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The Primary Care Access Referral, and Evaluation (PCARE) Study: A Randomized Trial of Medical Care Management for Community Mental Health Settings

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Abstract

Objective—Poor quality of health care contributes to impaired health and excess mortality in individuals with severe mental disorders. This study tests a population-based medical care management intervention to improve primary medical care in community mental health settings.

Method—A total of 407 subjects with severe mental illnesses at an urban community mental health center were randomized to either care management or usual care. For individuals in the intervention group, care managers provided communication and advocacy with medical providers, health education for patients, and support in overcoming system-level fragmentation and barriers to primary medical care.

Results—At 12-month follow-up, the intervention group received an average of 58.7% of recommended preventive services, compared to 21.8% in the usual care group ($p<0.001$). They received a significantly higher proportion of evidence-based services for cardiometabolic conditions (34.9% vs. 27.7%, $p=0.03$), and were more likely to have a primary care provider (71.2% vs. 51.9%, $p=0.003$). On the SF-36, the intervention group showed significant improvement on the Mental Component Summary score (8.0% improvement in intervention versus 1.1% decline in the control group, $p=0.008$) with a nonsigificant improvement on the Physical Component Summary score. Among subjects with available laboratory data, Framingham Cardiovascular Risk Scores were significantly lower (better) for intervention (6.9%) than control (9.8%) subjects ($p=0.02$).

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None of the other authors report any potential conflicts of interest.

Conclusions—Medical care management was associated with significant improvements in quality and outcomes of primary care. The findings suggest that care management is a promising approach for improving medical care for patients treated in community mental health settings.

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Introduction

Recent studies have demonstrated that public mental health clients die as much as 25 years earlier than the general population, largely due to medical causes rather than suicides and accidental deaths.[1], Standardized mortality ratios for medical deaths are between 1.5 and 3 times the rate for persons without mental disorders, [2,3] and this differential mortality gap appears to be increasing over time.[4]

Poor quality of medical care appears to be an important factor contributing to this excess morbidity and mortality seen in persons with severe mental disorders. For persons with mental illness after hospitalization for myocardial infarction, quality deficits may explain as much as half of the excess death rates.[5] Persons with severe mental disorders may be at risk for poor quality across a broad range of medical conditions, including diabetes,[6] asthma,[7] routine preventive services, [8] and cardiometabolic risk factors.[9]

A series of provider, patient, and system factors, acting individually and in conjunction, are likely to contribute to the quality deficits in persons with severe mental disorders. For mental health clinicians, provider factors include lack of knowledge or comfort with medical issues and lack of time and resources to address these problems in their busy practices.[10] For primary care providers, analogous problems include lack of knowledge of, or comfort with, populations with mental disorders, and clinical demands that make it difficult to address multiple comorbidities.[11] Patient factors are problems directly resulting from mental symptoms, including amotivation, cognitive limitations, and poverty. These may lead to deficiencies in consumers' capacity to serve as effective agents and self-advocates in obtaining the services they need. System factors include fragmentation and financing challenges that limit the ability to provide medical care within mental health facilities, and challenges in referring and coordinating care offsite.

Although there is little research on strategies for improving medical care in persons with severe mental illnesses, several studies have demonstrated the potential to improve quality of care in this population.[12] A randomized trial of clients with severe mental illness at a Veterans Affairs Medical Center found that an onsite, collocated medical clinic was associated with improved quality of care and health outcomes. [13] Other studies have demonstrated the potential benefits of organized models for linking patients from emergency care to outpatient medical follow-up[14] and of providing medical consultation in inpatient settings.[15] Similarly promising results have been found in pilot programs targeting persons with schizophrenia,[16] bipolar disorder,[17] and older populations.[18]

Serving more than 3.5 million adults with mental illness each year, Community Mental Health Centers (CMHCs) are perhaps the most important point of entry to the health care system for persons with severe mental disorders.[19] Based on the growing literature on excess medical morbidity and mortality in persons with severe mental disorders, CMHC administrators are increasingly interested in assessing and addressing the medical problems of the persons they serve.

However, CMHCs currently have few evidence-based approaches to improving primary care in the patients they serve. CMHCs typically lack the economies of scale and resources to deliver a full range of medical services onsite,[19] making fully collocated approaches less

feasible than in larger, quasi-integrated systems such as the VA Healthcare System. They need to simultaneously address the needs of patients across a range of medical and mental diagnoses, requiring approaches that can be implemented across multiple conditions. Care is likely to require involvement of community medical providers, however access to and quality of primary medical care for CMHC patients in the community is typically substandard.[20]

In general medical settings, there is increasing interest in the use of care managers to help improve quality and coordinate care for patients treated across multiple systems of care. Rather than provide direct medical care, these staff provide education, advocacy, and logistical support to help them navigate through the healthcare system. Care management is one of the central "active ingredients" of multifaceted approaches designed to improve chronic illness care.[21] It has also been successfully implemented as a standalone intervention for major depression,[22] and other chronic medical conditions. [23, 24,25] Care coordination, one of the core tasks of these care managers, has been designated by the IOM as a top priority for transforming health care. [26]

This study is the first to test a population-based approach for improving primary medical care in community mental health settings. We hypothesized that persons with care management would have a greater improvement in quality of primary care (primary outcome) and in health-related quality of life as compared with the usual care group.

Method

The Primary Care Access Referral, and Evaluation (PCARE) study is a randomized trial examining the impact of population-based medical care management on quality of care for persons with severe mental disorders. All study participants gave written, informed consent, and the study was approved by the University's Institutional Review Board.

Study Setting

The study was conducted in an urban community mental health center in Atlanta, Georgia. Its target population is individuals age 18 and older from the area who are economically disadvantaged and who experience serious and persistent mental illness with or without comorbid addictive disorders. The clinic does not provide any formal medical or mental health care management or any onsite medical care.

Sample Recruitment

The sample was recruited through a combination of flyers posted at the CMHC, waiting room recruitment, and through provider referrals, with approximately 1/3 of potential subjects identified through each of the three approaches. This hybrid method has been recommended as a strategy for balancing between recruitment efficiency and representativeness in health services intervention trials.[27] To be eligible, subjects had to be on the active patient roster at the CMHC, have a severe mental illness, [28] and have the capacity to provide informed consent. Inclusion criteria were purposely kept broad to optimize generalizability to other community mental health settings. Subjects were enrolled between September 1st 2004 and April 1st 2007.

Measures

Reviews of all medical and mental health charts at baseline and 12-month follow-up were used to assess quality of preventive and cardiometabolic care. An interview battery administered at baseline, 6 and 12-months was used to assess report of a source of usual

care, health-related quality of life, and to identify sites for all medical and mental health service use.

Quality of primary care was assessed at baseline and 12 months using 25 indicators indicators drawn from the U.S. Preventive Services Task Force (USPSTF) guidelines. A total of 23 indicators were included, across four domains: 1. physical examination (blood pressure check, eye examination, height/weight check, oral examination, breast examination, mammogram, and pelvic examination). 2. Screening tests: (cholesterol, fecal blood screening, HIV screening, sigmoid screening, and TB screening). 3. Vaccinations (influenza, hepatitis B, MMR, pneumovax, tetanus-diptheria, and varicella) 4. Education: (exercise, self-examination, smoking, nutrition, and weight). [29] The primary study outcome was an aggregate preventive services score, representing the proportion of services for which an individual was eligible that were obtained by the subject.

Among individuals with a cardiometabolic condition (diabetes, hypertension, hypercholesterolemia, or coronary artery disease), quality indicators were drawn from chart reviews using the RAND Community Quality Index (CQI) study.[30] These include chart-based quality indicators for diabetes (7 measures), hypertension (28 measures), hyperlipidemia (7 measures), and coronary artery disease (3 measures). An aggregate cardiometabolic score was calculated to reflect the mean value for any given individual across these cardiometabolic risk factors.[30] The Framingham Cardiovascular Risk Index, which estimates the 10-year risk of developing incident coronary heart disease, was assessed among the subset of individuals with available values for blood glucose, total cholesterol, and HDL cholesterol. It is calculated based on a weighted score based on age, blood pressure (4 levels), smoking status (yes/no), diabetes (yes/no), total cholesterol (3 categories), and HDL cholesterol (3 categories). This measure required that values be available for all of the components of the summary, and thus was considered an exploratory outcome.

Presence of a primary care provider was defined as self-report of a usual source of care other than the emergency room in conjunction with presence of one or more documented primary care visit during the past year.

Health-related quality of life was assessed using the SF-36. A summary Physical Component Summary (PCS) and Mental Component Summary (MCS) score can be constructed from the survey, scored between 0 (poor health) to 100 (perfect health). [31] The oblique method, which is the preferred approach when examining persons with comorbid physical and mental conditions,[32, 33] was selected *a priori* as the approach for calculating the summary scores. Individual subscales were also calculated and presented to provide context for these summary scores.[34]

Randomization

Using a computerized algorithm, patients were randomized to the intervention or usual care group by the project manager. After randomization, interviews were administered at 6 and 12 months. Interviewers were blinded to subjects' randomization status.

Intervention

Two full-time registered nurses followed a manualized protocol for care based on standardized approaches documented in the care management literature.[35] The program was targeted to help overcome the patient, provider, and system-level barriers to primary medical care experienced by persons with mental disorders.

To address patient barriers to primary care, the care manager used strategies to enhance activation by providing information about the patient's medical conditions; available medical providers in the community, and upcoming appointments. A laminated booklet was provided to the patient with updated information at each meeting.' Motivational interviewing techniques, which seek to understand patient concerns from within their frame of reference, monitor their readiness to change, and to reinforce patient autonomy rather than work though direct persuasion, were used to help support patient self-management skills.[36] Action plans, comprising goals for medical care or lifestyle change, were used to foster health behavior change, as well as helping patients to become more active participants in their healthcare.[37]

To overcome the provider barriers to primary care, the care manager served as an advocate and a conduit with specialty medical and mental health providers. The care manager developed and maintained a provider list; with the subject's permission, providers were notified about changes in the patient's medication regimen and medical status. Coaching was provided to patients to help them interact more effectively with their providers. As needed, the care manager accompanied patients to visits to specialty providers.

To address system-level barriers to care, the care manager worked to help enroll uninsured patients in entitlement programs, including Medicaid (for eligible persons), public transportation tokens were provided as needed to ensure that patients were able to attend all medical visits. Strategies for troubleshooting childcare and other factors that hinder clients' ability to attend appointments were also addressed.

Usual Care

Subjects assigned to usual care were given a list with contact information for local primary care medical clinics that accept uninsured and Medicaid clients. Subsequently, subjects were free to obtain any medical care or other services.

Statistical Analysis

All analyses were conducted as intent-to-treat. Bivariate analyses were used to examine differences between the intervention and usual care groups on demographic and clinical variables at baseline, to assess adequacy of randomization, as well as at each follow-up period. The primary analytic technique for assessing statistically significant changes in outcome variables was random regression. This method makes it possible to compare the difference in change between groups over time, and to conduct intent-to-treat analyses that include subjects with missing data at one or more follow-up periods. Analyses conducted using the SAS MIXED procedure for continuous variables and PROC GENMOD for binary and ordinal variables. For each outcome measure, the model assessed the outcome as a function of 1) randomization group 2) time since randomization and 3) group*time interaction. The group*time interaction, which reflects the relative difference in change in the parameters over time, was the primary reflection of statistical significance.

Results

Patient Flow (Figure 1)

Figure 1 presents the flow of patients from screening through 12-month follow-up. A total of 758 patients were assessed for eligibility; of these, 167 were excluded for not meeting the inclusion criteria (with the most common reason because they were not on the active patient roster of the CMHC) and an additional 184 not wishing to participate. A total of 407 subjects provided informed consent and were randomized. Of those randomized, 73% completed 6 month interviews and 68.1% completed 12-month interviews. A total of 8

subjects (2.0% of the sample) withdrew during the study period. There were no statistically significant differences on any baseline socioeconomic or clinical characteristics between the case and control groups.

A total of 89.2% of the sample had complete 12-month chart review data.

Baseline Characteristics (Table 1)

Reflecting the demographic characteristics of the CMHC, the sample was largely African American (77.9%) and poor (median annual income of $3,400). The most common psychiatric diagnoses were schizophrenia (42.8%), depression (32.7%), and bipolar disorder (17.2%). A total of 25.3% of the sample had a co-occurring substance use disorder. The most common medical comorbidities were hypertension (45.6%), arthritis (36.6%), tooth/gum disease (25.6%), asthma (20.1%), and diabetes (17.9%). There were no significant differences between any of the demographic or diagnostic characteristics at baseline.

Quality of Preventive Services (Table 2)

At baseline, there were no significant differences in quality of indicated preventive care services received by subjects in the case versus control groups (21.5% vs. 21.6%, p=0.96). At follow-up, the average proportion of indicated preventive services more than doubled, to 58.7%, for the intervention group, but stayed essentially constant for the control group (21.8%). (Figure 1) The group by time interaction effect, which indicates the difference in changes between the two groups, was statistically significant ($F_{1,361}$=272.03, p<0.0001).

Within individual categories of preventive services, the PCARE group had twice as many indicated physical examination activities at 1-year (70.5% vs. 35.6%, ($F_{1,361}$=166.83, p<0.001), more than twice as many screening tests (50.4% vs. 21.6%, ($F_{1,361}$=105.93, p<0.001) more than four times as many educational interventions (80.0% vs. 18.9%, ($F_{1,353}$=410.93, p<0.001), and more than six times as many indicated vaccinations (24.7% vs. 3.8%, ($F_{1,353}$=100.76, p<0.001).

As compared with usual care, subjects in the intervention group had a significantly greater improvement in having a usual source of care (from 49.5% to 71.2%, versus 48.3% to 51.9% for usual care, ($F_{1,310}$=10.42, p=0.001). They were significantly more likely to report having one or more visit to a general medical doctor (81.8% vs. 69.9%, p=0.006) and had a higher number of primary care visits among those with at least one visit (4.94 vs. 4.11, ($F_{1,319}$=9.39, p=0.02).

A significantly greater number of previously undiagnosed medical conditions were identified at one year follow-up in the intervention group (11.9%) than in the usual care group (1.8%) (χ^2=10.75, p=0.0046). The most common newly diagnosed conditions were hyperlipidemia and hypertension.

Health Related Quality of Life (Table 3)

On the SF-36, the PCARE group showed significant improvement on the Mental Component Summary score (MCS). At 12 month follow-up, the intervention group had a significantly higher score than the control group (z=−3.15, p=0.002). The difference in change between the two groups (8.0% improvement in intervention versus 1.1% decline in the control group was statistically significant ($F_{2,571}$=4.87, p=0.008 for group*time interaction). At 12-month follow-up, there was a trend towards a higher score on the Physical Component Summary for the intervention than the usual care group (37.1 vs. 34.7, z=0.08, p=0.08). However, the difference in change between the two groups was not

statistically significant (1.9% improvement in intervention versus 2.8% decline in the control group, group*time interaction ($F_{2,571}$=0.46, p=0.63).

Examining specific subscales used to calculate the summary scales, at 12-month follow-up, the intervention group had significantly higher scores on the mental health (z=−2.19, p=0.03), general health (z=−2.27, p=0.02), social functioning (z=−3.09, p=0.002), vitality (z=−1.98, p=0.04), and role-emotional scales (z=−2.21, p=0.03) than the usual care group. The difference in change over time as reflected in the group by time interaction was significant for the mental health ($F_{2,572}$=3.22, p=0.04) and social functioning indices ($F_{2,573}$=4.42, p=0.01).

Quality and Outcomes of Cardiometabolic Care (Table 4)

A total of 202 subjects had one or more cardiometabolic condition (diabetes, hypertension, hypercholesterolemia, or coronary artery disease). Among this group, those in the PCARE intervention had a significantly greater increase in the proportion of indicated services received for cardiovascular disease than those in the control group (34.9% vs. 27.7%, $F_{2,166}$=4.90, p=0.03 for group*time interaction).

Among those with blood tests available (n=100), the Framingham index, which represents the risk of developing cardiovascular disease in 10-years, was significantly lower at one year in the case versus the control group (6.9% vs. 9.8%, z=2.23, p=0.03). Whereas the care group showed a relative improvement of 11.8% (from 7.8 to 6.9), the usual care group declined by 19.5% during the period (from 8.2% to 9.8%). This change, while clinically significant, was not statistically significant in the group*time interaction ($F_{1,65}$=1.27, p=0.26).

Discussion

PCARE, a population-based, care management intervention was associated with a more than doubling of the rate of receipt of evidence-based preventive medical services in individuals with severe mental illness. There was a significant improvement in care for cardiometabolic conditions, presence of a usual source of care, and mental health related quality of life. The results suggest that care management can be a useful strategy for improving quality of medical care in community mental health settings

The intervention showed a clinically and statistically significant effect on the primary study outcome, quality of primary care. Despite the fact that the care managers did not provide any direct medical services, they were able to facilitate improved primary care in the community through a combination of advocacy, education, and helping patients overcome logistical barriers to care. These findings are consistent with a growing body of literature suggesting the benefits of care management models for vulnerable populations in general medical settings. For instance, “guided care” has been shown to be effective in improving care in elderly patients with multiple comorbidities, [23, 24] and patient navigators are increasingly used for cancer screening and treatment in underserved populations. [25] Persons with severe mental disorders share common features with these populations, including high levels of medical comorbidity, limited health literacy, and fragmentation within the systems designed to serve them.

The intervention was associated with a significant improvement in mental, but not physical, health related quality of life. Recent psychometric studies of the SF-36 have raised questions about the distinctness of the physical and mental scales, noting that many of the same items load onto the two summary scales. [32–34] In the current study, the psychosocial support provided in helping patients obtain medical services may have contributed to improved

mental health status. At 12-month follow-up, there were significant differences between the case and control groups on subscales including mental health, social functioning, and emotional role functioning. Although there was not a significant change on the physical component summary, there were substantial and statistically significant differences between the case and control groups evident by 12 months on the general health and vitality subdomains. Changes in other physical subscales that load onto the PCS, such as physical functioning, which measures strength and mobility, would be expected to take a longer time period to become evident, particularly in populations with longstanding medical problems or disabilities.

Several features of the PCARE care management model make it an appealing approach for community mental health clinics seeking efforts to improve their patients' medical care As compared with collocated approaches, care management is relatively inexpensive to implement, and practical for even relatively small sites without the financial or staffing resources to establish fully functioning medical clinics onsite. Existing mental health care managers can be retrained to add medical services to their scope of activities. Finally, the fact that improving medical care may be linked with better mental health outcomes may provide a rationale for CMHCs to address primary care services in their clients.

However, care management programs are ultimately dependent on the availability and quality of primary medical care available in the community. These challenges are likely to be most salient for services requiring intensive and ongoing input from a prescribing physician. While the PCARE intervention was associated with a significant improvement in quality of care for cardiometabolic conditions, even individuals in the intervention group received fewer than half of indicated treatments for these risk factors. Even given these limits, the study showed promising trend towards improvement in risk of cardiovascular disease that are of comparable effect size to those seen in underserved populations without mental disorders. [38] Given that cardiometabolic disorders are the most important causes of excess mortality in persons with severe mental disorders,[9] the study suggests the potential for these programs to make a positive impact on those outcomes. More intensive models that include a prescribing provider on the team may eventually hold promise for improving cardiovascular quality and outcomes in this population. Longer follow-up periods will also be important for assessing these programs' impact on physical health and functioning outcomes.

At least two study limitations should be noted. The broad entry criteria, while optimizing practicality, limited the statistical power to examine outcomes for individual medical conditions. Second, because the study was only conducted in a single site, replication would be needed to fully assess generalizability to different types of community mental health settings, for instance rural regions with limited geographic access to medical providers.

The problem of excess morbidity and mortality in persons with severe mental illness is now gaining significant policy attention and traction. The 2009 Omnibus spending bill included $7 million dollars to hire primary care staff for community mental health centers nationwide, which is being distributed through SAMHSA as a series of demonstration grants.[39] The current study suggests that as these efforts move forward, care management should be a central component of models for improving health and health care in this vulnerable population.

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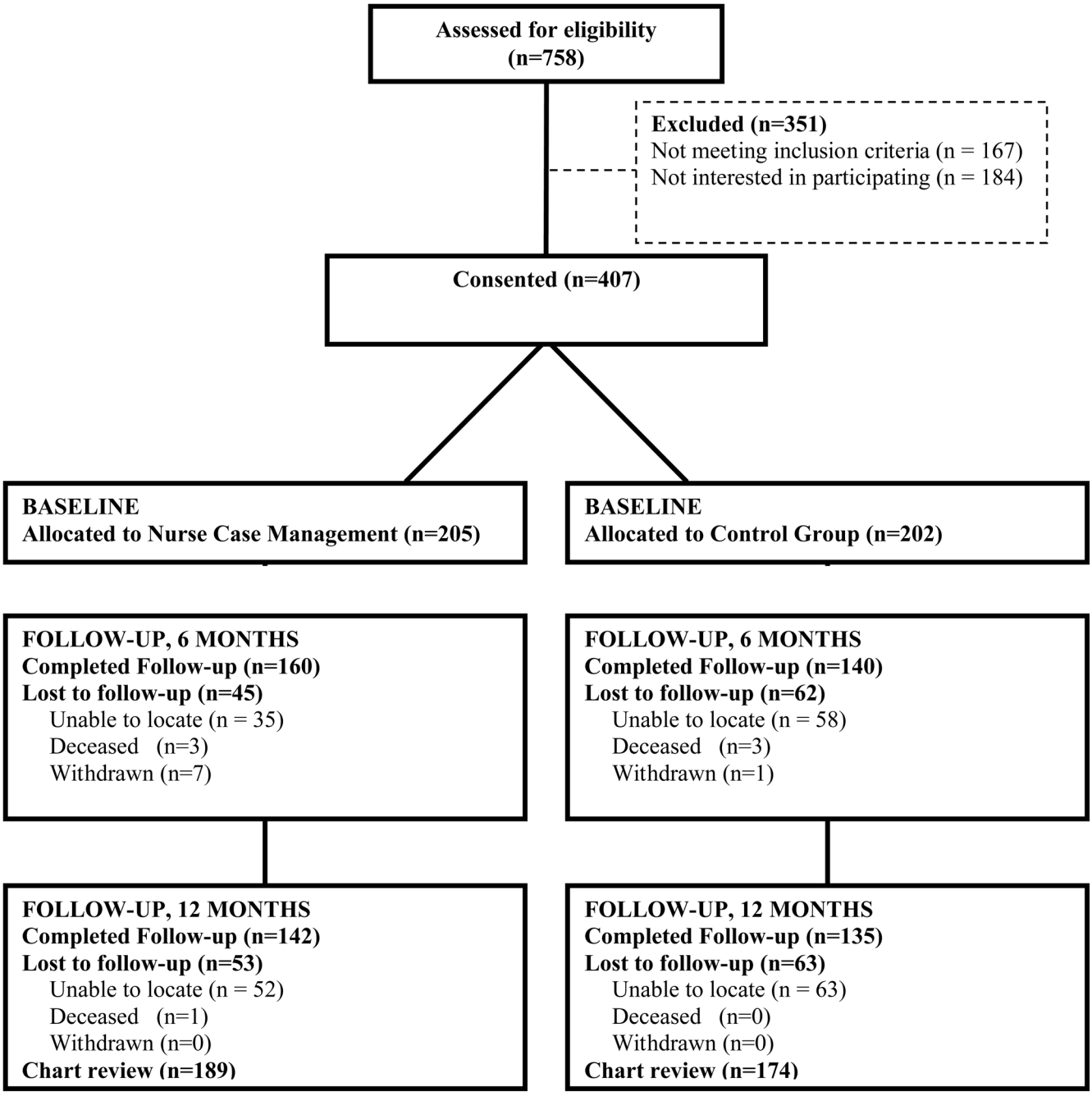

Figure 1.
Study Flow Chart

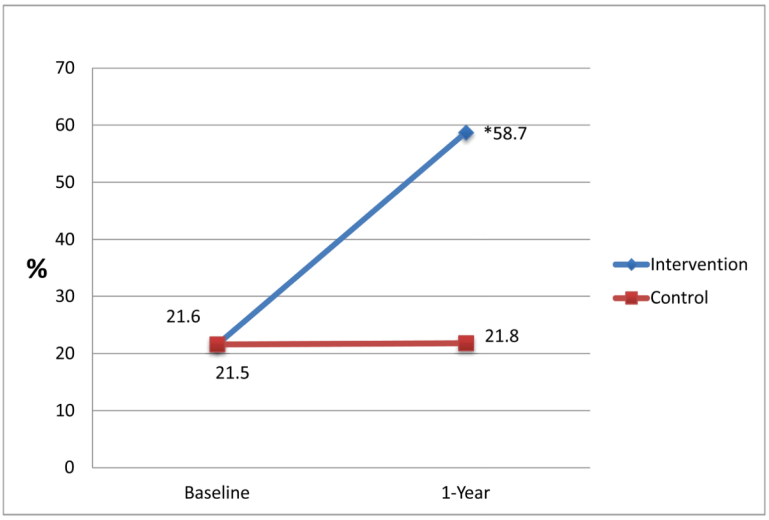

Figure 2.
Change in Receipt of Indicated Preventive Services

Table 1

Demographic and Clinical Characteristics

Characteristics	Case Management (n=205)	Usual Care (n=202)	p value
Demographics			
Age (years, means ± SD)	47.0±8.1	46.3±8.1	0.68
Age Category, n (%)			0.27
Age 18–34	13 (6.4)	21 (10.5)	
Age 35–49	127 (62.6)	114 (56.7)	
Age >50	63 (31.0)	66 (32.8)	
Female, n (%)	105 (51.2)	92 (45.5)	0.18
African-American, n (%)	156 (76.5)	159 (78.7)	0.78
Hispanic or Latino, n (%)	4 (2.0)	2 (1.0)	
Monthly income ($, median)	209.5 (0–603.0)	374 (80.0–623.0)	0.20
Single, never married, n (%)	102 (50.3)	96 (47.5)	0.91
Education Completed (years, median)	12 (11–13)	12 (11–13)	0.87
On Disability, n (%)	75 (36.8)	85 (42.1)	0.27
Primary Psychiatric Diagnosis			
Schizophrenia/schizoaffective disorder, n (%)	75 (36.6)	69 (34.2)	0.61
Bipolar disorder, n (%)	22 (10.7)	30 (14.9)	0.21
PTSD, n (%)	11 (5.4)	9 (4.5)	0.67
Depression, n (%)	94 (45.9)	85 (42.1)	0.44
Other, n (%)	0	1 (0.5)	0.31
Co-occurring Substance Use Disorder	50 (24.4%)	53 (26.2%)	0.66
Medical Diagnosis			
Hypertension, n (%)	93 (45.6)	92 (45.5)	0.99
Asthma, n (%)	48 (23.4)	38 (18.8)	0.21
Arthritis, n (%)	69 (33.8)	80 (39.6)	0.23
Diabetes, n (%)	38 (18.6)	35 (17.3)	0.73
Tooth or gum disease, n (%)	58 (32.4)	46 (25.8)	0.17
Gastrointestinal disease, n (%)	38 (18.6)	37 (18.3)	0.94

Values are means ± SDs, numbers of patients (percentages), or medians (25th to 75th percentiles).

Table 2

Quality of Preventive Services

	Case Management (n=205)	*Usual Care (n=202)*	*p value*	p value for group*time interaction
Physical Exam				<0.001
baseline	32.9±27.4 (191)	36.0±25.8 (189)	0.25	
1-Year	70.5±22.5 (189)	35.6±26.0 (174)	<0.001	
Screening				<0.001
baseline	22.4±19.2 (191)	22.3±18.1 (189)	0.82	
1-Year	50.4±26.1 (189)	21.6±18.5 (174)	<0.001	
Education				<0.001
baseline	17.7±20.0 (186)	16.9±19.8 (187)	0.65	
1-Year	80.0±34.4 (189)	18.9±19.7 (172)	<0.001	
Vaccination				<0.001
baseline	3.14±9.52 (186)	4.28±12.6 (187)	0.46	
1-Year	24.7±24.6 (189)	3.78±9.72 (172)	<0.001	
Total Preventive services				<0.001
baseline	21.5±16.1 (191)	21.6±16.2 (189)	0.97	
1-Year	58.7±21.1 (189)	21.8±16.0 (174)	<0.001	

Table 3

SF-36 Scores

		Case Management (n=205)	Usual Care (n=202)	p value	p value for group*time interaction
Mental Component Summary	Baseline	36.4±10.1 (35.0–37.8)	36.0±10.3 (34.6–37.4)	0.61	0.008
	6-Month	37.3±9.79 (35.8–38.9)	36.8±10.5 (35.0–38.5)	0.39	
	12-Month	39.3±9.91 (37.6–40.9)	35.6±10.1 (33.9–37.3)	0.002	
Physical Component Summary	Baseline	36.4±11.7 (34.8–38.0)	35.7±11.5 (34.1–37.3)	0.53	0.63
	6-Month	36.9±11.3 (35.1–38.6)	35.8±12.2 (33.8–37.8)	0.33	
	12-Month	37.1±11.5 (35.2–39.0)	34.7±11.9 (32.7–36.7)	0.08	
Mental Health	Baseline	48.5±19.0 (45.9–51.1)	48.8±20.2 (46.0–51.6)	0.80	0.04
	6-Month	52.5±20.5 (49.3–55.7)	50.2±20.4 (46.8–53.6)	0.20	
	12-Month	54.7±19.6 (51.5–58.0)	49.7±18.6 (46.6–52.9)	0.0288	
General Health	Baseline	49.3±23.4 (46.1–52.6)	48.2±23.9 (44.9–51.5)	0.74	0.12
	6-Month	49.6±25.6 (45.6–53.6)	49.2±26.9 (44.7–53.7)	0.82	
	12-Month	52.9±26.9 (48.5–57.4)	45.5±27.7 (40.8–50.3)	0.02	
Social Functioning	Baseline	55.6±28.5 (51.7–59.5)	53.8±28.2 (49.9–57.7)	0.53	0.01
	6-Month	58.4±31.6 (53.4–63.3)	58.5±31.2 (53.3–63.7)	0.99	
	12-Month	66.8±31.7 (61.6–72.1)	54.6±33.3 (48.9–60.3)	0.002	
Vitality	Baseline	44.1±23.8 (40.9–47.4)	43.2±22.6 (40.1–46.4)	0.76	0.11
	6-Month	43.0±20.0 (39.9–46.1)	43.8±20.5 (40.4–47.2)	0.83	
	12-Month	44.6±19.6 (41.3–47.8)	39.6±20.6 (36.0–43.1)	0.048	
Role – Emotional	Baseline	36.6±44.3 (30.5–42.7)	34.0±42.4 (28.1–39.9)	0.69	0.22
	6-Month	37.5±45.4 (30.4–44.6)	35.7±45.2 (28.2–43.2)	0.76	
	12-Month	48.1±48.5 (40.1–56.2)	35.6±46.3 (27.7–43.5)	0.03	
Role – Physical	Baseline	35.5±40.4 (29.9–41.1)	32.1±38.2 (26.8–37.4)	0.47	0.41
	6-Month	42.2±45.1 (35.1–49.2)	34.4±43.5 (27.2–41.6)	0.13	
	12-Month	36.8±45.1 (29.3–44.3)	32.5±42.7 (25.2–39.8)	0.48	
Bodily Pain	Baseline	54.3±33.4 (49.7–58.9)	52.6±32.8 (48.0–57.1)	0.71	0.73

		Case Management (n=205)	Usual Care (n=202)	p value	p value for group*time interaction
	6-Month	52.5±31.1 (47.7–57.4)	49.7±32.7 (44.3–55.2)	0.35	
	12-Month	51.3±31.6 (46.0–56.5)	48.3±31.9 (42.9–53.8)	0.46	
Physical Functioning	Baseline	53.7±35.7 (48.8–58.6)	54.6±37.3 (49.4–59.8)	0.83	0.65
	6-Month	53.0±32.4 (48.0–58.1)	52.3±34.9 (46.5–58.2)	0.85	
	12-Month	52.9±32.3 (47.5–58.3)	52.8±33.1 (47.1–58.5)	0.97	

Table 4

Quality of Cardiometabolic Risk Factor Management and 10-Year

Variable		Case Management	Usual Care	p value	P value for Change over Time
Aggregate Quality for Cardiovascular Risk Factors (n=202) *	Baseline	26.6±32.9	27.7±27.9	0.51	0.03
	1-Year	34.9±38.7	27.7±29.4	0.37	
Framingham Score for 10-year Cardiovascular Risk (n=100) **	Baseline	7.8±5.7	8.2±6.4	0.91	0.26
	1-Year	6.9±5.3	9.8±8.1	0.02	

* Represents the average proportion of recommended services received for individuals with a baseline diagnosis of Diabetes, High Cholesterol, Hypertension, and/or Coronary Artery Disease

** Calculated among the subset of individuals with complete blood test data available.