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Evaluating Diabetes Care for Patients With Serious Mental Illness Using the Chronic Care Model: A Pilot Study

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Abstract

People with serious mental illness (SMI) have a higher incidence of type 2 diabetes mellitus (T2DM) and shorter life span due to medical health problems. The chronic care model (CCM) has been used to improve care of patients with T2DM. One clinical organization that provided primary care to patients with SMI had excellent diabetes outcomes but did not have information on how they achieved those outcomes. Thus, we conducted a pilot study chart review for 30 patients with T2DM and SMI to determine how well the clinic's system aligned with the overall CCM components and which components correlated with diabetes control. We also evaluated use of the CCM using the Assessment of Chronic Illness Care provider survey. Results showed that the clinic had an overall basic implementation level of the CCM, which allows opportunity for improvement. Two elements of the CCM were correlated with hemoglobin A_{1C} and both were in an unexpected direction: self-management support in the variable of percentage of visits that included patient-specific goal-setting ($rs = .52$; $P = .004$) and delivery system design in the variable of number of nurse practitioner visits per study period ($r_s = .43$; $P = .02$). These findings suggest that the clinic may have made more concentrated efforts to manage diabetes for patients who were not in good diabetes control. Providers noted the influence of SMI and social service organization support on these patients' clinical outcomes. The findings will be reexamined after a fuller implementation of the CCM to further improve management in this population.

Keywords

diabetes, severe mental illness, chronic care model, quality improvement, primary health care

Introduction

Patients with serious mental illness (SMI) had poorer physical health than the general population and have a life expectancy of 8 to 32 fewer years; most of the mortality is due to medical causes rather than psychiatric.[1-6] Factors that contribute to decreased life span are lifestyle, metabolic side effects from antipsychotic medications that can lead to diabetes, limited access to health care, and physiologic changes such as inflammation in people with schizophrenia.[2,7,8] People with bipolar disorder and people with schizophrenia have a significantly higher incidence of diabetes.[7]

Patients with SMI and type 2 diabetes mellitus (T2DM) frequently lack adherence to diabetes management guidelines compared to patients without SMI, are less educated about diabetes and self-monitoring, and receive less prevention care for cardiovascular disease.[9-15] Integrating physical and mental health care in patients with SMI and diabetes has resulted in improved health outcomes, including hemoglobin A_{1C} (HbA_{1C}) levels.[13,16-18]

Standards of Medical Care in Diabetes, by the American Diabetes Association, recommend that care for patients with diabetes be aligned with the chronic care model (CCM).[19] The CCM guides health systems to organize to support the patient in managing their chronic illnesses, and it leads to improved outcomes.[20-22] The CCM has 6 elements: health system, delivery system design, self-management support, decision support, clinical information systems, and community linkages.[20]

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Implementing the CCM in settings with patients with diabetes has resulted in improved diabetes indicators, including lower A_{1C}.[23-25] Implementation of the CCM in a population of people with mental illness has been shown to be effective in improving mental health indicators.[26] However, studies are lacking in evaluating the CCM for people with both SMI and diabetes.

Project Aims

The aims of this project were to determine, within the setting of an urban federally qualified health center (FQHC) that provides primary care to patients with SMI, among patients with SMI and diabetes: (1) how well the clinic's system aligned with the overall CCM components, (2) which components of the CCM were associated with diabetes control, and (3) any additional factors outside of the CCM that may have contributed to patient outcomes.

Methods

Setting

The site of this study was an FQHC providing primary care to patients, most of whom had a documented SMI. Federally qualified health centers, a designation given to organizations receiving grants under the Public Health Service Act, qualify for enhanced reimbursement.[27] The organization consisted of 3 clinics; all providers were nurse practitioners (NPs). The clinic worked closely with a local social service organization to coordinate care.[28] This FQHC clinic received an award for their excellent diabetes outcomes in 2010 from a state-level agency and consistently surpassed diabetes goals for A_{1C} and cholesterol as set forth in Healthy People 2020 (D. Cesarone, MS, RN, personal communication, April 10, 2015).[29] However, information is lacking about which clinical organizational elements contributed to these outcomes.

Sample

We examined the charts of persons who met the following inclusion criteria: SMI, T2DM as determined by billing codes, and at least 1 clinic visit in the study time period. The electronic medical record (EMR) identified 47 unduplicated patients with a diagnosis of T2DM seen in the month of July 2014 from 2 clinics (the third had only recently opened and was not included in the study). Thirty randomly sampled patient's EMR numbers were obtained from those reports; those charts were evaluated using the chart abstraction tool for July 1, 2014, to June 30, 2015, in accordance with Joint Commission sampling guidelines.[30] A request to complete the provider survey was made to all providers (NPs) across the clinical organization.

Measurement Tools

We used a provider survey and a chart review. The survey used was the Assessment of Chronic Illness Care (ACIC) survey, version 3.5.[22] One additional question was added: "Are there any additional factors that may impact patient outcomes for this population?" This question allowed respondents to provide additional insight on issues that may not have been captured with the ACIC survey.

The ACIC surveys were scored in accordance with guidelines, resulting in a score for each of the 6 CCM elements.[22] Scores could range from 0 to 11: 0 to 2, limited support; 3 to 5, basic support; 6 to 8, reasonably good support; 9 to 11, fully developed support.[22]

We used a chart abstraction tool (see Table 1) that was investigator-designed and adapted from 2 sources: an example chart abstraction tool by RAND Health to measure the use of the CCM with patients who have diabetes and a measurement tool from a RAND Health study that used multiple sources of clinic data to assess organizations' implementation of the CCM (note 1).[31,32] The chart abstraction tool included questions targeted to assess the different elements of the CCM. All abstracted data from the charts pertained to individual patients, and data were entered into an Excel database with 1 line for each of the 30 patients. The patient was the unit of analysis, and the data were not aggregated by clinic.

Statistics

Descriptive statistics were used to summarize information from the chart review and provider surveys (Excel, SPSS version 22). Means and standard deviations were used for normally distributed variables and medians for nonnormally distributed variables. Variables in the chart review that represented components of the CCM were evaluated for correlation with average A_{1C} result from July 1, 2014, to June 30, 2015. For numerical variables, Spearman correlation coefficient was used to test for associations among A_{1C} and the CCM variables to account for nonnormally distributed data and small sample size. For categorical variables, a *t* test was used for differences between means.

Research Approval

Institutional review board approval and research council approval were obtained prior to data collection.

Results

The chart review examined 30 charts of patients with SMI and T2DM. The mean age was 52.7 (10.57) years , and ages ranged from 26 to 59 years. On average, there were 5.63 (3.23) diabetes visits in the study period, and the number of visits ranged from 0 to 15 (see Table 2).

Four providers (80% of eligible providers) completed the ACIC provider survey, and the overall mean score was 5.19, indicating basic support for chronic illness care. Two survey respondents answered the question "Are there any additional factors that may impact patient outcomes for this population?" One comment was about the noncompliance of patients with

Table 1. Chart Abstraction Tool Content.

Demographics	Patient Complexity	Standard of Care	Delivery System Design (I)	Self-Management Support (II)	Decision Support (III)	Information Support (IV)	Community Linkages (V)	Outcome Measures	Other
Record number	Number of chronic medical comorbidities by end of study period	On a statin by end of study period?	Number of NP visits per study period	Referral to nutritionist or diabetic educator done in study period?	Facilitation of expert consultation/ support done in study period? (consultation with specialist?)	Percentage of diabetes visits where data from the visit were shared for use in care management by social services agency	Evidence of specific referral back to community resource such as park district or walking group during the study period	Each A_{1C} measured in study period	Episodes of severe hypoglycemia
Date diabetes (DM type 2) diagnosis first noted	List of the medical comorbidities	On an ACE or ARB by end of study period?	Number of RN visits per study period	Prepacked pill packs used?				Average A_{1C} over study period	Comments
Year patient entered this clinic practice	List of the psychiatric diagnoses	On aspirin by end of study period?	Number of telephone/ letter/e-mail	Percentage of diabetes visits with counseling					
Patient age as of January 7, 2014	Number of known psychiatric hospitalizations during study period	Referral to ophthalmology or eye examination done in study period?	Percentage of diabetes visits that included proactive follow-up plan?	Percentage of diabetes visits where goal-setting or action plan discussed with patient?					
Number of diabetic visits in study period	Compliant with medical meds?	Referral to podiatrist or complete foot examination done in study period?		Percentage of diabetes visits where specific self-management education tailored to patient (eg, calendar for medication adherence)					
	Compliant with psychiatric meds?								

Abbreviations: NP, nurse practitioner; RN, registered nurse; ACE, angiotensin-converting enzyme inhibitor; ARB, angiotensin II receptor blocker.

Table 2. Descriptive Statistics.

Measure	n	Median	Mean	SD	Minimum and Maximum	Percentage of "Yes"
Demographics						
Year patient entered practice	30				Before 2008-2014	
Patient age as of January 1, 2014	30	55	52.87	10.57	26-69	
Number of diabetic visits in study period	30		5.63	3.23	0-15	
Patient complexity						
Number of chronic medical comorbidities by end of study period	30	10.00	10.77	5.11	3-23	
Number of known psychiatric hospitalizations during study period	30		0.1 (27 patients had no known psychiatric hospitalizations, 3 patients had 1 psychiatric hospitalization)	0.31	0-1	
Compliant with medical meds?	30					50.00%
Compliant with psychiatric meds?	30					90.00%
Standard of care						
On a statin by end of study period?	30					63.30%
On an ACE or ARB by end of study period?	30					66.70%
On aspirin by end of study period?	30					60.00%
Referral to ophthalmology or eye examination done in study period?	30					60.00%
Referral to podiatrist or complete foot examination done in study period?	30					56.70%
Delivery system design						
Number of NP visits per study period	30		6.40	2.87	2-15	
Number of RN visits per study period	30		0.00	0.00	0-0	
Number of telephone/letter/e-mail	30	6.00			1-71	
Percentage of diabetes visits that included proactive follow-up plan	29		99.00%	0.05	80%-100%	
Self-management support						
Referral to nutritionist or diabetic educator done in study period?	30					23.30%
Prepacked pill packs used?	30					86.70%
Percentage of diabetes visits with counseling	29		92.00%	0.16	25%-100%	
Percentage of diabetes visits where goal-setting or action plan discussed with patient	29	20%			0%-80%	
Percentage of diabetes visits where specific self-management education tailored to patient	29	13%			0%-67%	
Decision support						
Facilitation of expert consultation/support done in study period?	30					13.30%
Clinical information systems						
Percentage of diabetes visits where data from the visit were shared for use in care management by social service organization	29		89.07%	0.23	20%-100%	
Community linkage						
Evidence of specific referral back to community resource such as local park district or walking group during the study period	30					16.70%
Outcome						
Average A_{1C} over study period	30		7.19	1.40	4.70-11.25	
Other						
Episodes of severe hypoglycemia	30					6.70%

Abbreviations: NP, nurse practitioner; RN, registered nurse; SD, standard deviation.

SMI and how that may negatively impact outcomes; the other was on the support received from the social service organization for the patients and how that may positively impact outcomes.

Table 2 shows the CCM variables evaluated from the chart review and which ones had a strong presence in this clinic. There was a significant positive correlation between higher A_{1C} and higher number of NP visits during the study period

Table 3. Analysis of Chart Review CCM Variables and Correlation With A_{1C}.

CCM Element	Variable	n	*P* Value of *t* test or *P* value of Spearman ρ	*t* test	DF	Spearman ρ
Delivery system design	Number of NP visits per study period	30	0.02			0.43
	Number of RN visits per study period	30	(There were 0 RN visits during the study period)			
	Number of telephone/letter/e-mail	30	0.48			0.13
	Percentage of diabetes visits that included proactive follow-up plan	29	0.17			−0.26
Self-management support	Referral to nutritionist or diabetic educator done in study period?	30	0.05	2.30	7.19	
	Prepacked pill packs used?	30	0.79	−0.28	5.23	
	Percentage of diabetes visits with counseling	29	0.39			0.17
	Percentage of diabetes visits where goal-setting or action plan discussed with patient	29	0.004			0.52
	Percentage of diabetes visits where specific self-management education tailored to patient (eg, calendar for medication adherence)	29	0.16			0.27
Decision support	Facilitation of expert consultation/support done in study period? (consultation with specialist?)	30	0.97	0.05	4.51	
Information support	Percentage of diabetes visits where data from the visit were shared for use in care management by social services agency	29	0.43			−0.15
Community linkages	Evidence of specific referral back to community resource such as park district or walking group during the study period?	30	0.37	0.99	5.00	

Abbreviations: CCM, chronic care model; NP, nurse practitioners; RN, registered nurse; DF, degrees of freedom.

($r_s = .43$, $P = .02$). There was also a significant positive correlation between higher A_{1C} and patient records with a higher percentage of visits where goal-setting or action plan was developed ($r_s = .52$, $P = .004$). There were no other statistically significant findings between CCM elements and A_{1C} (Table 3).

Discussion

The 4 ACIC survey responses revealed only basic-level support for chronic illness care, a score often seen with a clinic that has not yet started implementation of the CCM model, suggesting much room for improvement.[32] The score results for each of the 6 CCM elements were as follows: Health System 6.78, Delivery System Design 5.27, Self-Management Support 5.68, Decision Support 5.38, Clinical Information Systems 2.90, and Community Linkages 6.67. Comments from providers show that connection with the social services agency may have contributed to patient outcomes.

Health System

The health system element was measured in the provider survey, not the chart review, due to its global nature. This concept includes visible support for improvement by senior leadership, improvement strategies, and a systematic way to address problems. The survey was completed during a time of transition for the clinical organization marked by high staff and leadership turnover, which may have affected the score.

Delivery System Design

The delivery system design element includes coordination across specialties, clear division of labor among the health-care team, inclusion of all team members to improve outcomes, and strong leadership in clinical practice. The positive correlation of the number of NP visits with A_{1C} was unexpected. Possibly, patients were asked to follow up more often when providers noted the diabetes was not well controlled. Although no other variables in this element were associated with A_{1C}, the number of phone calls had a wide range, including 1 patient with 71 calls in the study period. The chart review revealed times of frequent communication when the patient needed extra support around diabetes management. There were no registered nurse (RN) visits during this study period. It is noteworthy that there was not an RN at all clinical sites in the organization at the time of the provider survey. The delivery system in the clinics had strength in the increased visits with the NP when needed but possible weakness in the areas of inclusion and utilization of all of the health-care team.

Self-Management Support

This element includes having trained educators in empowerment and problem-solving, behavior change interventions, and peer support for self-management. The findings suggest a need for these interventions to be formally implemented. There was an unexpected statistically significant positive association between percentage of diabetes visits where specific goal-setting or action plan was discussed with the patient and A_{1C}. Possibly, as A_{1C} increased, NPs used skills of motivating the

patient, including helping the patient set a specific goal. Most patients used prepared pill packs, but there was no statistically significant difference between A_{1C} of those who did and those who did not. Most visits included patient education, but fewer used goal-setting and self-management education. The clinic has a routine procedure to print patient education, but no specific procedure about setting goals or providing self-management education.

Decision Support

Decision support includes facilitation of expert consultation by the provider, which occurred at least once within the study period in only 13.3% of patient charts, and there was no association between this variable and A_{1C}. Decision support also includes integrating diabetes management guidelines into the EMR and educating patients about guidelines, neither of which was a formal part of the clinic routine. This suggests consultation and guideline inclusion need improvement.

Clinical Information Systems

The chart review found that on average 89% of each patients' diabetes visits included communication to the patient's social service organization regarding the visit. This variable did not correlate with average A_{1C}, possibly because it is done so often in this clinic as part of the process of care. The clinic did not have the following recommended systems: a registry of patients with diabetes that uses prompts and reminders connected to guidelines, feedback by a team leader, or patient treatment plans.

Community Linkages

The chart review showed that 16.6% of patients received a referral back to a community resource within the study period, such as the local park district or social service organization's walking group, and this variable did not correlate with A_{1C}. This is a possible area for improvement.

Limitations

This pilot study was limited by the small sample size and lack of comparison group. Additional studies need a larger sample size and a comparison group of patients from a different clinic. Also the results of association do not imply causation.

Recommendations

Based on our chart review, we recommend improvement in the following areas: a standardized way of addressing systems problems, a clear division of labor and inclusion of all members of the health-care team, building EMR alerts in accordance with diabetes guidelines, and protocols for individualized goal-setting and self-management education.

To improve diabetes care for people with SMI, we recommend first evaluating current care patterns and then planning changes based on results within the framework of the CCM. We recommend that a follow-up study be done after full implementation of the CCM in this clinical organization.

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Note

1. Adapted with permission from "Assessing the Implementation of the Chronic Care Model in Quality Improvement Collaboratives" by Pearson et al, 2005, unpublished working paper by RAND Health.

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Pamlela Martyn-Nemeth is an assistant professor at UIC, and her research interests are focused on cardiovascular health promotion and risk reduction. Her current program of research targets cardiovascular disease (CVD) risk in persons with type 1 diabetes. She is examining the role of psychological factors (fear of hypoglycemia, stress, coping) and their influence on self-management behavior (e.g., eating behavior, physical activity), glycemic control and variability.