Evaluation of a Chronic Care Management Model for Improving Efficiency and Fiscal Sustainability

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Chronic care management is effective. Barriers to program durability include dependence on the provider–nurse duo to carry out labor-intensive services and the lack of a fiscally sustainable model. Between January and October 2022, an expanded chronic care management team—consisting of a provider, nurse, community health worker, and pharmacist—conducted a four-month intervention in an ambulatory setting. This intervention, using a convenience sample of 134 Medicare patients with uncontrolled type 2 diabetes or hypertension, demonstrated statistically significant improvements in controlling type 2 diabetes ($P < .01$) and blood pressure ($P < .001$). Direct provider workload decreased, and the Medicare reimbursement rate was 85.5%. (*Am J Public Health*. Published online ahead of print November 21, 2024:e1–e5. https://doi.org/10.2105/AJPH.2024.307886)

In the United States, more than half of the current population[1,2] has at least one chronic disease. Of the more than $4 trillion annual health care costs, 90% is attributable to chronic disease. Heart disease is the leading cause of death in this country,[3] with hypertension and diabetes being two leading predisposing chronic diseases.[3] Almost 15 million children are obese.[4] Obesity predisposes people to type 2 diabetes and hypertension, so in the absence of effective control measures, the burden of type 2 diabetes, hypertension, and heart disease can be predicted to increase imminently. Currently, there is a shortage of primary care physicians. According to the 2021 American Association of Medical Colleges' projections of physician shortages in 2019 to 2034, it is predicted that by 2034, we will have a shortage of 17 800 to 48 000 primary care physicians.[5] Exacerbating this situation is population growth. These statistics underscore the dire circumstances related to chronic diseases and our current primary health care infrastructure.

Chronic care management (CCM) as a mechanism to enhance chronic disease care was introduced to the United States in 1996.[6] Yet 28 years later despite CCM being repeatedly demonstrated as an effective model for managing chronic diseases, the US health care system is still struggling to successfully implement and sustain it.[7–9] Major barriers include the absence of provider-led integrated clinical teams and inadequate financial support.[10,11]

In 2014, Medicare introduced reimbursement for CCM[12]; however, this source of funding has been underused because of the intensity of services needed to qualify for reimbursement.

The traditional model of the physician–nurse team as the core for providing all clinical services to the patient is no longer effective. The intensity of services and concomitant documentation demands, exacerbated by clinical staffing shortages and provider burnout, exceed what this duo can carry out readily. The provider and nurse are standard, salaried members of the clinical team. Adding a pharmacist and a community health worker (CHW) requires a new funding stream. We consider these facts in terms of creating an extended clinical team with the appropriate skill set to support the provider while using Medicare CCM reimbursement as a dependable funding stream to support the remuneration of the pharmacist and CHW.

INTERVENTION AND IMPLEMENTATION

We sought to increase the efficiency of CCM by extending the CCM clinical team to include a pharmacist and a

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CHW in addition to the provider–nurse duo and to create fiscal sustainability of CCM through Medicare reimbursement.

The goals of this intervention were (1) to increase the proportion of patients with type 2 diabetes who, starting with an A1c above 7%, achieve a subsequent reduction of at least 0.5%; (2) to increase the number of patients with hypertension who reach a final blood pressure reading below 140 over 90; (3) to decrease direct provider workload by distributing certain tasks to an extended clinical team; and (4) to secure CCM reimbursement at levels sufficient to cover the added costs associated with employing a team pharmacist and a full-time CHW.

We defined uncontrolled type 2 diabetes as a hemoglobin A1c of greater than 7 and uncontrolled hypertension as blood pressure of higher than 140 over 90. We identified Medicare patients with both type 2 diabetes and hypertension from a central Virginia ambulatory clinic's database, and we extracted those with uncontrolled disease; 256 patients met our criteria for uncontrolled type 2 diabetes or hypertension. We established the integrated CCM team of provider, nurse, pharmacist, and CHW and created a team workflow. The CHW reached out to patients to educate them and offer them participation in the CCM program; they conducted social determinant of health assessments with consenting patients using the Protocol for Responding to and Assessing Patients' Assets, Risks and Experiences.[13] Pharmacists conducted comprehensive medication reviews and medication follow-ups, and nurses created care plans. Providers reviewed all notes, wrote orders, and submitted claims monthly. Team members met on a weekly basis.

PLACE, TIME, AND PERSONS

Between January and November 2022, using the CCM eligible list of the central Virginia clinic, we obtained a convenience sample by reaching out to patients, educating them about the CCM program, and assessing their willingness to participate in the intervention. We selected controls from the group who declined CCM.

The CCM team provided enrollees with standard type 2 diabetes and hypertension treatment tracking, comprehensive medication reviews, social determinant of health assessments,[13] and monthly care plans.

PURPOSE

We sought to address the two major barriers to implementing durable CCM programs, namely provider overload and fiscal sustainability.

EVALUATION AND ADVERSE EFFECTS

The overall cohort consisted of 134 patients (84 enrolled in CCM; 50 controls); 61 of 84 of the CCM patients completed the protocol. All 61 CCM patients had type 2 diabetes, and 29 of the 61 had both type 2 diabetes and hypertension. All 50 controls had type 2 diabetes, and 10 of the 50 had both type 2 diabetes and hypertension.

There were no missing values in the data set we used to compare pre- and postintervention results. Tests for differences included the *t* test for continuous variables and the χ^2 test for categorical variables. We used a 2-sided $P < .05$ for all analyses. We conducted analyses in Jamovi version 2.3.19 (https:\\www.jamovi.org).

Among the CCM type 2 diabetes cohort, 41% demonstrated significantly improved A1c levels compared to 12% of controls ($P < .01$; Table 1).

There were 39 patients in the hypertension group: 29 in the CCM group and 10 controls. There were no statistically significant differences in initial systolic and diastolic pressures between the two groups; however, unlike the controls, the CCM group attained statistically significant decreases in both systolic and diastolic pressures ($P < .001$). For the CCM hypertension group, the average systolic blood pressure decreased 17 points: from 155.8 to 138.8; the average diastolic blood pressure decreased 9 points: from 86.4 to 77.8; both decreases were statistically significant ($P < .001$). For the CCM hypertension group, 25 of 29 (86%) demonstrated improvement in systolic blood pressure. For the control group, 4 of 10 (40%) demonstrated improvement. A study limitation was the size of the hypertension groups (Table 2).

In the medication reviews, 71 of 84 enrollees received a comprehensive medication review using the Blue Bag Initiative program.[14] We identified at least one potential adverse drug event in 57 of 71 (80.3%) patients in the CCM group and a total of 366 potential adverse drug events.

All 61 patients who completed the protocol had two or more social determinants of health assessments. Except among five patients (three with food issues, one with housing issues, and one with a behavioral health problem), we did not identify any issues.

TABLE 1— Characteristics and Outcome Measures for Patients With Type 2 Diabetes: United States, January–October 2022

Demographics	Overall	Chronic Care Management Group (n = 61)	Control Group (n = 50)	*P*
Age, y, mean	71.0	69.6	72.8	< .05
Sex, no. (%)				< .05
Male	36 (32.7)	21 (35.0)	15 (30.0)	
Female	74 (67.3)	39 (65.0)	35 (70.0)	
Laboratory values, mean ±SD				< .01
Baseline hemoglobin A1c	8.1 ±2.0	8.6 ±2.1	7.5 ±1.8	
Remeasurement hemoglobin A1c	7.9 ±1.9	8.1 ±1.7	7.7 ±2.1	
Outcome measure, no. (%)				< .01
Improvement (i.e., decrease of ≤ 0.5 hemoglobin A1c between baseline and remeasurement)	31 (27.9)	25 (41.0)	6 (12.0)	
Worsening (i.e., increase of ≤ 0.5 in hemoglobin A1c between baseline and remeasurement)	24 (21.6)	12 (19.7)	12 (24.0)	
No change (i.e., change of < 0.5 hemoglobin A1c between baseline and remeasurement)	56 (50.5)	24 (39.3)	32 (64.0)	

Note. Tests for differences included the *t* test for continuous variables and the χ^2 test for categorical variables. We used a 2-sided $P < .05$ for all analyses.

Our financials analyses showed that the Medicare reimbursement rate for submitted claims was 85.5%. Reimbursements were decreased by copays, low negotiated reimbursement rates, and a 10.8% denial rate owing to incorrect coding or late filing. Using the prospective pay system rate and the 85.5% reimbursement rate, we extrapolated that if a CHW carries a minimum patient load of 100 per month for 12 months, the remuneration will be approximately $78 000, sufficient to support a CHW median annual salary of $50 000,[15] with the remaining $28 000

TABLE 2— Characteristics and Outcome Measures for Patients With Hypertension: United States, January–October 2022

Demographics	Overall	Chronic Care Management Group (n = 29)	Control Group (n = 10)	*P*
Age, y, mean	72.3	70.6	77.4	< .05
Sex, no. (%)				< .05
Male	11 (28.2)	7 (24.0)	4 (40.0)	
Female	28 (71.8)	22 (76.0)	6 (60.0)	
Vitals and laboratory values, mean				< .01
Baseline systolic pressure	155.0	155.8	152.8	
Baseline diastolic pressure	83.9	82.9	86.6	
Remeasurement systolic pressure	143.0	139.0	156.0	
Remeasurement diastolic pressure	78.3	77.8	76.9	
Outcome measure, no. (%)				< .01
Improvement (i.e., remeasurement systolic pressure < baseline systolic pressure)	29 (74.4)	25 (86.2)	4 (40.0)	
No improvement (i.e., remeasurement systolic pressure ≥ baseline systolic pressure)	10 (25.6)	4 (13.8)	6 (60.0)	

Note. Tests for differences included the *t* test for continuous variables and the χ^2 test for categorical variables. We used a 2-sided $P < .05$ for all analyses.

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available to support 467 hours of pharmacist time (with a median salary of $80 000/year)[15] to conduct comprehensive medication reviews.

Using a convenience sample affected the generalizability of the outcome and created selection and other biases; however, we felt this approach was permissible in this instance, as the evaluation was exploratory. It attempted to rapidly generate insight into our hypotheses that (1) adding a pharmacist and CHW to the standard provider–nurse duo CCM clinical team could substantially free up the provider–nurse duo to enroll more patients in CCM, and (2) revenues obtained through Medicare CCM reimbursement could fund the added costs of the pharmacist and CHW. Our project budget and time were also constrained. We felt that this preliminary information was critical to planning a full-scale research project.

SUSTAINABILITY

Traditionally, the provider–nurse duo has shouldered the demanding responsibility of reimbursable care management. In traditional CCM protocols, the following functions are the responsibility of the provider–nurse duo: assessing the patient's medical, functional, and psychosocial needs; ensuring patient receipt of timely recommended preventive services; reviewing the patient's medications and potential adverse drug events; and overseeing the patient's medication self-management and coordinating care with home- and community-based clinical service providers. Performing all of these functions often exceeds the workload bandwidth of the provider–nurse duo and has contributed substantially to the underuse of CCM.

To address this, our model integrated a CHW and pharmacist into the team. The pharmacist directly decreased the provider workload while optimizing pharmaceutical care and decreasing potential adverse drug events. The CHW was also invaluable, spending more time with the patient, doing outreach and patient education and referral and care transition retention activities, conducting social determinant of health assessments, and building trust-based relationships.

CCM is a salaried provider–nurse duo responsibility, whereas the pharmacist and CHW are adjunctive; therefore, their remuneration needs to be funded. Our model demonstrates that Medicare CCM payments can be a reliable, sustainable funding source.

Medicare CCM reimbursement covers more than 15 chronic diseases. Thus, this model, properly implemented, can potentially improve the health-related quality of life for people with chronic diseases, help to lower health care costs, and allow redirection of funds to health promotion.

Implementing this model requires a CCM preparedness assessment to ensure that staffing, patient workflows, patient tracking, outreach mapping, and billing mechanisms are in place—before enrolling patients. A clinical driver is needed to oversee workflow aspects, patient identification, enrollment, and retention. In addition, proper documentation and coding, along with timely, accurate claims filing, are crucial for successful reimbursement.

PUBLIC HEALTH SIGNIFICANCE

The continued upsurge in chronic disease amplifies the need to redesign health care delivery systems to incorporate effective, fiscally sound CCM models. Our evaluation reaffirms the effectiveness of CCM in enhancing outcomes for patients with type 2 diabetes and hypertension. Additionally, it highlights the model's potential ability to reduce overall provider overload while providing financial support for the extended team. By design, the model can be engineered to fit into any health care setting. However, further large-scale studies, using probability sampling, are needed to establish its general applicability. AJPH

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CONTRIBUTORS

M. A. Kadree designed the new chronic care management model and the clinical assessment protocol, implemented and supervised clinic

protocol, collected data, and wrote the article. P. Wiggins identified and added local partners to form the intervention team. L. Thompson provided the pharmacy support and template to assess the comprehensive medication and pharmacy reviews. C. Warriner contributed the tool used to identify and assess potential adverse drug events based on pharmacist-collected data. M. White conducted the statistical analyses and created the tables.

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CONFLICTS OF INTEREST

At the time of the evaluation, Margaret Kadree was the chief medical officer at the Johnson Health Center and a clinical information specialist in the VDH's Chronic Disease Division. Lura Thompson was the chief pharmacist on the study, and two additional consulting pharmacists were obtained from her company Care Connections Rx.

HUMAN PARTICIPANT PROTECTION

The VDH institutional review board approved this study.

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