuse substances but they think people on methadone are kind of even below that."

Specific local zoning restrictions and public misunderstandings were also repeatedly mentioned as regulatory or policy barriers to MAT. One East Coast state representative commented that MAT services are limited due to "jurisdictional barriers in terms of zoning laws and things like that." A representative of a neighboring Eastern state expanded on this issue, stating that city regulations and restrictions limit where they can provide medications: "One of the big components of the program is a mobile medication unit that will be dispensing methadone and Suboxone on wheels. We're still fighting in certain spots for city ordinances to park the mobile van in certain spaces. There's still plenty of resistance."

Another regulatory theme repeated throughout the discussions was the preauthorization required before clients can receive medications. Preauthorization typically means that the managed care company or Medicaid authority must approve the prescription before it will pay for the medication. This causes delay for the client and places a burden on the provider. Thus, this challenge also falls within the infrastructure barriers, as the agencies do not have the time or staffing to complete all the documentation and maintain the client in services until authorization is received. A Midwest SSA representative noted that barriers to medications, especially buprenorphine, were "the cost and the preauthorization piece utilizing the Medicaid."

A prominent criticism noted in several SSA interviews was the lack of education regarding MAT provided to legislatures. SSAs believed that a greater understanding of the disease process and of the effectiveness of medications in the treatment of addiction would facilitate more positive and active involvement by the states' legislatures. Overall, when legislation and policy decisions serve as barriers to the use of MAT, adoption may cease almost entirely or be diverted to a limited number of special programs. When governmental policies support MAT, however, it appears that core beliefs in the treatment field may shift and attitudes may become more positive.

Although many of the SSAs were concerned about legislative resistance to MAT, the level of legislative involvement was

diverse across the nation. It is promising that in some states, legislative actions have contributed to increased access to medications through legislative initiatives responsible for implementation of drug courts, as well as legislation that has led to increases in funding for medications in addiction services. State legislatures also were credited with actions regarding changes to medication dispersion statutes, which increase access and workforce capacity by allowing nurse practitioners to dispense medication to clients.

DISCUSSION

Results of this mixed methods study indicate that, from the perspective of the single state authorities, publicly-funded medication-assisted treatment is a priority and worthy of system-wide implementation. As of 2008, medications for the treatment of both alcohol and opioid dependence were offered in most states. Longitudinal data from 2007 to 2008 suggest that states are making strides in the implementation of addiction pharmacotherapies to varying degrees, with methadone consistently reported as the most widely adopted and utilized medication, followed by buprenorphine, naltrexone, and disulfiram, respectively. It is interesting that methadone and buprenorphine ranked as the most commonly adopted medications, despite the infrastructure barriers identified in SSA interviews. Naltrexone and disulfiram were less commonly adopted, yet are less costly and require less physician experience than the opioid substitution medications. Additionally, naltrexone and disulfiram are not "substitution" medications and are therefore not incompatible with "abstinence-only" treatment models (unlike methadone and buprenorphine). The relative underutilization of naltrexone and disulfiram, compared to opioid substitution medications, may be due to several issues. First, results with alcohol medications are less dramatic than with opioid agonists, which are self-reinforcing (Garbutt 2010, 2009; Comer et al. 2005). Second, disulfiram can work well in a monitored alcohol treatment program wherein the pharmacist observes medication ingestion on a daily or every-other-day basis (Brewer 1992). Needless to say, few patients are interested in such arrangements.

In this study, and consistent with related research, many SSA representatives identified a variety of challenges to MAT access and adoption. Medication utilization appears to be inhibited by many key barriers, including policy and regulatory issues, funding or reimbursement factors, a paucity of prescribing physicians, and provider-level attitudes and beliefs about medications, specifically buprenorphine (Mark et al. 2009; Knudsen, Ducharme & Roman 2007; Rieckmann et al. 2007). Accelerating the adoption of medications in substance abuse treatment requires changes in state policy, funding, provider organization, and workforce development, as well as shifts in service delivery patterns and documentation, and provider attitudes and beliefs.

Comprehensive implementation of MAT is a slow-moving process, and SSAs must identify additional strategies to further promote the increased adoption of MAT. A recent study by Wallack and colleagues (2010) examined substance abuse treatment organizations' adoption of buprenorphine and concluded that policies to encourage more widespread agency-level adoption of buprenorphine would be more effective if organizations focused on all three identified internal systems—technical, cultural, and political. Their findings on the impact of the cultural system on adoption, or more specifically, organizational attitudes toward the use of medications, correspond to those of the present study, in which many SSA representatives reported that there was a pervasive negative attitude toward the use of medications in substance abuse treatment or an abstinence-only philosophy that would prevent the effective incorporation of medications.

The findings of the present study, specifically those corresponding to strategies, also are consistent with research that has been conducted in the mental health setting. In a qualitative study on EBP implementation in mental health services, Magnabosco (2006) identified five categories of strategies that can be utilized to reduce barriers to EBP implementation, including state infrastructure building and commitment, financing, and continuous quality management. Findings from the present study are consistent with these strategies to increase adoption of MAT and other EBPs. In particular, infrastructure development was positively related to prioritization and implementation of medication-assisted treatment, especially implementation of buprenorphine and naltrexone. The correlation between buprenorphine and infrastructure development may be related to the need for treatment programs to have access to a physician qualified to prescribe buprenorphine per the Drug Addiction Treatment Act of 2000 (DATA 2000).

Isett and colleagues (2007) also focused on the role of state mental health authorities in evidence-based practice implementation. Financing and regulations, leadership, and training and quality were identified as crucial factors that influence the extent to which specific clinical practices are implemented at the state level. Indeed, SSAs have multiple options to influence provider-level service delivery, including financial incentives, contract language, infrastructure development, education and training, and establishing standards or benchmarks (e.g. National Quality Forum consensus standards). However, Isett and colleagues (2007: 920) are careful to specify that, while state authorities are key to EBP implementation, each specific practice "must be carefully selected because each of the EBPs mobilizes a different set of stakeholder groups, requires different regulations, and encounters different implementation obstacles."

Thus the role of the SSA in treatment service delivery is significant, even pivotal, yet research on *what* state policies, procedures, or strategies should be implemented and *how* changes should be initiated has been limited (Magnabosco

2006; Rapp et al. 2005). The influence of the SSA, which is complicated at best, is driven by state structure, internal and external leadership, funding, relationships with other agencies, visibility, degree of autonomy, and communications and resource management (Gelber & Rinaldo 2005). Results from this study confirm that the SSAs are prioritizing addiction medications and working to implement greater access, but their methods of addressing barriers often may lack a clear or systemic approach. For example, survey respondents did not reflect interdependence with other SSAs or experience with learning from networks of other providers. They often were unclear about policy implications and the most effective methods and language to use in changing administrative rules and regulations to allow for greater access to medications. Undoubtedly, resources also play a significant role in this process and, as many respondents noted, state offices remain short-staffed and underfunded in parallel with their providers. This limited human resource infrastructure also interferes with systemic change by reducing the time available to change policies, procedures, and clinical practice.

Findings from this study also correspond with the literature regarding funding, training needs, and provider acceptance of medications. Respondents repeatedly noted that a lack of resources and workforce support limited their use of medications. Similarly, Ducharme and Abraham (2008) found that Medicaid coverage of buprenorphine is a significant predictor of adoption. Medicaid coverage also is a policy change that states must pursue by modifying their Medicaid formulary to include buprenorphine as a reimbursable treatment option (Ducharme & Abraham 2008). In a recent review article by Garner (2009), receipt of training was cited as an important factor in practitioners' acceptance of buprenorphine specifically. Proctor and colleagues (2007) also report that training costs presented a challenge to EBP implementation in a mental health setting. Although the previous studies were focused primarily on agency directors and counselors, the present findings suggest that state officials also are concerned with similar implementation challenges.

In one attempt to prepare the addiction treatment workforce to effectively interact with individuals who were prescribed buprenorphine for opioid dependence, the National Institute on Drug Abuse (NIDA) and the Substance Abuse and Mental Health Services Administration (SAMHSA) initiated the NIDA/SAMHSA Blending Initiative (Addiction Technology Transfer Center Network 2010; Martino et al. 2010). Through this ongoing initiative, a Blending Team comprising NIDA researchers and Addiction Technology Transfer Center representatives was established to develop an awareness-raising training product focused on buprenorphine. This product, entitled *Buprenorphine Treatment: A Training for Multidisciplinary Addiction Professionals* (Addiction Technology Transfer Center Network 2005) was designed to provide non-physician addiction practitioners with an overview of buprenorphine, its effects, and the role of non-physicians in providing psychosocial treatment to those individuals receiving buprenorphine. Thus, SSAs can utilize the buprenorphine-specific products that have been and continue to be developed through the NIDA/SAMHSA Blending Initiative to further raise the awareness of their providers and encourage increased implementation of this particular pharmacotherapy.

A critical next step in this area of EBP implementation research is to conduct studies that manipulate organizational and provider variables to promote the use of medication-assisted treatment. In addition, further attention to the results and implications of initiatives that are currently underway (e.g. the Robert Wood Johnson Foundation-funded Advancing Recovery program) is warranted. By promoting the adoption of evidence-based medications, SSAs continue to improve the quality of care for, and increase the menu of options available to, substance abuse treatment patients. However, given the slow uptake of medications for use in addiction treatment, past models of diffusion and implementation appear to be underdeveloped or insufficient. Although complicated and challenging, it seems that full-scale adoption will only be achieved with initiatives that address policy, regulatory, organizational, and provider-level factors simultaneously.

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