Published in final edited form as:

J Subst Abuse Treat. 2013 September ; 45(3): 280–286. doi:10.1016/j.jsat.2013.02.009.

Medicaid care management: Description of high-cost addictions treatment clients

Charles J. Neighbors, Ph.D. M.B.A.^{a,*}, Yi Sun, M.A.^{b,c}, Rajeev Yerneni, M.B.A.^a, Ed Tesiny, M.S.^b, Constance Burke, M.A.^b, Leland Bardsley, B.A.^a, Rebecca McDonald, M.A.^a, and Jon Morgenstern, Ph.D.^a

^aHealth and Treatment Research and Analysis Division, The National Center on Addiction and Substance Abuse (CASA) at Columbia University, 633 Third Avenue, New York, NY 10017, USA

^bDivision of Outcome Management and System Investment, New York State Office of Alcoholism and Substance Abuse Services (OASAS), 1450 Western Avenue, Albany, NY 12203, USA

^cResearch Foundation for Mental Hygiene, Inc. (RFMH), 150 Broadway Suite 301, Menands, NY 12204, USA

Abstract

High utilizers of alcohol and other drug treatment (AODTx) services are a priority for healthcare cost control. We examine characteristics of Medicaid-funded AODTx clients, comparing three groups: individuals < 90th percentile of AODTx expenditures ($n = 41,054$); high-cost clients in the top decile of AODTx expenditures (HC; $n = 5,718$); and 1760 enrollees in a chronic care management (CM) program for HC clients implemented in 22 counties in New York State. Medicaid and state AODTx registry databases were combined to draw demographic, clinical, social needs and treatment history data. HC clients accounted for 49% of AODTx costs funded by Medicaid. As expected, HC clients had significant social welfare needs, comorbid medical and psychiatric conditions, and use of inpatient services. The CM program was successful in enrolling some high-needs, high-cost clients but faced barriers to reaching the most costly and disengaged individuals.

Keywords

Medicaid; Care management; Costs; Addictions treatment; Healthcare reform

1. Introduction

With the expansion of insurance coverage as well as benefits under healthcare reform, there is a growing economic imperative to better manage care for substance use disorders (Barry & Huskamp, 2011; Buck, 2011). Unlike the treatment for virtually any other health care problem, the overwhelming majority (about 75%) of treatment costs for alcohol and other drug use disorders (AOD) are drawn from public funding (Mark, Coffey, McKusick et al., 2005). Among government agencies, state and local governments fund the largest proportion of treatment services (\$8.4 billion), making up approximately 61% of all public funding. Thus, state and county governments have a huge stake in controlling the costs and improving the quality of AOD treatment.

To contain costs among the highest cost enrollees, state Medicaid programs have been introducing care management (CM) programs during the past two decades to address the particular needs of chronic medical patients that are not necessarily served by the current healthcare delivery system (Gillespie & Rossiter, 2003; Sprague, 2003; Wheatley, 2002). It is well accepted that substance dependence is a chronic condition that shares many features with other chronic conditions, such as asthma, hypertension and diabetes (McLellan, Lewis, O'Brien, & Kleber, 2000). In fact, care management targeting chronic conditions, and specifically AOD, among Medicaid recipients is an important component of healthcare reform efforts legislated in the Affordable Care Act (Patient Protection and Affordable Care Act, 2010). Although features of chronic care management programs vary, in general they are characterized by (1) use of administrative records to identify high-cost utilizers with a particular illness and target outreach; (2) greater patient education and promotion of self-management; (3) coordination of care using dedicated care management staff; (4) encouragement of evidenced-based practices and (5) greater use of clinical feedback information systems to improve care (Crippen, 2002; Krumholz et al., 2006; Short, Mays, & Mittler, 2003; Sprague, 2003).

Logic and evidence suggest that chronic care management programs may be an effective strategy to improve quality and reduce costs for Medicaid enrollees with AOD (Morgenstern et al., 2006; Morgenstern, Hogue, Dauber, Dasaro, and McKay, 2009). However, to the best of our knowledge there has yet to be a demonstration and evaluation of a state-wide care management program under Medicaid specifically targeting high-cost individuals with AOD. Starting in September of 2006, the state of New York implemented a \$25 million chronic care management program—Managed Addiction Treatment Services (MATS)—for high AOD treatment cost Medicaid recipients. The care management program was designed for clients in the 90th percentile of addictions treatment costs paid by Medicaid, generally with annual spending in excess of \$10,000–\$15,000 (varied by county). As is often observed, this group accounted for roughly half of all state spending for AOD treatment. The program designers drew from observations in the field to infer that the majority of these high-cost clients had poorly managed AOD and that they faced significant barriers to effective engagement with treatment. The goal of the intervention was to get clients engaged in appropriate levels of care and to reduce Medicaid costs due to inappropriate or inefficient use of high-cost (e.g., detoxification, inpatient, emergency department) crisis services. The program model presumed that better continuity of addictions treatment as well as connection to mental health care, medical services and the social safety net would lower overall Medicaid spending.

This study is a baseline description of the care management enrollees as well as a description of high-cost clients within the AOD treatment system. The analysis of high-cost clients may serve to inform on the characteristics of clients that would be targets for interventions in future healthcare reform efforts. New York has long covered indigent childless, non-elderly adults under its Medicaid program and has a large and diverse addictions population. Other states will soon extend Medicaid coverage to uninsured low-income individuals, and a disproportionate number of these individuals will be affected by substance use disorders (Donohue, Garfield, & Lave, 2010). As other states expand enrollment yet contend with pressures to contain costs, there may be comparable pressures to focus on high-cost clients and devise interventions to reduce inefficient spending.

In this study we present demographic and clinical characteristics as well as service utilization and cost patterns of the enrolled care management clients as well as high-cost AOD clients in 2008 who met the New York State high-cost threshold. To date, there have not been population-based empirical descriptions of the socio-demographic, clinical, and healthcare utilization characteristics of high-cost clients. Specifically, we were interested in

comparing the high-cost cohort to other individuals receiving AOD treatment to better understand what factors are associated with being a high-cost client as well as what findings indicated about the types of services that might be needed to improve care. This study also compares the clients enrolled in the care management service with non-enrolled high-cost clients. Because program enrollment involves use of administrative data followed by outreach to those who meet criteria, care management programs must devise selection and enrollment strategies to best recruit these clients who may be difficult to locate due to social instability wrought by their substance use disorders.

2. Materials and methods

2.1. Participants

A total of 1760 CM clients were enrolled across 22 counties in New York State (other than New York City) over a two-and-a-quarter-year period ending in December 2008: 160 in the last 3 months of 2006; 798 in 2007; and 802 in 2008. For comparison, we examine Medicaid data for HC ($n = 5,718$) and general AOD treatment clients ($n = 41,054$) in calendar year 2008. HC clients were those for whom Medicaid payments for treatment of substance use disorders equaled or exceeded \$10,000 in 2008, whereas general AOD treatment clients had Medicaid AOD treatment claims less than \$10,000. At the time of the study, New York Medicaid paid on a fee-for-service basis for the vast majority of addictions treatment, including hospital-based detoxification, inpatient rehabilitation, outpatient counseling, and methadone. Data used for analysis are limited to year 2008 for HC and other AOD treatment clients. For CM clients, data for the 12 months immediately preceding admission to the program were used. Descriptive information on healthcare utilization, demographics and clinical characteristics are presented in Table 1.

2.2. Care management program description

An important feature of MATS was that the program was managed at the county level where social services, medical and behavioral healthcare are coordinated. In addition, county governments bear a share of the financial costs for high-cost clients and, thus, had a direct and immediate monetary incentive to coordinate and improve care. Twenty-two counties and the City of New York received contracts to establish county-level care management programs coordinated by the counties' respective MH/substance use disorders agencies with cooperation from the county department of social services (i.e., welfare offices). Program eligibility was determined by the state via a review of Medicaid expenditures after obtaining appropriate patient consents. Care management programs contacted high utilizers and then engaged, assessed, monitored, followed, and linked them to needed care across substance abuse treatment, mental and medical health, and social service systems. Eligible individuals were identified via Medicaid record searches to find those whose cost of AOD treatment exceeded a threshold that approximated the 90th percentile of spending, which ranged between \$10,000 and \$15,000 across counties. Statewide approximately 8,000 individuals in a given year met criteria for the care management program. The counties that participated in the care management program reflect the variability in geographic size, infrastructure, and population density of the state, as well as a range in social, economic and organizational resources.

An important feature of the program was that client participation was voluntary. Consequently, case managers were challenged to locate these often disenfranchised clients and encourage them to enroll. Once clients were enrolled, case managers worked to (1) establish a collaborative treatment plan, (2) provide guidance and support in coordinating welfare benefits, (3) assess MH treatment needs and coordinate care, and (4) assess AOD

treatment needs, coordinate entry into an appropriate level of care, assist in gaining treatment engagement, and monitor treatment progress.

We used Medicaid data to examine history of healthcare utilization for AOD treatment, MH and general medical care. For demographic and clinical characteristics of clients, we used registry data from New York State Office of Alcoholism and Substance Abuse Services (OASAS) that catalogs all admissions and discharges from state-licensed treatment facilities.

2.3. Medicaid

New York State Medicaid encounter and claims data of recipients with any AOD diagnosis or treatment indicator provided by the Department of Health forms the basis of our analytical dataset. Medicaid records contain administrative data for payment of medical, MH, and AOD treatment, as well as months of Medicaid eligibility. Information from diagnoses codes (International Classification of Diseases, Ninth Revision, Clinical Modification; ICD-9-CM), procedure codes (either Current Procedural Terminology (CPT) or Health Care Common Procedure Coding System (HCPCS)), provider type (indicating specialty), and reimbursement rate [Diagnosis-related group (DRG) codes for hospitalizations, state-assigned code for other)] provide us with healthcare utilization statistics. Finally, pharmaceutical data were provided with National Drug Codes (NDC), from which we could classify into drug classes for AOD, MH and other medical treatment using the Lexi-Data basic database software (Lexicomp, 2011).

2.4. OASAS Client Data System (CDS)

All licensed providers of AOD treatment in the state of New York must enter admission and discharge data into the *Client Data System*. When clients start treatment, providers enter information on demographics (e.g., age, race/ethnicity, marital status), level of functioning (e.g., living status, health status, existence of comorbid MH issues), criminal justice status, substance use habits (recent history and frequency), and recent substance use treatment history. OASAS is able to track each individual by creating unique identifiers that are a combination of gender, date of birth, last four digits of the social security number, and first two letters of their last name.

2.5. Linked data

We linked clients in Medicaid to the state treatment registry using the OASAS identifier augmented, in cases where there were no exact matches, by searching for same treatment events that were recorded in each database. Additionally, we employed probabilistic matching techniques to account for data entry errors on elements of the OASAS identifier. We were able to link 88% of all Medicaid clients with any AOD diagnosis or treatment to CDS data.

2.6. Measures

Information obtained from Medicaid claims was used to identify various health conditions based on ICD-9-CM diagnosis fields; AOD treatment episodes based on procedure, rate and NDC codes; and cost categories based on Medicaid payments.

Clients were identified as having serious MH conditions if they were ever diagnosed with any of the following disorders: schizophrenia, major depression, bipolar disorder or other psychosis. Clients were classified as having a chronic physical condition if identified using ICD-9-CM coding for any of the following conditions: COPD, asthma, diabetes or cardiovascular conditions. Additionally, clients with any diagnosis of Hepatitis C and HIV/AIDS were also identified.

Specific treatment episodes such as emergency department visits were identified using a combination of payment rate codes and procedure codes. In particular, AOD treatment episodes which include detoxification services, rehabilitation and outpatient claims were identified using state-specific Medicaid rate codes, procedure codes, and DRG codes.

Medicaid costs were broadly classified into three mutually exclusive categories using all available Medicaid information: AOD treatment, MH, and other general medical services (GMO). Since some AOD treatment claims can also have MH diagnoses identified within the claim, we used the Medicaid rate codes to determine whether reimbursement was sought under AOD treatment or MH treatment funding mechanisms. We also used NDC codes to identify AOD and MH related medication. Any claim that was not classified as AOD treatment or MH was classified as GMO.

From the State registry (CDS) we obtained: education levels, residential status, employment, receipt of state assistance, and criminal justice involvement. We also obtained data on substance use, including the client's primary drug, frequency of use, and whether the client was an injection drug user. For care management clients, information was drawn from their admission into the CM program. For HC and general AOD treatment clients, we use data from the first recorded episode in year 2008.

2.7. Analysis

Descriptive information on three groups—high-cost clients (HC), MATS, and the remaining, general AOD treatment population—is presented in two parts: first we provide information from all clients found in Medicaid then we show results on client characteristics among the sub-set of Medicaid clients found in the CDS. We present means and standard deviations for continuous variables and proportions for discrete variables. We present estimates of effect size rather than statistical significance because the large sample size would suggest many statistically significant differences that were too small to be clinically meaningful. For continuous variables we present Cohen's d , which is a ratio of the difference between group means in the numerator and their pooled standard deviations in the denominator. In essence Cohen's d provides an indication of the size of the differences between groups relative to the variability in the measure. By convention, a ratio of 0.20 is considered small, a ratio of 0.5 is considered medium, and a ratio of 0.8 or greater is considered a large difference (Cohen, 1988). For proportions we present odds ratios to provide an indication of the relative magnitude of difference between groups. For interpretation, we apply threshold values of 0.67 (for odds ratios < 1.0) and 1.50 to select substantive differences then further interpret the odds ratio for clinical meaningfulness (Rosenthal, 1996). We then present two separate logistic regressions to better summarize group differences. Variables in these models reflect the following domains: (1) socio-demographics; (2) individual factors affecting clinical care (e.g., housing instability); (3) substance use; (4) psychiatric comorbidity; (5) medical comorbidity; and (6) history of hospital emergency department use. The first model compares HC to general AOD treatment clients. The second model compares CM to HC clients. All analyses were conducted with STATA II (StataCorp, 2009).

3. Results

3.1. High-cost versus general AOD treatment population

3.1.1. Treatment utilization—Table 1 presents data from Medicaid records on AOD treatment and other healthcare utilization and costs as well as effect size estimates of differences between groups for each variable. By definition, the HC clients had much higher AOD treatment costs and utilization than the general AOD population. These clients represented 12% of the total AOD population, yet accounted for 49% of total AOD

treatment costs paid by Medicaid in 2008. Notably, 76% of HC clients had at least one inpatient rehabilitation admission during the year (compared to 11% of the general AOD population), with 28% of HC clients having more than one rehab admission (compared to 2%). Fifty-four percent of HC clients had an inpatient detoxification episode (compared to 15%), with 30% having more than one detoxification admission. While a comparable proportion of HC as well as general AOD clients had some outpatient treatment (78% versus 82%), HC clients had three times the number of visits [$M = 51.6$ ($SD = 58$) versus 18.7 ($SD = 25$), Cohen's $d = 1.06$]. Mean AOD treatment costs were substantially greater for HC clients [$\$18,052$ ($SD = \$11,059$) versus $\$2,686$ ($SD = \$2,687$), Cohen's $d = 3.23$], with the majority of these costs resulting from inpatient rehabilitation (42%) and detoxification (31%).

3.1.2. Other healthcare utilization and costs—While differences in other costs paid by Medicaid were not as large as with AOD treatment, the HC clients had greater costs for mental and medical health that contributed to their overall burden to Medicaid. The HC clients had twice the MH treatment costs as the general AOD population [$M = \$3,867$ ($SD = 13,081$) versus $\$1,814$ ($SD = 8,837$), Cohen's $d = .21$]. The HC clients also had greater medical, non-behavioral health costs [$M = \$8,885$ ($SD = 18,570$) versus $\$5,591$ ($SD = 12,555$), Cohen's $d = 0.24$]. Notably, the HC clients averaged twice as many emergency department visits as the general AOD population [$M = 2.4$ ($SD = 6.4$) versus 1.09 ($SD = 3.27$), Cohen's $d = 0.38$].

3.1.3. Prior year utilization and costs—To get a sense of consistency in costs and utilization among HC clients, we also examined the group's averages for the prior year. Broadly speaking, utilization for this group was much lower in 2007 compared to 2008, although the averages were still above that of the general AOD population. Mean AOD treatment costs for the HC group were $\$6,477$ ($SD = 13,541$) in 2007. In contrast to their high levels of utilization in 2008, only 27% of HC clients had had at least one detoxification, and 21% had at least one inpatient rehabilitation admission during the prior year. Overall costs to Medicaid were also much lower in the prior year ($M = \$15,215$, $SD = \$27,210$).

3.1.4. Psychiatric and medical comorbidities—Compared to the general AOD population, proportionately more HC clients had a claim that included a diagnosis of a serious mental illness at some point in their histories, with 56% the HC clients being identified with significant MH comorbidity. The most prevalent psychiatric conditions were major depressive and bipolar disorders (35% and 34% of HC clients, respectively). Thirty-nine percent of the HC clients had at least one chronic medical condition. Specifically, HC clients were more likely to have cardiovascular disease (OR = 1.51), COPD (OR = 1.51), and HIV/AIDS (OR = 1.81). Nearly double the proportion of HC clients had a hepatitis C diagnosis compared to the general AOD population, OR = 2.19.

3.1.5. Socio-demographic characteristics—HC clients were significantly older than the general AOD population [$M = 37$ ($SD = 12$) versus $M = 34$ ($SD = 11$), Cohen's $d = 0.266$].

Table 2 includes information from Medicaid clients that were linked to the State treatment registry. We found 79% of general AOD clients and 98% of HC clients in the registry. This higher level of linking for high-cost clients suggests that the HC clients had some level of contact with state licensed AOD treatment providers. Based on data from the CDS, there are no meaningful differences in racial or ethnic composition between groups. HC clients had much greater levels of homelessness (OR = 1.93) and a proportionately higher number of clients were living in institutional settings (e.g., incarcerated, housing programs) prior to

their index treatment episode (OR = 1.66). A lower proportion of the HC clients were employed (6% versus 14%, OR = 0.39). Overall, the HC group had fewer interactions with the criminal justice system, with approximately a third under some form of supervision (e.g., parole, probation) at the moment they were admitted to the index treatment episode, compared to approximately half of the general AOD population (OR = 0.56).

3.1.6. Substance use—As expected, the HC clients had indications of more severe substance use disorders with greater proportions reporting using three or more times per week (46% versus 32%, OR = 1.81) and injection drug use (17% versus 9%, OR = 2.07). Nearly one-third of HC clients reported opiates as their primary drug, compared to little under one-fifth of the general AOD population (OR = 1.95).

3.2. Care management compared to high-cost clients

3.2.1. Treatment utilization—Table 1 also presents data comparing MATS and HC clients. While the CM clients had high utilization and costs relative to the general AOD population, their average utilization and costs were not as high as among HC clients. Overall, Medicaid [\$22,320 (*SD* = \$19,957) versus \$30,938 (*SD* = \$28,041), Cohen's *d* = −0.32] and AOD treatment [\$12,010 (*SD* = \$10,473) versus \$18,052 (*SD* = \$11,059), Cohen's *d* = −0.55] expenses were lower for CM than for HC. Notably, CM clients had lower frequency of detoxification services as well as lower associated costs. Additionally, they had fewer inpatient rehabilitation visits and costs. Conversely, the CM and HC clients had a comparable number of outpatient treatment visits.

3.2.2. Other healthcare utilization—Average spending for MH and other medical treatment was comparable for CM and HC clients. Additionally, while HC clients had more emergency department use, the difference was small.

3.2.3. Psychiatric and other medical comorbidities—CM clients had a slightly higher proportion of individuals who had received a psychiatric diagnosis, with the predominant conditions being major depressive disorder (39%) and bipolar disorder (39%). CM and HC clients looked similar in the level of comorbid chronic medical conditions except for prevalence of HIV/AIDS.

3.2.4. Socio-demographic characteristics—The CM program recruited a larger proportion of women relative to their representation among HC clients (43% versus 30%, OR = 1.76). The program also recruited an older group [age *M* = 40 (*SD* = 10) versus *M* = 37 (*SD* = 12), Cohen's *d* = 0.25].

Table 2 presents data on CM clients drawn from the state treatment registry. We found 99% of the CM clients in the registry. While there were no differences in recruitment of African Americans, the CM program recruited a lower proportion of Latino clients relative to their proportion among HC clients and the general AOD population. Levels of homelessness were comparable for CM and HC clients. A lower proportion of CM clients were employed (4% versus 6%, OR = 0.65). CM and HC clients had comparable levels of criminal justice involvement.

3.2.5. Substance use—CM clients had a smaller proportion of individuals reporting opiates as a primary drug but a larger representation of individuals reporting cocaine and other stimulants as a primary drug. The proportion of injection drug use was comparable. However, a lower proportion of CM clients were reporting using their primary substance three or more times per week (36% versus 46%, OR = 0.66).

3.3. Logistic regression models

3.3.1. HC versus general AOD clients—Table 3 presents odds ratios (and 95% confidence intervals) for the parameters in each of the two logistic regression models. Table 3 presents demographic and substance use related variables and mental health, medical conditions and healthcare utilization. The models include demographically and clinically relevant variables but exclude indicators of AOD treatment utilization and costs since these were used to define the groups and would consequently dominate other variables. The left side presents model results for comparing HC to general AOD clients, while the right side compares CM to HC clients.

Receiver operating characteristics indicate that the HC versus general AOD client model had modest ability to detect high-cost clients (sensitivity = 4.0%). The model labeled very few of the lower cost clients as high costs (specificity = 99.5%). In addition, the majority of individuals labeled as high costs were actually high-cost clients (positive predictive value = 57.7%). Broadly speaking, HC clients were characterized as having more males, more social instability, poorer health, less oversight by the criminal justice system, and more severe substance use disorders relative to the general AOD population. Among indications of social instability, HC clients had greater proportion of homelessness (OR = 1.45, 95% CI = 1.33–1.59) and much lower levels of employment (OR = 0.51, 95% CI = 0.45–0.57). HC clients had higher prevalence of hepatitis C (OR = 1.32, 95% CI = 1.22–1.43), higher costs for emergency department and general medical care. A smaller proportion of HC clients were under criminal justice supervision (OR = .79, 95% CI = 0.74–0.85). HC clients were more likely to report cocaine/stimulants (OR = 2.26, 95% CI = 1.99–2.56), alcohol (OR = 2.27, 95% CI = 2.03–2.53), or opiates (OR = 3.04, 95% CI = 2.65–3.47) as their primary substance, while general AOD clients were more likely to have cannabis as a primary substance. HC clients were more likely to use substances daily (OR = 1.30, 95% CI = 1.22–1.39) and to be injection drug users (OR = 1.35, 95% CI = 1.20–1.51).

As expected, the CM program compared to the HC client model had lower levels of discrimination than the HC model compared to general AOD model. Sensitivity was 1.9%, specificity was 99.2%, and positive predictive value was 43.4%. Broadly speaking, CM clients were older, had fewer males (OR = 0.59, 95% CI = 0.52–0.67), fewer Latinos (OR = 0.58, 95% CI = 0.47–0.73), and were more likely to have stimulants as a primary substance than HC clients (OR = 1.45, 95% CI = 1.12–1.87). CM clients had lower prevalence of HIV/AIDS (OR = 0.51, 95% CI = 0.38–0.68) and cardiovascular conditions (OR = 0.74, 95% CI = 0.61–0.89) and visited hospital emergency departments less frequently than HC clients.

4. Discussion

As healthcare reform efforts evolve, there will be increased interest in understanding the characteristics of high-cost clients and developing programs to address their needs. System-level efforts to address chronic illnesses among high-cost, public-pay clients have been examined extensively in other illnesses; for examples, diabetes and asthma (Crippen, 2002; Gillespie & Rossiter, 2003; Nelson, 2012; Wheatley, 2002). This is the first study to examine a similar effort for AOD disorders. Our study results support the notion that a small proportion of AOD clients account for a disproportionate amount of treatment costs and that this group also has other medical and MH conditions that lead to high Medicaid expenditures. The study also illustrates many of the challenges that states and large health care systems face in serving high-cost, high-needs clients. In particular, care management programs will face challenges in locating and recruiting the highest cost and most socially disconnected Medicaid recipients.

The high-cost AOD treatment clients in Medicaid were only 12% of the AOD treatment population yet accounted for nearly half of all treatment costs. They were frequent users of many expensive inpatient and emergency services. This pattern of utilization may signal wasteful and unnecessary care and may represent a pattern that would benefit from typical managed care solutions; i.e., utilization management and use of care managers to aid in transitions in level of care.

However, examination of differences between high-cost clients and the general AOD treatment population suggests that there may be other underlying reasons that are driving greater use of inpatient and crisis services: greater severity of substance use; major use of alcohol and opiates, which may require inpatient detoxification; greater prevalence of serious mental illness and chronic medical conditions; and greater social instability. When coupled with being older, the general description signals a more chronic, medically and psychiatrically complex and disenfranchised—if not disabled—population. While more research is needed to better understand high-cost client needs, these results suggest that implementation of managed-care-type solutions that foster better transitions between levels of addictions treatment and keep patients engaged longer in AOD outpatient treatment may be insufficient to fully address the challenges presented by this population. Notably, high-cost clients have deficits in social resources (e.g., housing instability, low education, low income) as well as clinical complications that present significant barriers to accessing and effectively engaging with healthcare. Additionally, the existing AOD treatment system is not well designed to assist in overcoming many of these barriers. The treatment system is part of a fragmented healthcare system where provider attitudes, segregated financing, overburdened and under qualified workforces, and privacy laws create large barriers to coordination of care across diverse agencies (Institute of Medicine, 2006).

With respect to the state's care management program, the transient nature of the high-cost population presented challenges for outreach and engagement. Less than a third of potentially eligible clients were enrolled in the care management program. The similarities and differences between the high-cost clients and those enrolled into the care management program are telling. The care management programs were successful in enrolling high-needs clients but did not reach those that were most costly and disengaged. Based on the available data and anecdotes from the field, the care management teams had the most success with clients who were connected to the social safety net or well-known to the treatment system. These care management clients tended to be older and more engaged with local county supportive services. Significantly, the care management program enrolled a disproportionate number of women, which may also suggest that those most connected to the social safety net were more available to the care management program. On the other hand, it is possible that while these clients were not among the most extreme cost outliers for Medicaid spending, they may have been among the costliest users of a non-Medicaid, government funded services at the county level.

Many care management programs have focused on clients with a prior history of high-cost spending to reduce healthcare costs. While looking through administrative billing records for cost outliers is a simple strategy to implement, it has limitations. Specifically, the emphasis on historical cost-outliers is subject to bias from the regression toward the mean phenomena, where prior outliers on a distribution are more likely to have values closer to the population average at subsequent assessment points (Stigler, 1997). To the point, the findings here indicate that the highest cost clients in 2008 were not, as a group, among the highest cost clients in 2007. Ostensibly, prior high-cost clients are less likely to be the highest cost clients in the following year. While concerns about regression towards the mean have been recognized in medicine, and work has been done to devise predictive algorithms of high-future costs (Billings, Dixon, Mijanovich, & Wennberg, 2006; Hughes et al., 2004;

Reid, Roos, MacWilliam, Frohlich, & Black, 2002), these algorithms do not adequately predict high-future costs among AOD populations (Ettner, Frank, McGuire, & Hermann, 2001). Future care management initiatives targeting high-cost AOD clients would benefit from research on predictive modeling for this particular population to better allocate resources.

The study findings must be considered in light of its limitations. First, it provides a cross-sectional snapshot of high-cost clients in a given year. While this description is useful in identifying the qualities of clients during a period of high expenditures, we cannot infer any causal relationships from these findings. Second, we cannot assert that the array of services for high-cost clients is indicative of poor quality care in every case. While these clients are outliers on the distribution of costs for all AOD clients, it may be that in some cases the care is appropriate for their level of need. However, the number of repeated detoxification and inpatient rehabilitation episodes in a single year suggests ineffective care in many cases and the potential for better chronic illness management. Third, this analysis does not provide information on what these clients look like during the period prior to the year in which they became high cost. That is, this analysis does not provide predictive information that may inform selection of clients prior to when they become high cost. It may be that the use of services by these clients will revert to a pattern more representative of the general treatment population in the following year even if they received no care management intervention. Finally, the analyses have the same concerns typical of those commonly associated with administrative data. The data come from a large and varied workforce that is inputting into databases used for program management. While the system has quality controls, there are inevitable data input variations that increase the potential for error. Since the data are used for program monitoring and management, it captures essential administrative information but may not reflect on the full scope of substance-related activity that may be of interest. For example, we have limited information about the context in which substance use is occurring and may also be influencing treatment outcomes. Finally, the analysis focuses on treatment costs as paid by Medicaid, ignoring any utilization of services funded through other sources (e.g., charity care for indigent individuals), and, consequently, does not capture the full scope of treatment and other healthcare-related costs.

In summary, this study provides a baseline description of a statewide care management program as well as provides a statistical description of high-cost AOD clients. Unlike previous studies of high-cost clients, the study benefits from the combination of large administrative databases to document many characteristics of clients in AOD treatment across the state. Additionally, the AOD care management program is the first such Medicaid-based program in a large state with a long history of covering indigent non-elderly childless adults. Care management may be one of the most promising strategies for improving integration of care across fragmented systems for AOD treatment. Notably, care management is the center piece of the Health Home program that is heavily subsidized by the federal government under the Affordable Care Act (Patient Protection and Affordable Care Act, 2010). However, there are few studies that can provide guidance on how to implement care management with high-cost, high severity AOD clients. The current analysis highlights the fact that high-cost clients in AOD treatment systems supported by state governments are disenfranchised and face many barriers to care. These findings are consistent with previous smaller scale studies on frequent utilizers of crises services. The present study extends these findings by documenting that at a state level a small proportion of clients (approximately 10%) account for about half of spending for treatment. However, the members of this outlier group vary from year to year, such that current outlier clients were not necessarily cost-outlier clients in the prior year. Consequently, setting care management eligibility on prior year spending may not be an optimal solution for managing current year costs. Finally, the study found that the care management programs faced

significant challenges in finding and enrolling the most severe cost outliers. The implications for future care management programs are that (1) the group of Medicaid outlier clients need support for a broad array of social, medical, and behavioral health problems, (2) program eligibility should take into account current (rather than prior year) morbidity as well as potential to benefit from added services, and (3) added resources and novel strategies are required to locate and engage disenfranchised clients afflicted with severe substance use disorders.

Acknowledgments

Funding for this study was provided by NIDA grant R01DA23891.

References

- Barry CL, Huskamp HA. Moving beyond parity—Mental health and addiction care under the ACA. *The New England Journal of Medicine*. 2011; 365:973–975. [PubMed: 21848453]
- Billings J, Dixon J, Mijanovich T, Wennberg D. Case finding for patients at risk of readmission to hospital: Development of algorithm to identify high risk patients. *BMJ*. 2006; 333:327. [PubMed: 16815882]
- Buck JA. The looming expansion and transformation of public substance abuse treatment under the Affordable Care Act. *Health Affairs*. 2011; 30:1402–1410. [PubMed: 21821557]
- Cohen, J. Statistical power analysis for the behavioral sciences. 2. Hillsdale, NJ: Lawrence Erlbaum Association; 1988.
- Crippen, DL. Disease management in Medicare: Data analysis and benefit design issues. Washington, D.C: Congressional Budget Office; 2002.
- Donohue, J.; Garfield, R.; Lave, J. The impact of expanded health insurance coverage on individuals with mental illnesses and substance use disorders. 2010. Retrieved from <http://www.wchsa.org/vertical/Sites/%7BB5D9E240-2100-4AE1-B9FD-C91DC7DBA2A5%7D/uploads/%7BEF33AA4A-558D-4D6D-9870-EEFBC0B20FEA%7D.PDF>
- Ettner SL, Frank RG, McGuire TG, Hermann RC. Risk adjustment alternatives in paying for behavioral health care under Medicaid. *Health Services Research*. 2001; 36:793–811. [PubMed: 11508640]
- Gillespie JL, Rossiter LF. Medicaid disease management programs: Finding from three leading U.S. state programs. *Disease Management and Health Outcomes*. 2003; 11:345–361.
- Hughes JS, Averill RF, Eisenhandler J, Goldfield NI, Muldoon J, Neff JM, Gay JC. Clinical Risk Groups (CRGs): A classification system for risk-adjusted capitation-based payment and health care management. *Medical Care*. 2004; 42:81. [PubMed: 14713742]
- Institute of Medicine. Improving the quality of health care for mental and substance-use conditions. Washington, D.C: National Academies Press; 2006.
- Krumholz HM, Currie PM, Riegel B, Phillips CO, Peterson ED, Smith R, Faxon DP. A taxonomy for disease management: A scientific statement from the American Heart Association Disease Management Taxonomy Writing Group. *Circulation*. 2006; 114:1432–1445. [PubMed: 16952985]
- Lexicomp. Lexi-Data Full database (Version Lexi-Data Full 20110613). Denver: Cerner Multum; 2011. Retrieved from <http://www.lexi.com/businesses/solutions/clinical-decision-support/>
- Mark, TL.; Coffey, RM.; McKusick, DR.; Harwood, HJ.; King, EC.; Bouchery, E.; Dilonardo, J. National estimates of expenditures for mental health services and substance abuse treatment, 1991–2001. Rockville, MD: Substance Abuse and Mental Health Administration; 2005.
- McLellan AT, Lewis DC, O'Brien CP, Kleber HD. Drug dependence, a chronic medical illness: Implications for treatment, insurance, and outcomes evaluation. *Journal of the American Medical Association*. 2000; 284:1689–1695. [PubMed: 11015800]
- Morgenstern J, Blanchard KA, McCrady BS, McVeigh KH, Morgan TJ, Pandina RJ. Effectiveness of intensive case management for substance-dependent women receiving temporary assistance for needy families. *American Journal of Public Health*. 2006; 96:2016–2023. [PubMed: 17018819]

- Morgenstern J, Hogue A, Dauber S, Dasaro C, McKay JR. A practical clinical trial of coordinated care management to treat substance use disorders among public assistance beneficiaries. *Journal of Consulting and Clinical Psychology*. 2009; 77:257–269. [PubMed: 19309185]
- Nelson, L. Lessons from Medicare's demonstration projects on disease management and care coordination (2012–01). Washington D.C: 2012. Retrieved from http://www.cbo.gov/ftpdocs/126xx/doc12664/WP2012-01_Nelson_Medicare_DMCC_Demonstrations.pdf
- Patient Protection and Affordable Care Act, Pub. L. No. 111–148, 124 § 2703, 122 Stat. (2010).
- Reid RJ, Roos NP, MacWilliam L, Frohlich N, Black C. Assessing population health care need using a claims-based ACG morbidity measure: A validation analysis in the Province of Manitoba. *Health Services Research*. 2002; 37:1345–1364. [PubMed: 12479500]
- Rosenthal JA. Qualitative descriptors of strength of association and effect size. *Journal of Social Service Research*. 1996; 21:37–59.
- Short A, Mays G, Mittler J. Disease management: A leap of faith to lower-cost, higher-quality health care. *Issue Brief Center for Studying Health Systems Change*. 2003; 69:1–4.
- Sprague L. Disease management to population-based health: Steps in the right direction? *National Health Policy Form Issue Brief*. 2003; 791:1–16.
- StataCorp. STATA Statistical Software. College Station, TX: STATA Corporation; 2009.
- Stigler SM. Regression towards the mean, historically considered. *Statistical Methods in Medical Research*. 1997; 6:103–114. [PubMed: 9261910]
- Wheatley B. Disease management: Findings from leading state programs. *State Coverage Initiatives Issue Brief*. 2002; 3:1–6. [PubMed: 12506930]

Table 1
Baseline characteristics of MATS compared to high-cost (HC) clients and general AOD clients.

Medicaid data	General AOD	Effect size	HC > AOD TX 10 K	Effect size ^d	MATS (CM)
<i>n</i> (48,532)	41,054		5718		1760
Proportion	84.6%		11.8%		3.6%
Costs					
Total Medicaid cost	\$10,256	1.13 ^b	\$30,938	-0.32 ^b	\$22,320
SD	(16,453)*		(28,041)		(19,957)
AOD TX cost	\$2686	3.23 ^b	\$18,052	-0.55 ^b	\$12,010
SD	(2687)		(11,059)		(10,473)
Mental health cost	\$1814	0.21 ^b	\$3867	-0.05 ^b	\$3192
SD	(8837)		(13,081)		(9456)
Medical cost	\$5591	0.24 ^b	\$8885	-0.11 ^b	\$7006
SD	(12,555)		(18,570)		(11,010)
Treatment history—detox utilization/cost					
None	85%		46%		64%
One to two	14%		37%		28%
Three or more	2%		17%		8%
Detox cost	\$325	1.28 ^b	\$5590	-0.31 ^b	\$2412
SD	(1288)		(11,189)		(5795)
Rehab utilization/cost					
None	89%		24%		51%
One to two	10%		64%		44%
Three or more	1%		12%		5%
Rehab cost	\$439	2.42 ^b	\$7648	-0.39 ^b	\$4804
SD	(1522)		(7451)		(6767)
Outpatient					
Outpatient visits	18.76	1.06 ^b	51.58	-0.05 ^b	48.60
SD	(25)		(58)		(55)
Outpatient cost	\$1376	1.14 ^b	\$4106	-0.09 ^b	\$3689

Medicaid data	General AOD	Effect size	HC > AOD TX 10 K	Effect size ^a	MATS (CM)
SD	(1863)		(4649)		(4285)
Emergency room					
ER visits	1.09	0.38 ^b	2.39	-0.12 ^b	1.75
SD	(3.27)		(6.42)		(3.73)
ER cost	\$108	0.42 ^b	\$288	-0.15 ^b	\$178
SD	(319)		(847)		(416)
Demographics					
Gender—male	64%	1.31 ^c	70%	0.57 ^c	57%
Age mean	34	0.26 ^b	37	0.25 ^b	40
SD	(11)		(12)		(10)
Clinical complexity					
Serious MH	39%	1.91 ^c	55%	1.23 ^c	60%
Chronic Conditions (1)	31%	1.42 ^c	39%	1.00 ^c	39%
Hepatitis-C	12%	2.19 ^c	23%	0.94 ^c	22%
Asthma	18%	1.28 ^c	22%	1.00 ^c	22%
Cardiovascular disease	9%	1.51 ^c	13%	0.74 ^c	10%
COPD	9%	1.51 ^c	13%	1.09 ^c	14%
Diabetes	10%	1.23 ^c	12%	0.91 ^c	11%
AIDS	4%	1.81 ^c	7%	0.55 ^c	4%

^a Annotations regarding effect size.

^b Cohen's *d* for mean comparison (continuous variable): $d = \frac{\bar{x}_2 - \bar{x}_1}{s}$, where $s = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2}}$, $s_1^2 = \frac{1}{n_1 - 1} \sum_{j=1}^{n_1} (x_{1j} - \bar{x}_1)^2$ and $i = 1, 2$.

^c OR (odds ratio) for binary variable: $OR = \frac{\text{odds of 2nd group}}{\text{odds of 1st group}} = \frac{(x_2\%)/(1-x_2\%)}{(x_1\%)/(1-x_1\%)}$.

Table 2

Client characteristics drawn from state treatment registry (CDS).

	General AOD linked to CDS	Effect size ^c	HC > AOD TX 10 K	Effect size ^c	MATS (CM)
<i>n</i> (39,781)	32,422 (81.5%)		5614 (14.1%)		1745 (5.4%)
Demographics					
Race—African American	33%	0.83	29%	1.10	31%
Ethnicity—Latino	11%	1.00	11%	0.61	7%
Marital status—never married	60%	0.85	56%	0.89	53%
Housing status					
Homeless	9%	1.93	16%	0.93	15%
Institutional ^a	19%	1.66	28%	1.27	33%
On welfare	38%	1.18	42%	1.38	50%
Employed	14%	0.39	6%	0.65	4%
Criminal justice involved ^b	50%	0.56	36%	0.96	35%
Primary drug usage					
Opiates	18%	1.95	30%	0.66	22%
Alcohol	39%	1.13	42%	1.18	46%
Cocaine	19%	1.00	19%	1.50	26%
Other	24%	0.35	10%	0.57	6%
Smoker	68%	0.84	64%	1.25	69%
Intravenous	9%	2.07	17%	0.73	13%
Frequency of use:					
3 times/week	32%	1.81	46%	0.66	36%

^aSingle resident occupancy (hotel, rooming house, adult home, or residence for adults); OASAS community residence; MH/MRDD community residence; institution other than above (e.g., jail, hospital); other group residential setting (may include group homes, supervised apartments, college housing or military).

^bIn court, on bail or conditional discharge; probationer; alternative-to-incarceration; incarcerated; conditional correctional supervision; parolee.

^cOR (odds ratio) for binary variable: $OR = \frac{\text{odds of 2nd group}}{\text{odds of 1st group}} = \frac{(x_2\%)/(1-x_2\%)}{(x_1\%)/(1-x_1\%)}$.

Table 3

Multivariate regression^{a,b,c} of HC clients on general AOD clients and MATS (CM) enrollees.

	HC vs. general AOD			CM vs. HC		
	AOR	95% CI	CI	AOR	95% CI	CI
Socio-demographics						
Male (vs. female)	1.41 [*]	1.32	1.51	0.59 [*]	0.52	0.67
African American (vs. other race)	1.01	0.94	1.09	0.89	0.78	1.02
Latino (vs. other ethnicity)	1.03	0.94	1.14	0.58 [*]	0.47	0.73
Age—up to 25 (reference)						
Age—25–35	0.98	0.90	1.08	1.91 [*]	1.55	2.36
Age—36–45	1.10 [*]	1.00	1.22	2.68 [*]	2.18	3.30
Age—46–55	1.12 [*]	1.01	1.25	3.17 [*]	2.53	3.98
Age—56 and above	1.18 [*]	1.00	1.41	2.94 [*]	2.11	4.10
Less than HS grad (vs. HS and above)	0.88 [*]	0.82	0.94	1.10	0.97	1.24
Never married (vs. ever)	0.86 [*]	0.81	0.92	0.92	0.81	1.03
Clinical complexities						
Homeless (vs. other)	1.45 [*]	1.33	1.59	0.96	0.82	1.13
On welfare (vs. other income)	0.92 [*]	0.86	0.98	1.18 [*]	1.04	1.32
Criminal justice involved (vs. not)	0.79 [*]	0.74	0.85	1.01	0.89	1.14
Employed (vs. not)	0.51 [*]	0.45	0.57	0.83	0.64	1.09
AOD variables						
Cannabis and other drugs (ref)						
Cocaine primary substance	2.26 [*]	1.99	2.56	1.45 [*]	1.12	1.87
Alcohol primary substance	2.27 [*]	2.03	2.53	1.22	0.96	1.54
Opiate primary substance	3.04 [*]	2.65	3.47	0.96	0.73	1.28
Daily use (vs. other)	1.30 [*]	1.22	1.39	0.76	0.67	0.86
IDU (vs. other)	1.35 [*]	1.20	1.51	1.14	0.90	1.43
Regular user before age 17 (vs. after)	1.04	0.97	1.12	1.12	0.98	1.28

	HC vs. general AOD			CM vs. HC		
	AOR	95% CI	CI	AOR	95% CI	CI
Admitted to intens. residential (vs. not)	1.18 *	1.05	1.31	1.01	0.83	1.23
Mental health						
Bipolar	1.11 *	1.03	1.20	1.14 *	1.00	1.31
Major depression	1.24 *	1.15	1.33	1.12	0.99	1.28
Schizophrenia/other psychosis	0.91 *	0.84	0.99	0.92	0.79	1.07
OMH cost	1.04 *	1.03	1.05	1.03 *	1.01	1.05
Physical health						
Diabetes (vs. not)	0.85 *	0.77	0.94	0.90	0.75	1.08
Cardio-vascular condition (vs. not)	1.04	0.94	1.15	0.74 *	0.61	0.89
AIDS (vs. not)	1.17 *	1.02	1.34	0.51 *	0.38	0.68
Hepatitis (vs. not)	1.32 *	1.22	1.43	0.98	0.85	1.14
Emergency room visits						
0 ER visits (reference)						
1 ER visit	0.92	0.82	1.03	0.75 *	0.60	0.94
2-3 ER visits	0.96	0.84	1.10	0.78	0.61	1.02
4 or more ER visits	1.03	0.88	1.20	0.55 *	0.40	0.75
ER cost	1.13 *	1.11	1.15	1.01 *	0.97	1.05
Other cost	1.07 *	1.06	1.09	0.98	0.95	1.02

*
p < 0.05

^aLogistic regression used data that incorporated both Medicaid and CDS information.

^bVariables with no corresponding values were eliminated in respective models using backward selection.

^cAOD costs and treatment episode (detox, rehab and outpatient) information was not included in the models.