Published in final edited form as:

J Subst Abuse Treat. 2012 December ; 43(4): 389–396. doi:10.1016/j.jsat.2012.06.001.

EFFECT OF QUALITY CHRONIC DISEASE MANAGEMENT FOR ALCOHOL AND DRUG DEPENDENCE ON ADDICTION OUTCOMES

Theresa W. Kim, M.D.^a, Richard Saitz, M.D., M.P.H.^{a,b}, Debbie M. Cheng, Sc.D.^{a,c}, Michael R Winter, M.P.H.^d, Julie Witas, M.S.W.^a, and Jeffrey H. Samet, M.D., M.A., M.P.H.^{a,e}

^aClinical Addiction Research and Education (CARE) Unit, Section of General Internal Medicine, Boston Medical Center, Boston University School of Medicine

^bDepartment of Epidemiology, Boston University School of Public Health, Boston, MA, 02118, USA

^cDepartment of Biostatistics, Boston University School of Public Health, Boston, MA, 02118, USA

^dDepartment of Data Coordinating Center, Boston University School of Public Health, Boston, MA, 02118, USA

^eSocial and Behavioral Sciences, Boston University School of Public Health, Boston, MA, 02118, USA

Abstract

We examined the effect of the quality of primary care-based chronic disease management (CDM) for alcohol and/or other drug (AOD) dependence on addiction outcomes. We assessed quality using 1) a visit frequency-based measure and 2) a self-reported assessment measuring alignment with the chronic care model. The visit frequency-based measure had no significant association with addiction outcomes. The self-reported measure of care - when care was at a CDM clinic - was associated with lower drug addiction severity. The self-reported assessment of care from any healthcare source (CDM clinic or elsewhere) was associated with lower alcohol addiction severity and abstinence. These findings suggest that high quality CDM for AOD dependence may improve addiction outcomes. Quality measures based upon alignment with the chronic care model may better capture features of effective CDM care than a visit frequency measure.

1. Introduction

Although alcohol and other drug (AOD) dependence is characterized as a chronic disease (McLellan, 2000), its treatment in the USA is too often episodic, poorly coordinated, and difficult to access (Institute of Medicine, 2005; Friedmann, Lemon, Stein, & D'Aunno, 2003). Access issues are due to several reasons including lack of insurance, inadequate supply of available treatments in close proximity, and confusing or strict program entry requirements (Institute of Medicine, 2005; Cohen, Feinn, Arias, & Kranzler, 2007). In

© 2012 Elsevier Inc. All rights reserved.

Corresponding author: Theresa W. Kim, Tel: 617-414-6932, fax: 617-414-4676, theresa.kim@bmc.org.

Address for all authors: Boston Medical Center, 801 Massachusetts Avenue, Boston, MA 02118, USA.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

addition, most patients with addictions have medical and/or psychiatric comorbidity (Grant et al., 2004; de Alba, Samet, & Saitz, 2004; Mertens, et al., 2003). Care for conditions in these three spheres often occurs in separate locations and systems, a fact likely responsible in part for poor quality care (Samet, Friedmann, & Saitz, 2001).

There is growing interest in shifting addiction treatment from an “acute care framework” to one that is more suitable for patients with chronic disease (Institute of Medicine, 2005; McKay, 2009). Chronic disease management (CDM) models based on the principles of the chronic care model (Wagner, Austin, & Von Korff, 1996) may improve the quality of addiction care (Institute of Medicine, 2005; Saitz, Larson, LaBelle, Richardson, & Samet, 2008; Watkins, Pincus, Tanielian, & Klein, 2003). As with other chronic diseases such as depression, diabetes, and congestive heart failure (Neumeyer-Gromen, Lampert, Stark, & Kallischnigg, 2004; Gilbody, Bower, Fletcher, Richards, & Sutton, 2006; Blonde, 2000; McAlister, Lawson, Teo, & Armstrong, 2001), CDM for AOD dependence has the potential to improve addiction outcomes by providing patient-centered, longitudinal care to increase the receipt of effective treatments and provide self-management support (Wagner, et al., 2001). Care may be delivered in a flexible manner with treatment intensity and modality responsive to fluctuations in disease severity and other patient needs. A multidisciplinary team can track and coordinate care with the goal of addressing a comprehensive set of needs (addiction, medical, psychiatric, and social) and re-engaging patients who drop out of care. However, despite the potential benefits of CDM for AOD dependence, few data are available about its effectiveness for people with AOD.

Interest in CDM for AOD dependence parallels a realignment of primary care settings to deliver longitudinal, coordinated care for a comprehensive set of health needs, known as the patient centered medical home (PCMH) (American Academy of Family Physicians, et al., 2011). Increasingly, policy makers and others are recognizing the importance of addressing AOD dependence in primary care to potentially realize the benefits of the PCMH (Agency for Healthcare Research and Quality, 2011). The National Committee for Quality Assurance (NCQA) recently added a PCMH accreditation standard to target a mental health, behavioral, or substance abuse “condition” for quality improvement (NCQA’s Patient Centered Medical Home, 2011). Although there is growing support to integrate care for AOD dependence in primary care (Substance Abuse and Mental Health Services Administration, 2011), it is not clear how AOD dependence care should be organized and delivered in the PCMH (Agency for Healthcare Research and Quality, 2011). CDM for AOD shares many of the core tenets of the PCMH and may be an effective strategy for addressing AOD dependence.

Although there is evidence suggesting the efficacy of CDM for AOD dependence, little is known about whether the quality of CDM care should be considered, and if so, how it should be measured. The quality of addiction care has been measured by visit frequency and timing-based measures. The quality of chronic disease management has been measured by self-reported validated scales. How the quality of CDM relates to addiction outcomes is unknown; however, we do know that when offered, most patients with AOD dependence are willing to engage with CDM care (Kim, et al., 2011).

Therefore, the objective of the current study is to examine if higher quality CDM for AOD dependence is associated with better addiction outcomes (abstinence, addiction severity). We hypothesized that receipt of quality CDM care for AOD dependence is associated with abstinence and lower addiction severity which is the primary aim of this analysis. Because CDM care is structured to increase the receipt of effective treatments, the secondary objectives are to examine whether quality CDM care is associated with higher odds of specialty addiction treatment utilization, addiction pharmacotherapy, and mutual help group

attendance. The rationale for examining the latter is that mutual help group attendance is consistent with two chronic care model principles, namely the importance of helping patients develop skills and confidence to manage their addiction (i.e., a self-management plan) and of promoting involvement with community support. Mutual help groups are also often thought to be important components of addiction treatment plans in the U.S.

2. Methods

2.1 Study design

This is a secondary data analysis of data collected during the Addiction Health Evaluation and Disease management (AHEAD) study, a randomized clinical trial of access to a primary care-based CDM clinic for AOD dependence. Details of the study have been published (Kim, et al., 2011). Briefly, eligible participants were adults with AOD dependence (Composite International Diagnostic Interview Short Form, Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998) and any recent (past 30-day) opioid, stimulant, or heavy alcohol use (i.e., >21 drinks in a week or at least 2 days of >5 drinks in a day for men; >14 drinks per week or at least 2 days of drinking >4 for drinks in a day for women) who were willing to establish or continue primary care at Boston Medical Center. Interest in addiction treatment and readiness to change were not required for study enrollment.

Recruitment occurred in several ways: screening in an inpatient detoxification unit, referrals from Boston Medical Center mostly from primary care clinics and the emergency department, and advertising to the general public in medical center public areas, in newspapers and on buses.

After completion of the baseline research interview, subjects were randomized to either have access to the AHEAD study CDM clinic established for that purpose or usual care. All subjects, both intervention and controls, were referred to primary care at Boston Medical Center and were given access to short-term motivational enhancement therapy. All subjects could choose to access medical, psychiatric, and addiction treatment services provided by the hospital or in the community.

For subjects randomized to attend the CDM clinic, research associates accompanied them to their first visit. Subjects were compensated for study procedures completed at study entry, which included the first visit to the CDM clinic for subjects randomized to it. Beyond the initial CDM clinic visit, subjects were neither required to attend nor compensated for additional CDM clinic visits though that clinic remained available to them. In-person research interviews were done at 3, 6, and 12 months after study enrollment. Research associates neither encouraged nor discouraged CDM clinic use.

2.2. Description of the AHEAD Study CDM Clinic

The AHEAD study CDM clinic was located in the primary care clinic at an urban hospital. Treatment goals were to engage patients in longitudinal addiction care, to facilitate access to community resources including specialty addiction care, to communicate with caregivers including primary care providers and to re-engage patients with care after relapse or loss to clinical follow-up (Saitz, Larson, LaBelle, Richardson, & Samet, 2008). CDM system components in the clinic included: 1) multidisciplinary team comprised of a nurse care manager, social worker, internist with addiction specific skills, and psychiatrist; 2) informal linkages to community addiction treatment; 3) a shared electronic medical record with primary care and other medical clinicians; 4) appointment reminders and proactive callbacks; and 5) availability for drop-in care.

The CDM clinic provided some services on-site and facilitated access to needed services provided elsewhere. Addiction specific components of care available in the CDM clinic included negotiation of treatment plans, motivational enhancement therapy (MET), a primary care adaptation of relapse prevention counseling (Friedmann, Saitz, & Samet, 1998), addiction pharmacotherapy (buprenorphine, naltrexone, and/or acamprosate), and referral to methadone maintenance treatment, specialty addiction treatment, and mutual help groups. Psychiatric assessment and treatment as well as case management for concrete needs such as food, transportation, and housing were also available. Although the CDM clinic was co-located with a primary care practice, it provided short-term medical care but not primary care. Instead the nurse care manager facilitated access to primary care, reminded patients to attend or complete evaluations for medical problems with the primary care physician, and coordinated medical and addiction treatment. Although the CDM clinic provided a somewhat diverse set of services, all were focused on improving addictions. All of these services have been conceptualized as such (Saitz, Larson, LaBelle, Richardson, & Samet, 2008).

The initial addiction, medical, and psychosocial clinical assessment in the CDM clinic included feedback, preventive services, initiation of addiction, short-term mental health and medical care, and additional referrals as needed. While there were overall guidelines for care, treatment was individualized based upon a patient's needs, resources (e.g., insurance), and preferences. After the care plan was in place, the nurse care manager kept in contact with the patient to assess needs and help with relapse prevention, facilitate referrals and appointments, and encourage use of CDM services.

2.3. Measures

CDM quality measures—Our analytic models assessed the relationship between CDM quality and addiction outcomes. Three measures of CDM quality were used - a summary of each measure is presented in Table 1. The first quality measure, engagement with CDM clinic care, was based on the Washington Circle (WC) quality measure for outpatient addiction treatment engagement (Garnick, et al., 2002). Because we were interested in evaluating care specifically from the CDM clinic, the WC engagement measure was adapted to only include CDM clinic visits rather than outpatient addiction treatment visits. Engagement with CDM clinic care was defined as 2 or more visits to the CDM clinic within 30 days of "initiation" of care (initiation was at least 1 visit within 14 days of the first ("index") CDM clinic visit) (Kim et al, 2011). This visit frequency-based utilization measure was determined prospectively using electronic medical records adapted for the clinic. Three exposure groups for the engagement analyses were developed: 1) subjects assigned (randomly to) access to the CDM clinic who engaged 2) those assigned access to the CDM clinic who did not engage, and 3) those (randomly) assigned to not have access to the CDM clinic. The rationale for including this third group for comparison is that the specifications of the WC measure of engagement do not include any mention of access to services; patients who receive specified services qualify as having engaged, and those who do not (regardless of the reason) are categorized as not having engaged. Consistent with that approach we did not restrict analyses to those with access to the CDM clinic.

Both the second and third measures of CDM quality were assessed using the Patient Assessment of Chronic Illness Care (PACIC), a widely used 20-item patient-completed survey that measures the extent to which care is aligned with core features of the chronic care model (Table 2) (Glasgow, Nelson, Whitesides, & King, 2005). Higher scores indicate care with more core features of the chronic care model. Specifically, the second quality measure was an assessment of the extent to which care received from *the CDM clinic* contained core components of the chronic care model. This measure (PACIC-CDM clinic)

was assessed with a subset of questions from the PACIC survey (to minimize repetitiveness and subject burden during the interview and to focus on concepts most relevant to the services provided by the CDM clinic while ensuring that at least one question was asked about each core component of the chronic care model (patient activation, delivery system design/decision support, goal setting/tailoring items, problem-solving/contextual issues, and proactive follow-up/coordination of care). Because the questionnaire asks specifically about care provided by the CDM clinic, it was only administered to subjects assigned to have access to the CDM clinic and recalled attending it.

The third quality measure was an assessment of the extent to which care from *any healthcare source* was aligned with the chronic care model using the PACIC questionnaire (the complete instrument). This quality measure (PACIC-any), unlike the PACIC-CDM clinic measure, was assessed for all subjects who received any care related to AOD dependence since study enrollment. Any care included “talking or counseling, medication, groups or other treatments” provided in any healthcare setting, such as “detox, hospital, emergency room, or office” by any “healthcare provider, including doctors, nurses, social workers, counselors or others.”

Both PACIC measures were determined at a 12-month interview after study entry. Given the absence of well-established PACIC score cut-offs and to avoid an assumption of linearity, both PACIC-CDM clinic and PACIC-any scores were categorized based on tertiles of the distributions. Although the PACIC was developed to assess CDM of medical conditions, questions in the PACIC ask about highly valued components of addiction care, such as shared decision making (Institute of Medicine, 2005), proactive follow-up (McKay, 2009), “encouragement to go to a specific group” (e.g. 12-step), and help with planning “to take care of my illness even in hard times” (e.g. relapse prevention counseling).

In sum, the first two quality measures, engagement with the CDM clinic and PACIC-CDM clinic, were an assessment of care provided by the CDM clinic whereas the third quality measure, PACIC-any, reflected care provided by any healthcare provider, AHEAD study-related or otherwise.

Outcome measures—Outcomes were assessed during interviews at 3, 6 and 12 months. Abstinence, the primary outcome, was defined as no opioid or stimulant use, or heavy drinking (>5 drinks per day for men; >4 for drinks per day for women) in the past 30 days. Opioid and stimulant use were assessed by the substance use questions of the Addiction Severity Index (ASI) (McLellan, et al., 1992) and heavy drinking by the 30-day Timeline Followback (Sobell & Sobell, 1992) calendar method. Secondary outcomes included alcohol and drug addiction severity, assessed by the alcohol and drug composite scores of the Addiction Severity Index. Three past 3-month addiction treatment variables (dichotomous) were examined as potential intermediate outcomes of the receipt of quality CDM: 1) specialty addiction treatment defined as outpatient or inpatient addiction treatment excluding detoxification; 2) addiction pharmacotherapy defined as medication to prevent drinking or drug use, help cut-down, or quit, excluding medication for detoxification; and 3) any mutual help group attendance.

2.4. Analytic strategy

Descriptive statistics were used to portray the study sample at baseline. We examine the relationship between measures of CDM quality and each outcome of interest by fitting separate multivariable longitudinal regression models. Generalized estimating equations (GEE) logistic regression models were used to model binary outcomes (i.e. abstinence, utilization of any specialty addiction treatment, any addiction pharmacotherapy, and any mutual help group attendance). Because the distributions of alcohol and drug ASI scores

were non-normal and a suitable transformation was not identified, each variable was categorized into multiple ordered categories. The alcohol ASI composite score cutpoints were: 0; > 0 to 0.1; > 0.1 to 0.2; > 0.2 to 0.4; > 0.4 to 0.6; and > 0.6. The drug ASI composite score cutpoints were: 0; > 0 to 0.1; > 0.1 to 0.2; > 0.2 to 0.3; and > 0.3. The ordered categorical data was then analyzed using GEE proportional odds models. The odds of lower scores (i.e. better outcomes), were modeled for both cases. The GEE approach was used to account for the correlation from using repeated observations from the same subject over time. An independence working correlation was used and empirical standard errors from the GEE approach are reported for all analyses.

Different analytic samples were used based on the independent variables and outcomes analyzed. A summary of the criteria used to comprise the analytic samples is presented in Table 1. Subjects with at least one follow-up interview were eligible for all analyses. Analyses of alcohol and drug severity included only subjects with any alcohol dependence ($n = 409$) and any drug dependence ($n = 458$), respectively at study entry. There were additional criteria for the PACIC-CDM clinic and PACIC-any analyses. Both analyses included subjects who completed those interviews (done at 12-months). PACIC-CDM clinic analyses, however, only included those who had been randomly assigned to have access to the CDM clinic and recalled attending it. Those without access to the CDM clinic were not included. Analyses of care provided by any health care source (PACIC-any) measure consisted of those who reported receipt of any care for AOD dependence since study enrollment with no distinction made to indicate whether subjects were in the intervention or control arms of the randomized study.

All regression models were fit with a single main independent variable of interest and the following covariates: age, sex, race/ethnicity, an indicator variable for time since enrollment (3, 6, or 12 months), homelessness (any night on the street or in a shelter, past 3 months), and moderate to severe depression (PHQ-9 score > 10 ; Kroenke, Spitzer, & Williams, 2001) – the latter 2 were modeled as time-dependent variables. Alcohol and drug severity analyses also included baseline alcohol and drug severity, respectively. Prior to regression modeling, potential collinearity among covariates was assessed by calculating the correlation between all independent variables and covariates, and no pair of variables had a Spearman correlation > 0.40 . Due to the exploratory nature of the analyses, no adjustments were made for multiple comparisons. However, pair-wise comparisons were not made unless the global p-value for the CDM measure was statistically significant ($p < 0.05$). All statistical analyses were performed using SAS version 9.2 (SAS Institute, Inc., NC, USA).

3. Results

3.1. Sample characteristics

This study's analytic samples were derived from the AHEAD study randomized trial. Among the 655 eligible adults, 563 (87%) were randomized in the AHEAD intervention trial. Ninety eight percent of those randomized completed at least one follow-up interview (89%, 87%, and 95% at 3, 6, and 12-month interviews, respectively). There was no significant difference between the proportion of the intervention and control groups interviewed at each follow-up.

Among the 563 subjects enrolled in the AHEAD intervention trial, 553 (98%) had at least one follow-up interview (analytic sample for the CDM clinic engagement analyses). Among the 270 subjects assigned access to the CDM clinic, 249 (92%) completed a 12-month follow-up interview, attended the clinic and recalled doing so comprising the analytic sample for PACIC-CDM clinic analyses. The analytic sample for the 'any care' (PACIC-any)

analyses was 451 (those who completed the 12-month interview [532] and reported receipt of care for AOD dependence from any healthcare source since study enrollment).

The analytic sample for the engagement analyses (Table 3) had the following characteristics: men (73%); non-white (53%); homeless (59%); had both alcohol and drug dependence (66%); a comorbid substance abuse-related medical condition (65%); and moderate to severe depression (84%). At baseline, a low percentage had past 3-month utilization of specialty treatment (34%) or addiction pharmacotherapy (6%), yet nearly half had mutual help group attendance. Approximately a quarter of the subjects with access to the CDM clinic met criteria for engagement (23%). Approximately a third of the sample was abstinent at follow-up (35%, 34%, and 43% at 3, 6, and 12-month interviews, respectively) (Table 4).

3.2. Multivariable regression results

No significant group differences were detected for the effect of engagement in CDM on abstinence or drug and alcohol addiction severity (Table 4).

Receipt of higher quality CDM from the clinic as reflected by higher PACIC-CDM scores was significantly associated with lower drug addiction severity (global p -value = 0.03) (adjusted odds ratio [AOR] 1.71; 95% Confidence Interval [CI] 1.13, 2.59, highest vs. middle tertile). No significant associations were detected between PACIC-CDM clinic scores and abstinence or alcohol addiction severity.

Higher PACIC-any scores, reflecting the quality of care received anywhere, were associated with higher odds of abstinence (global p -value < 0.001) (AOR 1.99 95% CI: 1.34, 2.95, highest vs. lowest tertile; AOR 1.75 95% CI: 1.24, 2.48, highest vs. middle tertile) and lower alcohol severity (global p -value = 0.02) (AOR 1.68 95% CI: 1.16, 2.45 for highest vs. middle tertile). Higher PACIC-any scores appeared to be associated with lower drug addiction severity but the global association was not statistically significant (p =0.09).

Upon examination of secondary outcomes, all measures of quality CDM care (Table 1) were significantly associated with specialty addiction treatment utilization (Table 5). Engagement was also associated with higher odds of addiction pharmacotherapy (AOR 3.55 95% CI: 2.02, 6.25) but not with mutual help group attendance. Each PACIC measure, reflecting care from the CDM clinic (PACIC-CDM clinic) or any healthcare source (PACIC-any) was associated with higher odds of mutual help group attendance, but neither was significantly associated with utilization of addiction pharmacotherapy.

4. Discussion

To date, the most widely accepted measures of the quality of addiction care are based on visit frequency. In this sample of adults with AOD dependence, a measure of CDM care quality based on visit frequency - engagement - was not associated with abstinence or addiction severity despite being associated with receipt of specific addiction treatments (e.g., pharmacotherapies). However, a self-reported quality measure assessing alignment with the chronic care model was associated with several addiction outcomes. Specifically, those who received care from any healthcare source with core features of the chronic care model were more likely to be abstinent from heroin, cocaine, and heavy drinking and among those with alcohol dependence to have lower alcohol addiction severity. Those who received higher quality care specifically from the CDM clinic were more likely to have lower drug addiction severity.

The lack of significant associations between CDM engagement and abstinence or addiction severity is notable. Engagement with CDM care as measured by visit frequency is likely a

necessary minimum first step that can lead to receipt of known efficacious treatments; however in this cohort, adults with comorbidity and social ills (e.g., homelessness), it was not sufficient for improving addiction outcomes.

Findings were clearer and more consistent when the predictor of interest was the self-report quality measure of alignment with the chronic care model regardless of the source of care. Analyses examining care quality from any health care source are informative because individuals with AOD dependence often receive episodic acute care services (e.g. in detoxification units or emergency departments) rather than longitudinal comprehensive chronic care. Among patients with chronic medical conditions including diabetes mellitus, asthma, coronary artery disease, and chronic pain, higher PACIC scores (indicating care with more features of the chronic care model) were associated with more self-management behaviors (e.g., regular exercise; Schillinger, Wang, Handley, & Hammer, 2009) and higher quality of life (Schmittdiel et al., 2007). Our results suggest that receipt of care for AOD dependence that includes components of the chronic care model is also important for addiction treatment effectiveness.

Although the quality of CDM care from any health care source was significantly associated with abstinence and alcohol addiction severity, analyses of drug addiction severity did not quite achieve statistical significance. We did find, however, that drug addiction severity was significantly associated with the quality of care from the CDM clinic. It is possible that this finding was related to the way that services were organized in the CDM clinic. For example, the clinic provided some psychiatric services on-site and facilitated linkage to other psychiatric services. This may have been particularly helpful for those with drug dependence because of the higher mental health comorbidity rate for patients with drug dependence (Grant et al., 2004). Also, since drug dependence is more difficult to treat without addiction pharmacotherapy, we postulated that greater access to addiction pharmacotherapy in the CDM clinic may have contributed to these findings. However, we did not find that the quality of care from the CDM clinic or from any source of addiction treatment was associated with higher odds of addiction pharmacotherapy receipt.

These differences should not be overstated and are only hypothesis-generating. Although there were differences in these analyses, overall, our main findings are that regardless of the source of care, the quality of CDM care matters and that a quality assessment based upon the content of care appears to have predictive validity but a visit-based, frequency measure does not. The fact that the results of utilization analyses were the same for each PACIC measure, (i.e., significant associations for specialty addiction treatment and mutual help group attendance but not addiction pharmacotherapy) support the finding that both PACIC measures assessed similar constructs regardless of the source of care. Both PACIC measures seem to be assessing something different than the engagement measure as indicated by the engagement association with addiction pharmacotherapy but not mutual help group attendance.

All quality measures were associated with higher odds of utilization of specialty addiction treatment. This is not insignificant because successful referrals to “off-site” addiction treatment providers with whom the CDM clinic did not have formal referral relationships can be particularly challenging (Gurewich, Sirkin, & Shepard, 2012) and linkage to outside resources is an important component of chronic care models (Wagner, Austin, & Von Korff, 1996).

This study adds to the literature supporting the benefits of longitudinal, integrated care for patients with AOD dependence by showing that the quality of CDM can contribute to improved outcomes. O’Toole et al. (2011) found that primary care with elements of the

chronic care model customized for homeless patients, of whom 70% had alcohol abuse, was associated with better medical outcomes (blood pressure, glycemic control, and lipid levels). Alcohol use outcomes were not reported. Among patients in addiction treatment, Chi et al. (2011) found that continuing care, defined as having yearly primary care and specialty addiction and psychiatric care when needed, was associated with abstinence over a 9-year follow-up period. The current study contributes to this literature by examining addiction outcomes from a type of care that may facilitate receipt of primary, psychiatric, and specialty care that was also structured to provide self-management support and other elements of the chronic care model.

This study has several limitations. Due to the study's observational design, it is possible that patients who were abstinent (or had lower addiction severity) tended to rate treatment more favorably. However, we used prospectively collected data to assess addiction outcomes over a 12-month study follow up period adjusted for potential determinants of care (i.e., gender, race/ethnicity, homelessness, and depression). Additionally, the PACIC is an instrument that assesses implementation of the chronic care model rather than simply patient satisfaction. Nonetheless we cannot exclude the possibility that unmeasured factors influenced which participants rated treatment with high PACIC scores and also influenced addiction outcomes. We did not have information about the type of addiction treatment participants were rating. However, the question of interest was not the specific treatment modality but rather receipt of care with core features of the chronic care model. Given that there are few data about CDM for AOD dependence, these findings serve as a "proof of concept" study. Future study should examine types of care that deliver high quality CDM.

Another limitation of this study is the method used to model exposure and outcome. Assessment of CDM quality was done at the 12-month study interview and addiction outcomes were measured prospectively at 3, 6, and 12-month interviews. Subjects may have rated care that was received after the addiction outcome was measured. Studies are needed to prospectively examine the receipt of care delivered before the assessment of addiction outcomes. Finally, generalizability is another consideration. The majority of participants were recruited from a detoxification unit and most participants had social and psychiatric comorbidities such as homelessness and depression. This study's findings may not generalize to primary care patients seeking addiction treatment or individuals with less social and psychiatric comorbidity. On the other hand, it is precisely these sorts of populations who need and could potentially benefit from high quality integrated and coordinated care.

This study's strengths include prospective data collection and a high proportion assessed at follow-up. In addition to process measures of care such as receipt of addiction treatment and addiction pharmacotherapy, we examined outcomes with clear clinical significance (i.e., abstinence and severity). Additionally, we used a measure based on the NCQA/HEDIS quality performance measure for addiction treatment engagement to define engagement with the particular treatment of interest in this study, CDM. Also, this was an innovative analysis using a tool (PACIC) not often applied to addiction care that may be increasingly used to evaluate the quality of care consistent with CDM in the patient-centered medical home.

Given the need for improvement of the quality of care for patients with addictions, chronic disease management shows some promise for improving patient receipt of effective treatments, thereby improving outcomes. These data support efforts to improve care for patients with addictions that integrate medical, mental health and addiction services, provide longitudinal coordinated care and care that pro-actively follows patients. These data also suggest that as such efforts become more common, attention will need to be paid to the quality of care - how it reflects key features of the chronic care model - to assure the effectiveness of primary care based chronic disease management for AOD dependence.

In conclusion, this study provides empirical data that suggest that receipt of quality CDM for AOD dependence is associated with improved processes of care and better outcomes. Furthermore, our results suggest that widely used visit-based frequency measures may be inadequate for capturing characteristics of CDM that are associated with better outcomes, characteristics better captured by self-report measures of exposure to elements of chronic care management.

Acknowledgments

We presented an earlier version of the manuscript as an oral presentation at the Addiction Health Services Research Conference, Fairfax, VA on October 4, 2011. This study was supported by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) Grant R01 AA010870 and the National Institute on Drug Abuse (NIDA) Grant R01 DA010019. This work was also supported in part by the Boston University Clinical Translational Science Institute from the National Center for Research Resources (UL1-RR025771). The sponsors had no further role in the study design; collection, analysis, and/or interpretation of the data; in the writing of the report; or in the decision to submit the paper for publication. The content is solely the responsibility of the authors and does not necessarily represent the official views of NIDA, NIAAA, or the National Institutes of Health.

REFERENCES

- American Academy of Family Physicians (AAFP). American Academy of Pediatrics (AAP). American College of Physicians (ACP). American Osteopathic Association (AOA). [Accessed February 2, 2011] Guidelines for Patient-Centered Medical Home Recognition and Accreditation Programs. http://www.acponline.org/running_practice/pcmh/understanding/educ-joint-principles.pdf
- Agency for Healthcare Research and Quality (AHRQ). [Accessed Nov 7, 2011] What is the PCMH? AHRQ's definition of the medical home. 2011. http://pcmh.ahrq.gov/portal/server.pt/community/pcmh_home/1483/PCMH_Defining%20the%20PCMH_v2
- Blonde L. Disease management approaches to type 2 diabetes. *Managed Care*. 2000; 9:18–23. [PubMed: 11729413]
- Chi FW, Parthasarathy S, Mertens JR, Weisner CM. Continuing care and long-term substance use outcomes in managed care: Early evidence for a primary care-based model. *Psychiatric Services*. 2011; 62:1194–1200. [PubMed: 21969646]
- Croghn, TW.; Brown, JD. Integrating mental health treatment into the Patient Centered Medical Home. Rockville, MD: 2010. Agency of Healthcare Research and Quality Publication No. 10-0084-EF
- De Alba I, Samet JH, Saitz R. Burden of medical illness in drug and alcohol dependent persons without primary care. *American Journal of Addictions*. 2004; 13:33–45.
- Friedmann PD, Saitz R, Samet JH. Management of adults recovering from alcohol or other drug problems: relapse prevention in primary care. *Journal of American Medical Association*. 1998; 279:1227–1231.
- Friedmann PD, Lemon SC, Stein MD, D'Aunno TA. Accessibility of addiction treatment results from a national survey of outpatients substance abuse treatment organization. *Health Services Research*. 2003; 38:887–903. [PubMed: 12822917]
- Garnick DW, Lee MT, Chalk M, Gastfriend D, Horgan CM, McCorry F, McLellan AT, Merrick EL. Establishing the feasibility of performance measures for alcohol and other drugs. *Journal of Substance Abuse Treatment Services*. 2002; 23:375–385.
- Glasgow RE, Wagner E, Schaefer J, Mahoney LD, Reid RJ, Greene SM. Development and validation of the Patient Assessment of Chronic Illness Care (PACIC). *Medical Care*. 2005; 43:436–444. [PubMed: 15838407]
- Glasgow RE, Nelson CC, Whitesides H, King DK. Use of the Patient Assessment of Chronic Illness Care (PACIC) with diabetic patients: Relationship to patient characteristics, receipt of care, and self-management. *Diabetes Care*. 2005; 28:2655–2661. [PubMed: 16249535]
- Gilbody S, Bower P, Fletcher J, Richards D, Sutton AJ. Collaborative care for depression: a cumulative meta-analysis and review of longer-term outcomes. *Archives of Internal Medicine*. 2006; 166:2314–2321. [PubMed: 17130383]

- Grant B, Stinson FS, Dawson DA, Chou SP, Dufour MC, Compton W, Pickering RP, Kaplan K. Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Archives of General Psychiatry*. 2004; 61:807–816. [PubMed: 15289279]
- Gurewicz D, Sirkin JT, Shepard DS. On-site provision of substance abuse treatment services at community health center. *Journal of Substance Abuse Treatment*. 2012; 42:339–45. [PubMed: 22116010]
- Cohen E, Feinn R, Arias A, Kranzler HR. Alcohol treatment utilization: findings from the National Epidemiologic Survey on Alcohol and Related Conditions. *Drug and Alcohol Dependence*. 2007; 12:214–21. [PubMed: 16919401]
- Institute of Medicine. Improving the quality of healthcare for mental and substance-use conditions. National Academies Press; Washington, DC: 2006.
- Kessler RC, Andrews G, Mroczek D, Ustun B, Wittchen HU. The World Health Organization Composite International Diagnostic Interview Short Form (CIDI-SF). *International Journal of Methods Psychiatric Research*. 1998; 7:171–185.
- Kim TW, Saitz R, Cheng DM, Winter MR, Witas J, Samet JH. Initiation and engagement in chronic disease management care for substance dependence. *Drug and Alcohol Dependence*. 2011; 115:80–86. [PubMed: 21168981]
- Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine*. 2001; 16:606–13. [PubMed: 11556941]
- McAlister FA, Lawson FM, Teo KK, Armstrong PW. A systematic review of randomized trials of disease management programs in heart failure. *American Journal Medicine*. 2001; 110:378–384.
- McLellan AT, Kushner H, Metzger, Peters R, Smith I, Grissom G, Pettinati H, Argeriou M. The fifth edition of the addiction severity index. *Journal of Substance Abuse Treatment*. 1992; 9:199–213. [PubMed: 1334156]
- McLellan AT, Lewis DC, O'Brien CP. Drug dependence: a chronic medical illness: implications for treatment, insurance, and outcome evaluations. *Journal of the American Medical Association*. 2000; 284:1689–1695. [PubMed: 11015800]
- McKay JR. Continuing care research: What we have learned and where are we going. *Journal of Substance Abuse Treatment*. 2009; 36:131–45. [PubMed: 19161894]
- Mertens JR, Lu YW, Parthasarathy S, Moore C, Weisner CM. Medical and psychiatric conditions of alcohol and drug treatment patients in an HMO: comparison with matched controls. *Archives Internal Medicine*. 2003; 163:2511–2517.
- National Committee for Quality Assurance. [accessed January 31, 2012] Patient centered medical home (PCMH) overview white paper. 2011. <http://www.ncqa.org/tabid/1302/Default.aspx>
- Neumeyer-Gromen A, Lampert T, Stark K, Kallischnigg G. Disease management programs for depression: a systematic review and meta-analysis of randomized controlled trials. *Medical Care*. 2004; 42:1211–1221. [PubMed: 15550801]
- O'Toole TP, Buckei L, Bourgault C, Blumen J, Redihan SG, Jiang L, Friedmann P. Applying the chronic care model to homeless veterans: effect of a population approach to primary care on utilization and clinical outcomes. *American Journal of Public Health*. 2011; 100:2493–2499.
- Saitz R, Larson MJ, LaBelle C, Richardson J, Samet JH. The case for Chronic Disease Management for Addiction. *Journal of Addiction Medicine*. 2008; 2:55–65. [PubMed: 19809579]
- Samet JH, Friedmann P, Saitz R. Benefits of linking primary medical care and substance abuse services: patient, provider, and societal perspectiveness. *Archives of Internal Medicine*. 2001; 161:85–91. [PubMed: 11146702]
- Schilinger D, Wang F, Handley M, Hammer H. Effects of self-management support on structure, process, and outcomes among vulnerable patients with diabetes. *Diabetes Care*. 2009; 32:559–66. [PubMed: 19131469]
- Schmittiel J, Mosen DM, Glasgow RE, Hibbard J, Remmers C, Bellows J. Patient-Assessment of Chronic Illness Care (PACIC) and improved patient-centered outcomes for chronic conditions. *Journal of General Internal Medicine*. 2007; 23:77–80. [PubMed: 18030539]

- Substance Abuse and Mental Health Services Administration. [Accessed January 30, 2012] SAMHSA-HRSA Center for Integrated Health Solutions. <http://www.integration.samhsa.gov/about-us/what-is-integrated-care>
- Sobell, L.; Sobell, M. Timeline Followback (TLFB). User's Manual. Addiction Research Foundation; Toronto, Canada: 1995.
- Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, Bonomie A. Improving chronic illness care: translating evidence into action. *Health Affairs*. 2001; 20:64–78. [PubMed: 11816692]
- Wagner EH, Austin BT, Von Korff M. Organizing care for patients with chronic illness. *Milbank Q*. 1996; 74:511–544. [PubMed: 8941260]
- Watkins K, Pincus HA, Tanielian TL, Klein DJ. Using the chronic care model to improve treatment of alcohol use disorders in primary care settings. *Journal of Studies on Alcohol*. 2003; 64:209–18. [PubMed: 12713194]

Table 1

Description of measures of the quality of chronic disease management (CDM) care for alcohol and other drug (AOD) dependence

	Definition	Analytic sample	Exposure categories
Engagement ^a	At least 2 visits to the CDM clinic within 30 days of initiation of care (initiation=2 visits within 14 days of study enrollment)	Subjects with any follow-up data (n=553) ^b	Engagement No engagement No access to the CDM clinic
PACIC-CDM clinic ^C	Measure of the degree that care delivered by the <i>CDM clinic</i> is aligned with core components of the chronic care model ^C	Subjects assigned access to the CDM clinic with 12-month follow-up data (n=249) ^d	PACIC-CDM clinic summary score (tertiles)
PACIC-any ^e	Measure of the degree that care for addictions delivered by <i>any healthcare provider</i> is aligned with core components of the chronic care model	Subjects who received any care for addictions from any healthcare provider since study enrollment with 12-month follow-up data (n=451) ^f	PACIC summary score (tertiles)

^aBased upon the Washington Circle measure of treatment engagement

^bAlcohol and drug addiction severity analyses limited to subjects with alcohol dependence ("alcohol subsample") n=409 and drug dependence ("drug subsample") n=458, respectively.

^CPatient Assessment of Chronic Illness Care (PACIC)

^dAlcohol subsample: n=184 and Drug subsample: n=208

^eAny care for alcohol or other drug problems includes counseling, medication, groups or other treatments provided in any healthcare setting, such as detox, hospital, emergency room, or office by any healthcare provider, including doctors, nurses, social workers, or counselors.

^fAlcohol subsample: n=320 and Drug subsample: n=378

Table 2Summary of item content for Patient Assessment of Chronic Illness Care (PACIC) ^a

Chronic care model core component	Description	PACIC Survey Question
Patient activation	Actions that solicit patient input and involvement in decision-making	1) Asked for my ideas when my healthcare provider made a treatment plan ^b 2) Given choices about treatment to think about ^b 3) Asked about problems with medications
Delivery system design, decision support	Actions that organize care and provide information for patients to enhance their understanding of care	4) Given written list of things to do to improve my health ^b 5) Satisfied that care was well-organized ^b 6) Shown how what I did to take care of my illness influenced my condition
Goal setting, tailoring items	Acquiring information for and setting of specific collaborative goals	7) Asked to talk about my goals in caring for my illness ^b 8) Helped to set specific goals to improve my eating or exercise 9) Given a copy of my treatment plan 10) Encouraged to go to a specific group or class to help you cope with <i>your addiction</i> 11) Asked questions, either directly or on a survey, about your health habits
Problem-solving, contextual issues	Considering potential barriers and the patient's social and cultural environment in making treatment plans	12) Sure that my doctor/nurse caring for my <i>addiction</i> thought about my values and my traditions when they recommended treatment ^b 13) Helped to make treatment plan that I could do in my daily life ^b 14) Helped to plan ahead so I could take care of my illness even in hard times 15) Asked how <i>addiction</i> affects my life.
Proactive follow-up, coordination of care	Arranging care that extends and reinforces office-based treatment and making proactive contact with patients to assess progress and coordinate care	16) Contacted after a visit to see how things were going 17) Encouraged to attend programs in the community that could help you 18) Referred to a dietician, health educator, or counselor 19) Told how visits with other types of doctors or health professionals helps my treatment 20) Asked how visits with other doctors or health professionals were going ^b

^aPACIC is a 20-item instrument, response scores range from 1-5 with higher scores indicating care that is more consistent with the chronic care model. The summary score is the mean score of all individual survey items. The word "addiction" was used in place of "my illness".

^bPACIC questions used to assess the quality of care from the CDM clinic based upon services provided in the CDM clinic.

Table 3

Characteristics of subjects with alcohol and/or other drug dependence enrolled in a trial of access to a primary care based chronic disease management (CDM)care with follow-up data(N=553)

Baseline	N (%) ^a
Age, median years (25 th , 75 th quartiles)	39 (29, 46)
Male	404 (73)
Race/ethnicity , non-white	293 (53)
Homeless, any (past 3 month)	327 (59)
Dependence, type ^b	
Alcohol only	65 (12)
Drug only	123 (22)
Drug and alcohol	365 (66)
Alcohol addiction severity, mean (std) ^c	0.63 (0.25)
Drug addiction severity, mean (std) ^d	0.34 (0.12)
Heroin, any (past 30 days)	329 (60)
Cocaine, any (past 30 days)	375 (68)
Heavy alcohol, any (past 30 days)	433 (78)
Depression, moderate or severe ^e	460 (84)
Substance disorder-related medical condition ^f ,lifetime	358 (65)
Specialty addiction treatment, any (past 3 month)	189 (34)
Addiction pharmacotherapy, any (past 3 month)	33 (6)
Mutual help group attendance, any (past 3 month)	265 (48)
Engagement with CDM clinic care ^g	127 (23)
PACIC-CDM clinic score, tertiles ^{h, i}	
Highest	4.29 - 5
Middle	3.43 - < 4.29
Lowest	1 - < 3.43
PACIC-any score, tertiles ^{h, j}	
Highest	3.70 - 5
Middle	2.95 - < 3.70
Lowest	1 - < 2.95

^aUnless otherwise indicated

^bComposite International Diagnostic Interview-Short Form

^cAmong subjects with alcohol dependence and recent heavy alcohol use, n = 409

^dAmong subjects with drug dependence and recent drug use, n = 458

^ePatient Health Questionnaire (PHQ-9) Score 10

^fIncludes seizures, heart failure, atrial fibrillation, rapid heart beat, hepatitis, cirrhosis, peripheral neuropathy, cancer of mouth/esophagus/stomach, skin infections, pneumonia, tuberculosis, gastritis, pancreatitis, anemia, septic arthritis, endocarditis, or blood clots.

^g Among subjects randomly assigned access to the CDM clinic, n = 270

^h PACIC score range: 1-5 with higher scores indicating care with more core features of the chronic care model.

ⁱ Measure of the degree that care delivered by the *CDM clinic* is aligned with core components of the chronic care model

^j Measure of the degree that care for addictions delivered by any healthcare provider is aligned with core components of the chronic care model

Table 4

Outcome variable distributions by time point (n [%])

	3 months (n = 500)	6 months (n = 487)	12 months (n = 532)
Abstinence	177 (35)	164 (34)	229 (43)
Alcohol addiction severity ^{a, b}			
0	28 (8)	41 (11)	53 (14)
> 0 - 0.2	122 (33)	121 (33)	142 (36)
> 0.2 - 0.4	95 (26)	103 (28)	88 (22)
> 0.4 - 0.6	61 (18)	43 (12)	61 (16)
> 0.6	62 (17)	56 (15)	49 (13)
Drug addiction severity ^{a, c}			
0	15 (4)	20 (5)	37 (8)
> 0 - 0.1	125 (31)	136 (34)	167 (38)
> 0.1 - 0.2	130 (32)	119 (30)	126 (29)
> 0.2 - 0.3	70 (17)	76 (19)	64 (15)
> 0.3	70 (17)	51 (13)	47 (11)
Specialty addiction treatment ^d	280 (56)	226 (47)	218 (41)
Addiction pharmacotherapy ^d	86 (17)	83 (17)	97 (18)
Mutual help group ^c	275 (55)	268 (55)	294 (55)

^aAddiction Severity Index^bSubjects with alcohol dependence and recent heavy use who completed interviews at 3-months (n=369), 6-months (n=364), and 12-months (n=394).^cSubjects with drug dependence and recent use who completed interviews at 3-months (n =411); 6-months (n= 402); and 12-months (n=441).^dPast 3 months

Table 5

Multivariable associations of 3 measures of high quality chronic disease management (CDM) care and addiction outcomes^a

	Abstinence Global p-value AOR (95% CI)	Lower alcohol addiction severity Global p-value AOR (95% CI)	Lower drug addiction severity Global p-value AOR (95% CI)
Engagement with CDM clinic care ^b			
Yes	0.2 0.94 (0.61, 1.43)	0.8 1.08 (0.64, 1.82)	0.4 0.86 (0.59, 1.26)
No	0.76 (0.56, 1.03)	0.94 (0.69, 1.27)	0.84 (0.64, 1.10)
Control	1	1	1
PACIC-CDM clinic (tertiles) ^c			
Highest	0.1 1.71 (1.00, 2.94)	0.2 1.22 (0.69, 2.13)	0.03 ^e 1.15 (0.71, 1.86)
Middle	1.19 (0.69, 2.03)	0.78 (0.46, 1.35)	0.67 (0.43, 1.06)
Lowest	1	1	1
PACIC-any (tertiles)			
Highest	0.0005 ^f 1.99 (1.34, 2.95)	0.02 ^g 1.24 (0.81, 1.88)	0.09 1.45 (1.04, 2.04)
Middle	1.13 (0.76, 1.68)	0.73 (0.49, 1.10)	1.25 (0.89, 1.76)
Lowest	1	1	1

^aResult of separate multivariable longitudinal regression models predicting abstinence (GEE logistic regression for engagement) and lower alcohol and drug addiction severity (GEE proportional odds model).

All models include age, sex, race/ethnicity, time, homelessness, and depression (PHQ-9). Alcohol and drug addiction severity models also include baseline alcohol and drug addiction severity, respectively.

^bEngagement defined as at least 2 visits to the CDM clinic within 30 days of CDM clinic initiation. Analytic samples consist of subjects with follow up data (n=553); Alcohol and drug addiction severity analyses limited to subjects with alcohol dependence ("alcohol subsample") (n=409) and drug dependence ("drug subsample") (n=458), respectively.

^cPACIC-CDM clinic defined as the degree that care delivered by the CDM clinic was aligned with core features of the chronic care model. Analytic samples consist of subjects randomized to have access to AHEAD CDM care with 12-month interview data (n=249); alcohol subsample (n=184); drug subsample (n=208). PACIC-CDM clinic score tertiles: highest 4.29 - 5, middle: 3.43 - 4.29, lowest: 1 - 3.43.

^dPACIC-any defined as the degree that care delivered by any healthcare source is aligned with core features of the chronic care model. Analytic samples consist of subjects with 12-month interview data who received any care for alcohol or other drug dependence since study entry (n=451); alcohol subsample (n=320); drug subsample (n=378). PACIC-any tertiles: highest 3.70 - 5; middle: 2.95 - 3.70, lowest: 1 - 2.95

^eHighest vs middle PACIC-CDM clinic tertile predicting lower drug severity

\$watermark-text

\$watermark-text

\$watermark-text

^fHighest vs middle PACIC-any tertile predicting abstinence **AOR 95%CI: 1.75 (1.24, 2.48)**
Highest vs lowest PACIC-any tertile predicting abstinence **AOR 95%CI: 1.99 (1.34, 2.95)**
^gHighest vs middle PACIC-any tertile predicting lower alcohol severity **AOR 95%CI: 1.68 (1.16, 2.45)**

Table 6

Association of receipt of high quality chronic disease management and utilization of specialty addiction treatment, addiction pharmacotherapy, and mutual help group ^a

	Specialty addiction treatment Global p-value AOR (95% CI)	Addiction pharmacotherapy Global p-value AOR (95% CI)	Mutual help 12-step group Global p-value AOR (95% CI)
Engagement with CDDM			
Yes	0.001 2.34 (1.51, 3.64)	0.0008 3.55 (2.02, 6.25)	0.2 1.18 (0.74, 1.87)
No	1.24 (0.94, 1.64)	1.50 (0.99, 2.27)	0.81 (0.59, 1.09)
Control	1	1	1
PACIC-CDM clinic (tertiles)			
Highest	0.004 2.13 (1.31, 3.45)	0.5 1.33 (0.70, 2.49)	0.02 1.88 (1.12, 3.14)
Middle	2.00 (1.21, 3.30)	0.93 (0.49, 1.76)	2.09 (1.22, 3.60)
Lowest	1	1	1
PACIC-any (tertiles)			
Highest	0.002 1.83 (1.30, 2.59)	0.4 1.37 (0.84, 2.26)	0.007 1.86 (1.26, 2.75)
Middle	1.18 (0.83, 1.67)	1.27 (0.77, 2.09)	1.49 (1.02, 2.18)
Lowest	1	1	1

^aResults of separate multivariable logistic regression models for each outcome and each main independent variable.

Specialty addiction treatment defined as outpatient or inpatient addiction treatment excluding detoxification; addiction pharmacotherapy as medication to prevent drinking or drug use, help cut-down, or quit (not for detoxification); and mutual help, 12-step (e.g., AA) groups.

All models include age, sex, race/ethnicity and the following time-varying covariates: homeless (Y/N), depression (PHQ-9), alcohol and drug severity, time since study enrollment (3.6, or 12 months).

Analytic sample sizes: Engagement with CDDM clinic care = 553 PACIC-CDM clinic = 249 PACIC-any = 451