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Implementation of Network for the Improvement of Addiction Treatment (NIATx) Processes in Substance Use Disorder Treatment Centers

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Abstract

Internal process improvements embedded within the Network for Improvement of Addiction Treatment (NIATx) program are promising innovations for improving substance use disorder (SUD) treatment performance, such as engagement and retention. To date, few studies have examined the variables that may increase diffusion and implementation of NIATx innovations. This study investigates organizational characteristics associated with SUD treatment center utilization of NIATx process improvements in a sample of 458 treatment programs. Overall, 19% had utilized NIATx process improvements. After statistically controlling environmental factors, five organizational variables were associated with the likelihood that treatment centers used NIATx processes. Organization size, administrative intensity, membership in a provider association, and participation in National Institute on Drug Abuse's Clinical Trials Network were positively associated with the odds of utilizing NIATx processes, while the association for the level of slack resources was negative. The findings suggest that policies and related supportive efforts may be required to facilitate diffusion and implementation of NIATx processes to affect SUD treatment center performance and capacity.

Introduction

Effective treatment for substance use disorders (SUD) includes efficient and professional processing of patients from intake into treatment through engagement into the treatment

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process and ultimately to post-treatment follow-up. Along with treatment itself, design and implementation of these processes should be based on the best available evidence.^{1,2}

Developing, promoting and studying the utilization of improved practices for treatment delivery has been the core of the Network for the Improvement of Addiction Treatment (NIATx), founded in 2003 at the University of Wisconsin. Based in industrial engineering concepts, NIATx process improvement strategies alter organizational practices that affect patients' experiences. For example, intake procedures that include burdensome paperwork, impersonal client interactions, and scheduling delays may prevent initiation of treatment and lead to loss of potential patients.³ NIATx process improvements tend to increase patient engagement and retention.⁴ NIATx practices are of a similar genre as total quality management/continuous process improvement (TQM/CPI) practices, which have been found to improve patient care and organizational performance.^{5–11}

Despite the promise of process improvement for increasing the quality of care in the treatment of SUD, research attention to such managerial practices has been minimal compared to adoption of evidence-based treatment practices. NIATx is designed to engage SUD treatment centers in process improvement by targeting highly specific outcomes, such as reduced days between first patient contact to entrance into treatment, reduced 'no show' rates, and enhanced retention in care.¹² The NIATx approach is predicated on the fundamental TQM/CPI assumption that quality improvement requires change in organizational processes.¹³ NIATx's technical support to SUD treatment centers, which includes teleconference calls and onsite visits by coaches, is based on five evidence-based principles: "Understand and involve the customer; Fix the key problems; Pick a powerful change leader; Get ideas from outside the organization; and Use rapid-cycle testing".^{13(p. 2)} NIATx also uses "walk-throughs" in which staff members personally experience the challenges clients face in entering treatment.¹⁴ Process problems identified during the walk-through exercise are addressed using tools available from NIATx such as flowcharting, and the "plan, do, study, act (PDSA)" approach to rapid cycle testing.¹³ The dissemination of NIATx technology and methods to the treatment field, is supported by NIATx materials and case studies available on its website (www.niatx.net).

The evidence supporting NIATx impact is impressive, although this evidence has been exclusively collected by members of the team who have developed and who are committed to diffusing the techniques. These evaluation data have shown that among early NIATx utilizers, average waiting time for treatment declined and patient retention increased significantly across some levels of care.¹² Separate analyses indicated that treatment centers maintained these gains in efficiency and service quality after 20 months.¹⁵ In another cohort of treatment centers, NIATx process improvements also reduced waiting time to treatment and improved retention in care.¹⁵ In a randomized trial of 4 process improvement strategies among 201 treatment providers, waiting time declined and admissions increased for centers receiving NIATx coaching or coaching combined with other collaborative approaches.¹⁴ Other studies have found that NIATx implementation not only improved patient service quality, but also increased short term revenues and treatment center staff enthusiasm and commitment.¹⁶ NIATx improvements were also found to enable treatment providers to better address the treatment of women patients.¹⁷

The current study aims to identify the organizational variables that are related to the likelihood an organization has used the NIATx model for process improvement. As of now, all of the evidence points toward the utility of using NIATx techniques. Conducting a cycle of NIATx-based process improvement requires treatment organizations' commitment of staff and other scarce resources.³ Resources are needed for time-consuming internal analysis of problems and causes, development of new capabilities, the change process itself, and collection of detailed data to monitor results.^{13,16} This study contributes to the literature describing how organizational characteristics predict treatment delivery organizations' dedication of resources to the implementation of innovations other than those involving treatment, and to directly address issues surrounding managerial processes. The result of this study may help facilitate these categories of organizational change that seem increasingly prominent with policy changes such as the Affordable Care Act and implementation of parity in the financial coverage of treatment services.

Organizational characteristics influencing use of NIATx

Previous reviews of contextual variables that facilitate or hinder implementation of quality improvement in health services settings have focused on the 'inner' and 'outer' settings of organizations.¹⁸ The 'outer' setting includes environmental variables such as coercive pressures from regulatory bodies or mimetic pressures to look and act like other organizations in the industry. Because environmental factors are usually beyond the control of SUD treatment center managers but may affect the likelihood of a SUD treatment center undertaking independent efforts to improve internal processes, they are controlled in this study. These variables include connections to a hospital, ownership by any form of government, and the organization's percentage of revenue obtained through fee-for service billing.

The 'inner' setting, which is the primary focus of this study, includes organizational characteristics that may be associated with the utilization of NIATx, such as the number of employees in the organization, level of slack resources, administrative capabilities, concern for financial stability, association with peer organizations, and engagement in other innovations such as NIDA's Clinical Trials Network (CTN).^{18–20} The rationale for investigating these particular organizational characteristics follows.

Across studies, organizational size is frequently positively related with adoption of innovations.^{21,22} Organizations with larger number of employees may be more likely to be aware of alternative innovations like NIATx because there are more staff resources scanning the environment or passively receiving information about innovative practices. Treatment centers with more staff members also may be better able to free staff time needed for activities critical NIATx implementation such as collecting and analyzing detailed data about current operations and identifying areas for possible improvement.^{7,16}

In a similar fashion, having larger numbers of staff members relative to a treatment center's patient census can indicate relative munificence or resource 'slack'. Previous studies have shown that greater resource slack increases the effects of quality management/process improvement efforts on treatment center performance.⁵ The ability of a treatment center to obtain excess resources provides an asset that could be applied to environmental scanning

for available options like NIATx and/or improvement of management processes through NIATx utilization.^{16,23,24}

For SUD treatment organizations, administrative intensity refers to the ratio of administrative staff to counseling and medical staff positions. Greater administrative intensity can indicate that an organization has staff resources needed to better coordinate internal efforts to obtain information about NIATx and manage the changes required by NIATx processes affecting multiple functional areas.^{16, 25,26} Among SUD treatment organizations, considerable financial uncertainty may arise from unpredictable funding from diverse revenue streams and a highly fluid legislative environment.²⁷ In addition, treatment providers may be financially ‘squeezed’ to enhance treatment approaches with evidence-based practices while facing continued limitations in third-party reimbursement.^{5,28} Organizations with greater concerns about financial viability may be more inclined to adopt quality improvements because these changes may increase revenue by engaging more new patients by shortening the delays for entering treatment and increasing retention of existing patients.^{3,29}

An organization’s membership in an association of peer organization can provide important support for undertaking non-traditional activities.³⁰ Association memberships can link treatment centers with others who are aware of and committed to implementing innovations to enhance patient services and treatment. In previous research, Savage and colleagues³¹ found that membership in a provider association was positively related to the likelihood of treatment centers being early adopters of buprenorphine for treating opioid dependence.

An organization’s willingness to adopt innovations may reflect the organization’s strategic orientation. Strategic orientation is linked with clear organizational goals.³³ All organizations must strategically seek opportunities, especially when faced with a changing business environment such as the trends currently confronting SUDs treatment providers.^{5,34,35} Different types of strategic orientation are not mutually exclusive and organizations may engage in multiple sets of behaviors.³⁵ A treatment organization’s membership in NIDA’s Clinical Trials Network (CTN) may indicate a strong orientation toward innovation that may extend beyond the evidence-based treatment focus of CTN to the use of managerial innovations such as NIATx in order to improve treatment delivery and patient outcomes.

Based on this background, the hypothesis examined in this study was:

Hypothesis 1: Organization size, slack resources, administrative intensity, organizational concern for financial strength, membership in an association of provider organizations, and participation in the CTN will have positive relationships with the likelihood of SUD treatment center utilization of NIATx.

Methods

Sample and procedures

The study hypotheses were examined in a sample of 458 SUD treatment organizations that were recruited as part of the National Treatment Center Study (NTCS). The NTCS is a series

of longitudinal studies of national samples of SUD treatment organizations in which the organization is the unit of analysis. The NTCS focuses on samples of specialty organizations available in communities that offer SUDs treatment at least equivalent to structured outpatient programming, as defined by the American Society of Addiction Medicine (ASAM) patient placement criteria. Counselors in private practice, halfway houses, transitional living facilities, programs offering only methadone maintenance, court-ordered driver education classes, and providers located in correctional and Veterans Administration facilities are excluded from participating in the NTCS.

This study focused on 458 SUD treatment organizations that were recruited in two distinct research projects. Both studies were reviewed and approved by the Institutional Review Boards of the University of Georgia and the University of Kentucky. The first project included data collected in 2008–2010 from 153 community treatment programs (CTPs) that were members of the National Institute on Drug Abuse's (NIDA) Clinical Trials Network (CTN). The CTN is a network of researchers and practitioners oriented toward enhancing SUD treatment through clinical trials that test the effectiveness of innovative treatment protocols. In 2008–2010, 224 CTPs were identified as members of the CTN. Data were obtained from 198 of these (88% response rate) through on-site interviews lasting an average of 2.5 hours. Information about whether a CTP had participated in a NIATx process improvement exercise was missing for 5 centers, resulting in a sample of 193 CTPs. Of these, 40 centers exclusively dispensed methadone and operated as opioid treatment programs (OTPs). Because OTPs were ineligible to participate in the second project (described below), OTPs were excluded from these analyses, leaving a sub-sample of 153 treatment centers that provided complete data.

The second research project recruited a national sample of 305 SUDs treatment providers in 2009–2011. To be eligible for this project, centers were required to obtain 50% or more of their revenue through fee-based billings of commercial insurance companies, Medicaid, or Medicare. Such centers, which must compete for more than half of their revenue, have been studied longitudinally within the NTCS for over 15 years. The original sample of organizations was selected through a two-stage sampling protocol, first stratifying counties by size, and then using national and state directories to enumerate treatment facilities within the sampled counties. Treatment centers were then randomly selected within each population stratum. Selected centers were screened to assure that met the eligibility criteria for sources of revenue; ineligible organizations were replaced by random selection from the same population stratum. The sample recruited in 2009–2011 consisted of 327 SUD treatment centers, 83% of which had participated in previous data collections. Consistent with recommendations regarding the handling of missing data in cross-sectional datasets,³⁶ 22 organizations with missing data on the dependent variable were excluded from analysis, resulting in a sample of 305 organizations.

The organizational data collected in the NTCS are generated through face-to-face interviews with administrative and clinical directors of treatment centers who are acting as key informants and who provided informed consent. The administrative director provided data about internal management practices and patient-focused quality improvement practices, while information about patient care was provided by the clinical director. The average

tenure of the center directors recruited in the current study exceeded 8 years, indicating these individuals were knowledgeable about the areas being studied.³⁷

Measures

Utilization of NIATx—Administrative directors were asked, “Has this treatment program actively participated in a NIATx process improvement exercise?” Centers were coded 1 for NIATx utilization and 0 otherwise, and this served as the dependent variable. For centers that had used NIATx, an open-ended question asked respondents to qualitatively describe the type(s) of improvements that the center had sought to make, which were then coded into broad themes.

Organization size—During the interviews, administrative directors reported the size of the center in full-time-equivalent (FTE) employees, which was transformed to its natural logarithm to reduce skew in the distribution of the variable.

Treatment center slack resources—Slack resources were measured as the ratio of the number of FTEs per patient for each center. While not taking the relative resource intensity of alternative types of treatment fully into account, this measure provides an indication of resources available relative to opportunities for use and has been used to operationalize slack resources in other studies of SUD organizations.⁶ This ratio was transformed to its natural logarithm to reduce skew in its distribution.

Administrative intensity—Administrative directors reported the total number of administrative staff and all staff working in the center. Administrative intensity was calculated as the ratio of administrative staff (including the director and non-clinical staff devoted to billing and human resource functions, but not staff responsible for the grounds or building maintenance) to the total number of staff working in the treatment center.

Concern for Financial Strength—During on-site interviews, administrative directors were asked to rate the relative importance of “retaining or securing above average liquidity & financial strength.” Responses ranged from 0 (low importance) to 5 (high importance).

Membership in a provider association—Administrative directors were asked if the treatment center belonged to any provider associations or membership organizations involving treatment programs with common interests. The responses were coded 1 for yes and 0 for no.

Participation in the CTN—Treatment organizations recruited as part of the CTN study were coded 1, while those from the national sample of fee-based centers were coded 0. As noted by McCarty and colleagues,³⁸ the CTN includes the full spectrum of US treatment programs, but participation in the CTN can also indicate that a treatment organization is more willing than other treatment providers to utilize treatment or management innovations.

Environmental control variables—In this analysis, three characteristics of the treatment center’s operating environment were controlled. These variables represent sources of pressures that affect the likelihood of a SUD treatment center undertaking independent

efforts to improve internal processes. These control variables were whether the organization was hospital-based (yes = 1; no = 0); owned by any form of government (yes = 1; no = 0); and the organization's percentage of revenue obtained through fee-for service billing, measured as the sum of the percentages of revenue received by the organization in the past year from commercial insurance, Medicaid, Medicare, and client payments.

Analysis

The analyses focus on the 458 organizations that provided data on NIATx utilization. Using listwise deletion to address missing data within the independent variables would have reduced the sample size by 9.8% (n=45). Multiple imputation by chained equations in *Stata 13* was used to address missing data for the independent variables.³⁹ The command statement for “mi impute chained” included the independent variables, the environmental control variables, and the dependent variable for the 458 cases with data on NIATx utilization; twenty datasets were generated.

Hypotheses were tested by estimating the parameters of logistic regression models using the environmental control variables alone (Model 1) and together with organizational characteristics to predict the likelihood of NIATx utilization (Model 2). This approach afforded the opportunity to observe the relationships of each set of variables with the outcome variables prior to their combined effects.

Results

The organizational and environmental characteristics of organizations within the entire sample, as well as the comparison of NIATx users with non-users are shown in Table 1.

Nineteen percent (86 of 458 treatment centers) had utilized NIATx processes one or more times. During the interviews, treatment center directors who indicated that the center had utilizing NIATx were also asked, “What improvement(s) were you seeking to make?” Of those (with multiple responses coded), approximately 40% described efforts focused on improving patient access to service, 40% on improving patient retention in treatment, 20% on better and faster service to patients including reduction in waiting times from first assessment, 12% on improved use of alternative treatment approaches, and 8% on access and retention of special groups such as adolescents and women.

The study hypothesis was tested by estimating the parameters of two multivariate logistic regression models predicting the likelihood of NIATx utilization. The results of the logistic regression analyses are presented in Table 2. In the first model that contained only the environmental control variables, NIATx utilization was significantly less likely in hospital-based centers, more likely in government-owned organizations, and negatively associated with the percentage of revenues from fee-for-service billing.

As shown in the second model in Table 2, the study hypothesis was partially supported. In the logistic regression model including both organizational variables and environmental control variables (Model 2), organization size, administrative intensity, membership in a provider association, and CTN participation were significantly and positively associated

with the likelihood of NIATx utilization. Contrary to the hypothesis, the relationship between slack resources and NIATx use was significant but negative in sign. Organizational concern about financial strength was not significantly associated with NIATx utilization.

To put these relationships of the organizational variables with NIATx utilization into perspective, odds ratios were calculated. SUD treatment centers that were members of a provider association were about 1.7 times more likely to use NIATx processes than centers that did not belong to a provider association (odds ratio, OR = 1.72). Treatment organizations participating in the CTN were more than twice as likely to use NIATx processes than those in the non-CTN sample (OR = 2.62). A standard deviation change in administrative intensity (SD = 0.19) was associated with a 49% increase in the odds that the center had used NIATx [$1.49 = e^{(2.11)(0.19)}$]. A one-unit increase in the measure of organizational size was associated with a 60% increase in the odds of NIATx usage (OR = 1.60), while a one-unit increase in slack resources was associated with 24% decrease in the odds of having used NIATx (OR = .76). Centers that were government owned were 3.4 times more likely to use NIATx than non-government centers (OR = 3.37).

Discussion

This is the first study to explore characteristics of treatment program organizations in a large national sample that may account for treatment center willingness to utilize NIATx processes for internal improvement. These findings indicate that NIATx processes are not adopted randomly, but are associated with theory-based organizational variables. For the sub-set of treatment centers that have used NIATx processes, the most popular types of improvements align with the core targets that have been central to NIATx itself, namely increasing access to treatment and treatment retention.

In seeking the improvement of SUD treatment, leadership of the field has placed almost exclusive emphasis on the adoption of evidence-based treatment practices (EBPs) and now has shifted this emphasis to the full implementation of these EBPs. However, understanding variables that impact diffusion and implementation of management and internal process improvements is critical for the long term health of the SUD treatment industry.⁴¹ Evidence pointing to the deterioration of the infrastructure of the SUD treatment system includes persistently high levels of clinical and management personnel turnover within treatment organizations^{42, 43} as well as more unpredictable and complex funding patterns than the rest of health care system.^{44,45} The net effect has been reduction in the number and range of medical and social services provided within these programs and increased patient dropout rates.⁴⁶ Previous research has found that the use of total quality management and continuous process improvement efforts may improve SUD treatment center performance.⁵ The gains in efficiency made possible through utilization of NIATx processes offers potential for better utilization of existing treatment infrastructure and resources.

The likelihood of the utilization of NIATx was greater with larger organization size, more administrative intensity, membership in a provider association, and participation in the CTN. Both treatment organization size and administrative intensity indicate the presence of organizational capacity necessary to undertake analysis of current processes as well as

development and implementation of changes while continuing to meet patient treatment needs. Having larger numbers of employees may increase the ability of treatment organizations to ‘free up’ staff resources to delve into problem areas and follow through with improvements identified through such processes as NIATx. Greater administrative intensity may run counter to a belief that SUD treatment programs should ‘run lean’ with minimized administrative infrastructure in order to boost measures of efficiency. However, greater administrative intensity may improve a SUD treatment organization’s ability to effectively provide more comprehensive care for patients because this level of care requires coordination of multiple external providers of wrap-around services that may be critical to patient progress and retention.⁴ In addition, higher levels of administrative intensity may not only facilitate implementation of NIATx improvements, but also help SUD treatment organizations be better prepared for the requirements of healthcare reform.²⁶

The positive relationships for association membership and CTN participation are consistent with Rogers’ predictions that organizational innovation adoption may be linked to engagement with outside influences.²³ Social relationships with other directors through organizational membership where information and influence are shared may reinforce the director’s professional identity and its value. These social pressures may also encourage directors of CTN-affiliated organizations to seek out changes such as internal improvement options through NIATx processes in order to maintain a ‘cutting edge’ reputation among similar treatment providers.²² Participation in the CTN likewise may connect treatment organizations with other SUD providers who focus on undertaking improvements in treatment methods and delivery mechanisms. Interaction with organizations with similar strategic orientations may reinforce the willingness of SUD providers to devote the resources and management effort to such other innovations as NIATx process improvements.

The negative relationship between NIATx use and the level of SUD treatment organization slack resources was surprising. While treatment centers with greater staff resources per patient should have more staff capacity available to undertake non-traditional activities such as process improvements, these treatment centers may feel less pressure to expend resources for NIATx related efforts. Willingness to utilize NIATx processes may reflect greater perceived needs within a treatment center to attract patients and other resources as well as to enhance the organization’s image and legitimacy with the treatment industry. Treatment centers with greater slack resources may be buffered from these demands and therefore less inclined to undertake process improvement efforts. Relative munificence may indicate that a treatment center has already tightened internal processes and therefore its management does not see reasons to participate in NIATx. Slack resources may directly or indirectly support managerial assumptions that things are going well and any form of “tightening” within the system is simply not necessary. From a negative perspective, this inverse relationship may suggest that greater relative resource availability in a center creates a sort of ‘blindness’ to possible improvements that forms a barrier to adoption of innovations. Alternatively, it may be that centers with greater slack resources are devoting those resources toward clinical improvements through the use of evidence-based treatment practices rather than focusing on process improvements. Future research should consider whether organizational slack has different associations for process improvements in relation to clinical improvements through evidence-based practices.

Limitations

The results of this study must be interpreted in light of some weaknesses. First, the data were provided through interviews provided by directors of each of the organizations acting as key informants and could contain inaccuracies unknown to the respondents. Future studies on the use of NIATx might consider a snowball approach, where additional individuals in the organization who participated in the NIATx efforts are interviewed in addition to the director. Second, approximately one-third of the centers in the study sample were selected as members of the CTN and for reasons unrelated to their representativeness of specialty treatment programs. The remaining two-thirds of the sample is representative of privately funded treatment programs, but eligibility criteria for the study mean that the findings may not generalize to programs that depend on governmental funding, specifically those that operate within the Veterans Administration or within tribal health authorities, or those that exclusively offer methadone services. The segment studied here is not trivial however, for our experience in creating the overall universe for sampling privately funded treatment organizations suggest that such centers represent about 40% of the US community-based treatment system. Third, the interview did not measure other specifically named process improvement efforts that SUD treatment centers may have undertaken independent of utilization of NIATx. Fourth, it is unknown whether nonrespondents were more or less likely to have utilized NIATx, which may have some impact on the generalizations that be drawn from the findings. Fifth, the study used cross-sectional data, which cannot support inferences of causality in the relationships between the independent and outcome variables.

A final limitation that warrants further discussion is the issue of an organization's perceived need for improvement in the areas targeted by the NIATx processes. NIATx seeks to improve key performance indicators, such as the average waiting time from when a patient first seeks treatment to the first appointment, treatment engagement, and retention in treatment.¹² The interview did not collect information regarding these performance indicators, so comparisons of NIATx utilizers and non-utilizers on these metrics were not possible. It is unknown whether pre-existing differences in these performance measures serve as the impetus to utilize NIATx process improvement strategies. In prior studies, the NTCS research team attempted to integrate measures of average treatment completion into the interview but found that many organizations could not provide such data because they simply did not track completion rates. It may be that exposure to the NIATx model may prompt some treatment organizations to begin systematically collecting such performance data. For organizations that receive state funding for providing treatment, state substance abuse authorities may also provide the impetus for collecting these data because of the consistency between the NIATx treatment process measures with the Washington Circle measures of treatment initiation and engagement.^{47,48}

Implications for Behavioral Health

From a practical perspective, this study illustrates that the willingness of treatment centers to undertake process improvements through NIATx processes can be explained to a substantial extent by organizational factors. These variables can help define the targets for policy

leaders' efforts to increase the use of process improvement strategies, such as NIATx, to improve critical patient-related outcomes. That is, the view that variables inherent to an organization's structure and context may drive strategic choices regardless of leadership efforts has been suggested by both resource dependence and institutional theories.^{49–51} Among organizational characteristics, a SUD treatment provider's administrative intensity may be underestimated in treatment centers and efforts to minimize administrative capabilities 'run lean', may limit the organization's ability to improve internal processes that in turn lead to better patient services and treatment capacity.

Organizations in the SUD treatment field still face constrained and uncertain resources. Restrictions in third-party treatment reimbursement persist despite Federal "parity" legislation enacted in 2010 that is yet to be fully implemented or enforced.²⁷ As a result, the flow of funding for individual SUD treatment providers remains unpredictable. The Affordable Care Act may present treatment centers with substantial opportunities to resolve some financial uncertainties through access to larger numbers of insured patients, particularly through broadened Medicaid coverage.⁵² However, without attention to internal efficiencies and delivery systems, these new opportunities may be missed by treatment providers whose internal processes impede the growth of caseloads and fail to facilitate quality improvement overall.

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Table 1

Descriptive statistics for full sample and comparison of NIATx users and non-users

	Full Sample Mean (SD) or % (N)	NIATx Users	Non-Users	<i>t</i> or χ^2
Use of NIATx	18.78% (86)	---	---	---
Size (natural-log transformed number of employees) ¹	2.87 (1.01)	3.08 (1.04)	2.82 (1.00)	-2.08 *
Slack resources (natural-log transformed) ²	-2.06 (1.24)	-2.00 (1.29)	-2.07 (1.23)	-0.47
Administrative intensity	0.27 (0.19)	0.30 (0.20)	0.27 (0.19)	-1.39
Financial concerns ³ (scale 0 to 5)	4.22 (1.12)	4.17 (1.22)	4.24 (1.10)	0.46
Member of provider organization	48.68% (221)	63.10% (53)	45.41% (168)	8.58 **
Member of Clinical Trials Network (CTN)	33.41% (153)	50.00% (43)	29.57% (110)	13.11 ***
Based in a hospital	24.89 (113)	10.47% (9)	28.26% (104)	11.81 **
Owned by a government	4.59% (21)	10.47% (9)	3.23% (12)	8.37 **
Percentage of fee-based revenue in the past year	65.45 (35.72)	52.10 (34.80)	68.54 (35.26)	3.84 ***

*
p < .05;**
p < .01,***
p < .001 (two-tailed tests)¹ Mean shown is natural log of 17.60 FTEs.² Mean shown is natural log of .13 FTEs per patient.³ Response options ranged from 0 representing "low importance" to 5 representing "high importance."

Table 2Multivariate logistic regression models of the likelihood of NIATx utilization[/]

	Model 1 Unstandardized Coefficient (SE)	Model 2 Unstandardized Coefficient (SE)
<i>Environmental Control Variables</i>		
Based in a hospital	-1.02 (.39)**	-.76 (.41)
Owned by a government	1.22 (.48)*	1.22 (.50)*
Percentage of fee-based revenue in the past year	-.01 (.00)*	-.01 (.00)
<i>Organizational Characteristics</i>		
Size (natural-log transformed number of employees) [/]		.47 (.15)**
Slack resources (natural-log transformed) ²		-.27 (.14)*
Administrative intensity		2.11 (.74)**
Financial concerns		-.09 (.11)
Member of provider organization		.54 (.27)*
Member of Clinical Trials Network (CTN)		.96 (.35)**

[/]Results from 20 imputed datasets with 458 cases in each dataset.