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Reducing readmissions to detoxification: An interorganizational network perspective

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ABSTRACT

Background: The high cost of detoxification (detox) services and health risks associated with continued substance abuse make readmission to detox an important indicator of poor performance for substance use disorder treatment systems. This study examined the extent to which the structure of local networks available to detox programs affects patients' odds of readmission to detox within 1 year.
Methods: Administrative data from 32 counties in California in 2008–2009 were used to map network ties between programs based on patient transfers. Social network analysis was employed to measure structural features of detox program networks. Contextual predictors included efficiency (proportion of ties within a network that are non-redundant) and out-degree (number of outgoing ties to other programs). A binary mixed model was used to predict the odds of readmission among detox patients in residential (non-hospital) facilities (N = 18,278).
Results: After adjusting for patient-level covariates and continuity of service from detox to outpatient or residential treatment, network efficiency was associated with lower odds of readmission.
Conclusion: The impact of network structure on detox readmissions suggests that the interorganizational context in which detox programs operate may be important for improving continuity of service within substance use disorder treatment systems. Implications for future research are discussed.

1. Introduction

One major service gap in the continuum of care for substance use disorders is the engagement of patients in treatment or rehabilitation after detoxification (detox). Multiple admissions to detox are common in the United States. One study found that one-third of patients received two or more detox services within a 6-month period, indicating not only the chronic nature of addiction but also inadequate care and inefficient use of public resources. In California, for example, only 23% of detox admissions result in transitions to substance use disorder (SUD) treatment (Urada et al., 2010). At the point of discharge from detox, patients are at high risk of relapse and therefore vulnerable to system failures. Detox alone increases patients' risk of mortality from overdose if they do not transition to SUD treatment after discharge (Wines et al., 2007). The need to improve coordination of care from detox to SUD treatment is critical.

Research on the problem of detox readmissions has identified a number of patient- and program-level factors associated with detox readmissions. Patient-level factors associated with detox readmissions include alcohol as the primary drug problem, drug use severity, residential instability, older age, unemployment, single marital status, Hispanic ethnicity, lack of follow-up rehabilitation care, and health coverage through fee-for-service Medicaid plans (Callaghan and Cunningham, 2002; Campbell et al., 2010; Carrier et al., 2011; Mark et al., 2006). Continuity of service between detox and SUD treatment is seen as an important means of reducing readmission to expensive forms of treatment such as detox care, increasing retention in less intensive forms of treatment such as outpatient care, increasing availability of detox for more individuals in need, and ensuring patients are served at the appropriate level of care (Mark et al., 2006; McLellan et al., 2005). Research suggests that program-level factors such as smaller program size, closer proximity between detox and SUD treatment facilities, and discharge planning are associated with continuity of service (Campbell et al., 2010; Carroll et al., 2009; McLellan et al., 2005). Implicit in the continuity of service framework, however, is the existence of interorganizational relationships among SUD treatment programs. Garnick et al. (2009) acknowledges this assumption by noting that the "rationale is that the residential facility has made the connection with the next level of care after discharge" (p. 271). These

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connections, however, cannot be taken for granted given the reputation of SUD treatment systems for being fragmented (McLellan et al., 2003; Saitz et al., 2008).

The current study expands upon prior research on patient- and program-level predictors of detox readmissions by examining the role of interorganizational networks. An interorganizational network perspective assumes that the ability of service organizations to achieve their goals for patient care depends in part on the relationships they have with other organizations. Interorganizational relationships and cooperative arrangements between health and human services providers are associated with improved access to care, enhanced service quality, and reduced costs (Alter and Hage, 1993; Provan and Milward, 1995; Rogers and Whetten, 1982).

1.1. Application of network theory to the problem of continuity of service

Network analysis is a set of theories and methods for studying social interaction among three or more actors, which can be individuals, organizations, or other units of analysis. Network analysis focuses on the relationships between actors rather than the individual attributes of individual actors. This study was grounded in network theory, which explores how network structure affects the availability of resources and performance of organizations. Networks reflect social structures, which are created from various types of exchanges between organizations. Morrissey et al. (1985) called these exchanges "resource flows," and the types of resources in the context of service delivery systems can include referrals, information, and services. Network analysis research has found that social ties are valuable to organizations for the development of financial capital (Uzzi, 1999), innovations (Ahuja, 2000; Burt, 2004; Liebeskind et al., 1996), and integration health and human services (Provan and Milward, 1995; Provan and Sebastian, 1998; Rosenheck et al., 2001).

One structural feature of networks that has been shown to provide individual actors with a competitive edge is known as a "structural hole." Structural holes occur in networks when some actors within the network are not connected to each other. Structural hole theory suggests that if all actors within a network are connected to each other, information and resources become redundant because everyone has access to the same information and resources. Similar to the "theory of weak ties," structural hole theory suggests that having non-redundant ties within an network is advantageous because they can help actors access information and resources outside their social circle (Ahuja, 2000; Burt, 2000; Granovetter, 1973).

Redundancy implies that detox programs and their ties to other detox and SUD treatment programs transfer patients among themselves. These redundant ties create closed organizational networks, which, in the current context, may result in a limited set of treatment options for patients. Structural holes, however, may create opportunities for detox and SUD treatment programs to transfer patients to other programs beyond their immediate network, thereby expanding their referral networks. For a detox program, having a broader range of referral options may facilitate continuity of service for patients if the services provided within the detox program's immediate network are not appropriate for patients' needs and preferences. This study hypothesized that patients served by detox programs with fewer redundant ties in their networks would have lower odds of readmission to detox.

2. Methods

2.1. Sample

This study used administrative data from the California Outcomes Measurement System (CalOMS). CalOMS is a state data collection and reporting system for alcohol and other drug treatment services that reports to the federal Treatment Episode Data Set. CalOMS requires all publicly funded treatment providers to provide admissions and discharge data for all patients regardless of funding source. CalOMS includes information on alcohol and drug use, criminal justice involvement, employment and education, family and social support, and physical and psychological health. The collection form includes 10 items from the Addiction Severity Index (McLellan et al., 1980) and the Drug Abuse Reporting Program (Simpson, 1984; Simpson and Sells, 1982). These scales have been shown to be reliable measures of substance abuse severity (Weisner et al., 2000), particularly among diverse populations (Longabaugh, 1991), allowing for assessment of patient characteristics from intake to discharge.

The administrative data included 150,955 patients who had a total of 440,496 admissions to treatment or detox services from July 1, 2008 to June 30, 2009. The sample of detox patients used for this analysis included all patients in the administrative record who were admitted to a residential detox program between July 1, 2008, and June 30, 2009 ($N = 18{,}278$). The patients were treated by 1600 individual programs or service delivery units, i.e., single programs such as residential rehabilitation and outpatient counseling within service organizations. The data included a total of 57 residential detox programs. To observe readmissions to detox within 1 year of discharge from the initial detox admission, an additional year of data was included in the dataset (July 1, 2009 to June 30, 2010).

2.2. Network analysis

Data from all patients admitted to publicly funded substance use disorder treatment services between July 1, 2008, and June 30, 2010, in 32 California counties were used to identify ties between service units. The 32 counties were selected from a total of 56 counties because they reported admissions data for detox programs in their counties. In the sample, there were 13 large counties (more than 800,000 people), 10 medium counties (250,000–800,000 people), and nine small counties (90,000–250,000 people; CADPAAC, 2006). The majority of detox admissions in the state were from Los Angeles, San Francisco, Alameda, and San Diego counties.

Network ties were based on patient transfers between all types of SUD treatment programs, e.g., free-standing residential detox programs, outpatient detox programs, residential programs, outpatient drug-free programs, and outpatient methadone programs. Transfers were defined as a new admission to any SUD service program within 14 days of discharge from a prior program (Garnick et al., 2002). Transfers, as defined in the current study, can flow in any direction and between all types of programs, e.g., detox to treatment, treatment to detox, detox to detox, and treatment to treatment. That is, programs gain ties when their patients transfer out to other programs and when patients transfer into their program. The networks were based on binary ties; that is, the number of transfers between programs was not considered in this analysis. The 14-day time frame has been used to define patient transfers for the purpose of performance measurement (Garnick et al., 2009). Prior research on transfers in CalOMS found that the mean number of days between services during a transfer was 6.8 and the median was 3 days; therefore, the window of 14 days sufficiently captures most patient transfers (Urada et al., 2010). The network analysis was conducted in UCINET version 6.374, a network analysis software program that calculates quantitative measures of network structure (Borgatti et al., 2002).

2.3. Measures

2.3.1. Dependent variable. The dependent variable was readmission to one or more detox programs within 1 year after discharge