Patient Preference and Adherence

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ORIGINAL RESEARCH

Interprofessional Medication Self-Management Program for Older Underserved Adults

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Introduction: Older adults have complex medication self-management challenges that can contribute to poor disease control.

Methods: In 2016, an interprofessional medication self-management program was implemented in an internal medicine primary care residency clinic caring for a large proportion of indigent patients. This was a 1-year, quasi-experimental, pre–post study approved by the Institutional Review Board to evaluate the impact of this program on hypertension and diabetes control in older adults. Patients aged 60 years or older with both systolic blood pressure > 140 mm Hg and A1C > 7.5% were included in the study; patients who did not have these characteristics were excluded. Interprofessional team members (nurses, certified medical assistants, pharmacist, dietician, social worker, and nurse technician) obtained 6-month medication fill histories from pharmacies and provided findings to physicians prior to patient appointments. During patient appointments, medication self-management interventions were performed such as motivational interviewing and regimen simplification. Members contacted patients by phone after each appointment for ongoing medication self-management support.

Results: Of 50 patients, the mean age was 67 years, 78% were female, 88% were black, the mean baseline systolic blood pressure was 159.8 mm Hg, and A1C was 9.7%. The 1-year mean systolic blood pressure was significantly reduced [151.5 mm Hg vs 141.8 mm Hg, −9.7 mm Hg difference, 95% confidence interval (CI) −6.19 to −13.19, P < 0.001], and the 1-year mean A1C was significantly reduced (9.6% vs 8.6%, −1.0% difference, 95% CI −0.49 to −1.39, P < 0.001) after implementation. Compared to baseline, the mean systolic blood pressure and A1C were significantly lower at each follow-up visit.

Conclusion: This interprofessional medication self-management initiative improved systolic blood pressure and A1C in underserved older adults in an internal medicine residency clinic.

Keywords: geriatrics, internal medicine, interprofessional, hypertension, diabetes

Introduction

In the United States (U.S.), approximately 70% of individuals aged ≥65 years have hypertension,[1] and almost 30% have diabetes.[2] Moreover, the percentages of older adults with both conditions has increased significantly, from 9.4% to 15.2% ($p < 0.05$), comparing 2009–2010 to 1999–2000.[3] About 40% of older adults with hypertension have uncontrolled blood pressure; similarly, about 40% of older adults with diabetes have uncontrolled blood glucose.[4]

Medication non-adherence leads to adverse health outcomes,[5] accounting for approximately 50–80% of treatment failures and contributing to $100–300 billion

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in avoidable health-care costs annually in the US.[6] Up to half of older adults with chronic illness are taking medications incorrectly.[7] In older patients, adverse outcomes from medication non-adherence lead to increases in clinic and emergency department visits, as well as hospitalizations.[5,8] Older patients present with complex medication adherence challenges, including, but not limited to cost, polypharmacy, fear of adverse effects, cognitive decline, and physical barriers (eg, vision abnormalities, pill dysphagia, decreased manual dexterity).[8,9] Therefore, health systems are evolving to incorporate nurses, pharmacists, and other team members to focus on interventions that enhance medication self-management in older adults.[7] However, literature is lacking regarding implementation strategies for team-based medication self-management support in older patients.

One 36-month study was conducted to evaluate a pharmaceutical care program conducted at the Public Primary Health Care Unit in Brazil.[10,11] The pharmaceutical care program involved an interdisciplinary team composed of 5 general practitioners, 4 clinical pharmacists, and 2 nurses. Activities consisted of individual patient follow-up every 6 months, in addition to group education activities every 6 months. Of 194 study patients (97 patients in the pharmaceutical care program and 97 patients in usual care), the mean age was 65 years, about 62% were male, and about 68% were black. At baseline compared to 36 months later, significant reductions resulted for mean systolic blood pressure (156.7 mm Hg vs 133.7 mm Hg; $P < 0.001$), diastolic blood pressure (106.6 mm Hg vs 91.6 mm Hg; $P < 0.001$), fasting glucose (135.1 mg/dL vs 107.9 mg/dL; $P < 0.001$), glycated hemoglobin (A1C) (7.7% vs 7.0%, $P < 0.001$), and other cardiovascular risk markers.[10] Additionally, the number of patients reaching adequate blood pressure values improved from baseline in the pharmaceutical care program (26.8% vs 86.6%; $P < 0.001$), and the same was seen for fasting blood glucose (29.9% vs 70.1%; $P < 0.001$) and A1C (3.3% vs 63.3%; $P < 0.001$).[11] The purpose of this study is to evaluate the impact of an interprofessional medication self-management support program on blood pressure and A1C in older patients with both uncontrolled hypertension and uncontrolled diabetes in an internal medicine residency clinic.

Background

In 2016, a geriatrics committee was developed at the clinic to improve care for older adults. This was spurred by four clinic nurses who completed the Nurses Improving Care for Healthsystem Elders Geriatrics Resource Nurse course,[12] in addition to other staff having interest in geriatrics care. Members of the committee included two physicians, six nurses, a certified medical assistant, a nurse technician, a pharmacist, a social worker, and a diabetes educator. As their first quality initiative, the committee developed an interprofessional medication self-management program.

Methods

Medication Self-Management Program

The medication self-management program was implemented at the internal medicine residency primary care clinic which provides care for adult patients regardless of financial status. More than 50% of patients in this clinic are estimated to be indigent. To identify patients for the program, the clinical pharmacist generated reports from the electronic medical record (EMR), using the criteria: age ≥ 60 years, systolic blood pressure > 140 mm Hg, and A1C > 7.5%. These reports were generated monthly during a 1-year timeframe.

For the medication self-management program, each geriatrics committee member was assigned patients who had been identified in the EMR report. Committee members called pharmacies by phone to request 6-month fill histories, then reviewed the refill histories. If discrepancies between fill histories and medication records in the EMR were identified, the team member called the patient to clarify how medications were being taken. Next, the team members provided findings to the primary care provided (PCP) prior to each patient appointment, either in-person or using electronic messages in the EMR.

During the patient appointment, PCPs assessed patient medication self-management using motivational interviewing and engaged patients in setting goals for hypertension and diabetes management. Geriatrics committee members worked together with PCPs and patients to devise and implement interventions to help meet these goals. Examples of interventions included referrals to pharmacies that offer adherence services such as blister packaging or home delivery, de-prescribing, reducing medication cost, reinforcing medication education, refilling outdated medications, changing prescriptions from 30-day to 90-day supplies, and adding therapy to help meet disease state goals. Other interventions involved the clinical pharmacist for follow up, or the social worker or dietician as needed for further support in the home or transportation to

pharmacy or clinic visits, lifestyle and nutrition education, and health coaching.

Following the PCP visit, geriatrics committee members contacted assigned patients by phone to evaluate medication adherence, provide medication education, and encourage self-management behaviors (eg, monitoring home blood pressure and glucose). For each phone call, geriatrics committee members utilized a script to direct the conversation (Figure 1), documented a telephone note in the EMR, and routed the note to the PCP with any further intervention recommendations. Follow-up phone calls occurred monthly until patients progressed towards their disease state goals, then every 3, 6, or 12 months. Committee members met monthly to discuss improvements using plan-do-study-act methodology and review patient cases.

Design

This was an Institutional Review Board approved, quasi-experimental, pre–post study comparing data from 1 year before implementation to 1 year after implementation of the interprofessional medication self-management program. For data collection, only values measured in the study clinic were recorded. Before the study, clinic staff were trained on correctly obtaining readings using electronic blood pressure monitors and weight scales. Clinic laboratory staff used a consistent process for A1C testing (point-of-care test, DCA Vantage® Analyzer by Siemens). The primary outcome was the mean of all blood pressure and A1C values from each PCP visit during 1 year before implementation compared to the mean of all values 1 year after implementation. Secondary outcomes included blood pressure and A1C changes from baseline to each follow-up, adverse effects, and pre–post number of chronic medications. Paired t-tests were used to analyze pre–post data, and descriptive statistics were used for other data.

Results

Fifty patients met inclusion criteria, and all 50 were enrolled in the study, with a mean age of 67 years; 78% were female, 88% were black, 18% were smokers, 41% had a cardiovascular disease diagnosis, and 22% had chronic kidney disease. The mean systolic blood pressure at baseline was 159.8 mm Hg, the mean diastolic was 75.0 mm Hg, and the mean A1C was 9.7% (Table 1).

The 1-year mean systolic blood pressures were significantly reduced after implementation [151.5 mm Hg vs 141.8 mm Hg, −9.7 mm Hg difference, 95% confidence interval (CI) −6.19 to −13.19, $P < 0.001$] (Table 2). Likewise, the 1-year mean A1C was reduced significantly (9.6% vs 8.6%, −1.0% difference, 95% CI −0.49 to −1.39,

Introduction	
-Introduce yourself and state why you are calling today	
Diabetes Assessment	
DM meds and BS checks	- "What medications are you taking for diabetes?" - "How often are you checking your blood sugars at home?" - "What have your blood sugars been?"
High Blood Pressure Assessment	
BP meds & BP checks	- "What medications are you taking for high blood pressure?" - "How often are you checking your blood pressure at home?" - "What have your blood pressure readings been?"
Coping with DM and BP	- What else are you doing to help yourself with your DM and BP – Diet? Exercise?
Medication Access Issues	
Medication Issues?	- "Are you getting your medicines refilled on time without skipping any doses?" - "Are you having any problems getting/taking your medicines? – cost, timing, transportation?"
Conclusion	
Close the call	- "Do you have your next appointment scheduled? – give pt date and time if needed (make appt for them if needed before calling) - "Any other questions or concerns?" - "Thanks for speaking with me today"

Figure 1 Patient follow-up telephone call script.

Table 1 Patient Characteristics

Patients, n	50
Mean age, years (± SD)	67.1 (5.0)
Females, n (%)	39 (78.0)
Males, n (%)	11 (22.0)
Black or African American, n (%)	44 (88.0)
Other race or ethnicity, n (%)	4 (8.0)
White or Caucasian, n (%)	2 (4.0)
Mean systolic blood pressure, mm Hg (±SD)	159.8 (22.2)
Mean diastolic blood pressure, mm Hg (±SD)	75.0 (17.2)
Mean hemoglobin A1C, % (±SD)	9.7 (2.1)
Mean baseline weight, kg (±SD)	90.8 (23.5)
Mean body mass index, kg/m^2 (±SD)	33.5 (7.0)
Smokers, n (%)	9 (18.0)
Cardiovascular disease, n (%)	22 (41.0)
Chronic kidney disease, n (%)	12 (22.0)
Number of chronic medications, mean (±SD)	8.26 (2.67)

P < 0.001). Compared to baseline (Table 3), the mean systolic blood pressure was significantly lower at each follow-up visit (Figure 2), and the same trend was seen for A1C (Table 4, Figure 3). Diastolic blood pressure significantly improved at each follow-up, except for the 3-month (Table 3). Two patients experienced low blood pressure (90s/60s mm Hg) with dizziness, and 1 patient had asymptomatic low blood glucose (70 mg/dL). None of these patients experienced severe symptoms, and no further treatment other than de-prescribing was required. No patients in our study experienced severe adverse events. Although blood pressure and A1C were reduced, the mean number of medications was the same at 1 year (8.26 vs 8.36, 95% CI −0.50 to 0.30, P = 0.6166).

Discussion

Significant improvements in systolic blood pressure and A1C were observed and sustained following implementation of the interprofessional medication self-management support program. Of note, we utilized the Eighth Joint National Committee in addition to the American Diabetes Association guidelines to determine goals for blood pressure (<140/90 mm Hg) and A1C (<7.0–8.5%).[13,14] Ultimately, blood pressure and A1C goals were chosen using a combination of these national guidelines, patient-specific medical history, and PCP decision-making. Since the time of this research, the American College of Cardiology and

Table 2 Blood Pressure (BP) and Glycated Hemoglobin (A1C) Pre–Post Implementation

	1 Year Before	1 Year After	Mean Difference	95% Confidence Interval	P value
Total BP results, n Number of BP results per patient, mean (±SD)	212 4.2 (0.9)	218 4.4 (0.8)	N/A		
Mean systolic BP, mm Hg (±SD) Mean diastolic BP, mm Hg (±SD)	151.5 (12.9) 71.3 (12.0)	141.8 (12.0) 69.1 (11.2)	−9.70 −2.20	−6.19 to −13.19 −0.34 to 4.02	<0.001 0.0121
Total A1C results, n Number of A1C results per patient, mean (±SD)	181 3.6 (0.6)	172 3.5 (0.8)	N/A		
Mean A1C, % (±SD)	9.6 (1.7)	8.6 (1.5)	−1.00	−0.49 to 1.39	<0.001

Table 3 Blood Pressure (BP) at Baseline and Each Follow-Up Visit

	Baseline	1-Month	3-Month	6-Month	9-Month	12-Month
Patients per visit, n	50	36	44	48	43	46
Mean systolic BP, mm Hg (±SD)	159.8 (22.2)	139.4 (18.0)	144.3 (25.0)	144.9 (22.5)	141.0 (16.3)	140.9 (15.0)
Mean difference[a], mm Hg	N/A	−20.40	−15.50	−14.90	−18.80	−18.90
P value[a]	N/A	< 0.001	0.0003	<0.001	<0.001	<0.001
95% CI	N/A	−14.64 to −28.81	−7.41 to −22.95	−7.91 to −22.63	−12.89 to −25.89	−12.54 to −26.85
Mean diastolic BP, mm Hg (±SD)	74.8 (17.4)	68.1 (15.0)	71.3 (14.8)	69.9 (12.1)	67.8 (12.8)	67.4 (13.5)
Mean difference[a], mm Hg	N/A	−6.7	−3.5	−4.9	−7	−7.4
P value[a]	N/A	<0.001	0.2513	0.0133	0.0023	0.003
95% CI	N/A	−3.89 to −13.14	−1.50 to 5.59	−1.16 to −9.43	−2.53 to −10.87	−2.89 to −13.23

Note: [a]Compared to baseline.
Abbreviation: CI, confidence interval.

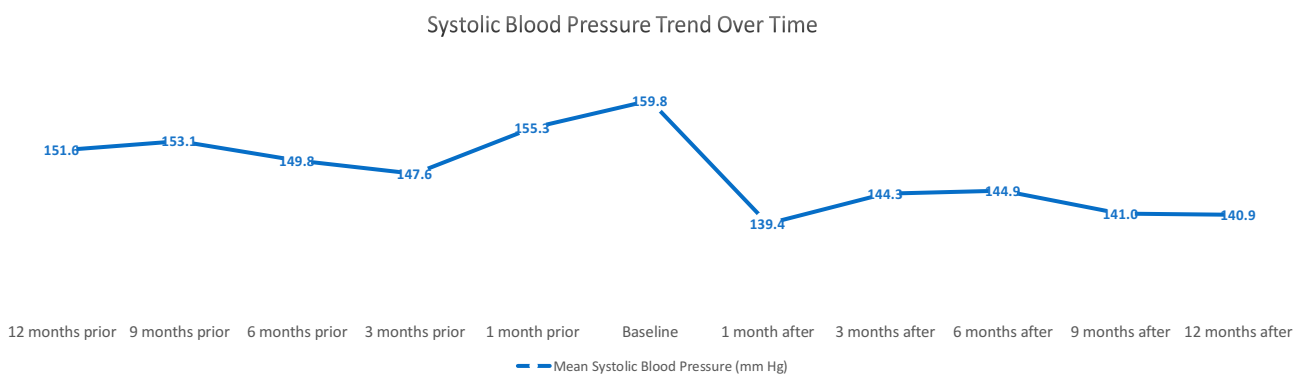

Figure 2 Systolic blood pressure trend.

American Heart Association Task Force introduced a recommended systolic blood pressure goal of <130 mm Hg in patients aged 65 or older who are noninstitutionalized, ambulatory and community-dwelling. Additionally, this new set of guidelines recommends treating diabetes patients to a goal blood pressure of <130/80 mm Hg.[15]

In residency clinics, patients experience a higher frequency of PCP turnover due to residents graduating and new PCP assignments every 1–3 years. This is a challenge to patient–physician relationships and continuity of care. The outreach by staff helps to improve continuity and can become influential in efforts to sustain the patients' self-management support system. Patient assignments to team members included consideration of any existing relationship staff already had with patients identified for the study. Clinical improvements may wane over time, reinforcing our observations that ongoing support is needed to sustain positive outcomes long term.[8]

It is also essential to maintain a blame-free environment when addressing medication adherence.[6] Using motivational interviewing and empathetic listening, we devised patient-centered solutions to medication self-management. Patient feedback at office visits and during phone call coaching discussions indicated that the personal connection enhanced their trust in the coaching recommendations and subsequently the impact of the interventions. Patient responses reflected that they were willing to participate in their own self-management because their physician's office team "cared."

Initially, for the first post-visit 1-month follow-up, each team member called 8–10 patients every month. As the study progressed and the patient follow-up intervals increased, each member had fewer patient calls to make monthly. The monthly call reduction based on actual patient "successes" reinforced staff engagement not only because the call frequency volume decreased but also because they, like the patients, could see the resulting A1C and/or systolic blood pressure improvements.

National medication adherence quality initiatives utilize prescription claims data to track adherence outcomes.[16] In the aforementioned study evaluating a pharmaceutical care program for older adults, medication adherence using the Morisky–Green test was found to be significantly better for patients in the pharmaceutical care program (50.5% of adherent patients at baseline, 83.5% after 36 months; $P < 0.001$).[11] Using dispense history, adherence improved from 52.6% to 83.5% ($P < 0.001$). In the usual care group, no significant improvements were seen with clinical outcomes or adherence. For our study, we did not have direct access to prescription

Table 4 Hemoglobin (A1C) at Baseline and Each Follow-Up Visit

	Baseline	3-Month	6-Month	9-Month	12-Month
Patients per visit, n	50	40	47	44	43
Mean A1C, % (±SD)	9.7 (2.1)	8.8 (2.0)	8.9 (2.1)	8.3 (1.5)	8.3 (1.7)
Mean difference[a], %	N/A	−0.90	−0.80	−1.40	−1.40
P value[a]	N/A	< 0.001	0.0024	< 0.001	< 0.001
95% CI	N/A	−0.39 to −1.33	−0.40 to −1.32	−0.82 to −1.96	−0.62 to −2.02

Note: [a]Compared to baseline.
Abbreviation: CI, confidence interval.

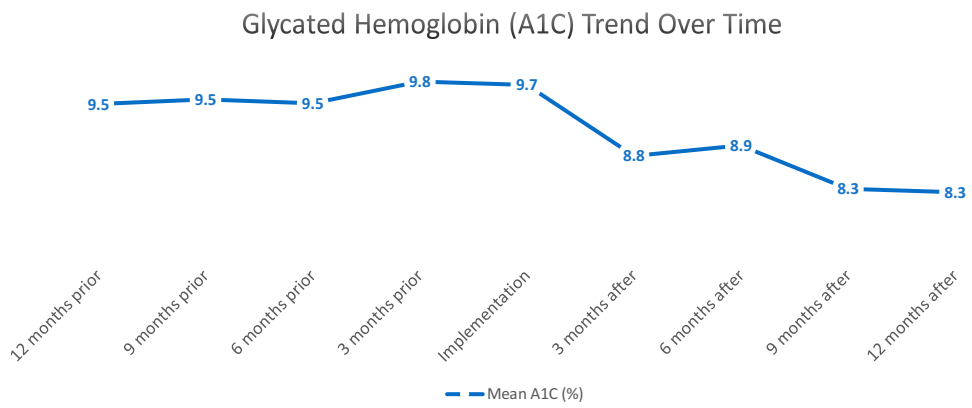

Figure 3 Glycated hemoglobin (A1C) trend.

claims data. Our medication self-management program was non-funded and required team members to dedicate time out of their regular schedules, limiting the ability to track adherence. Instead, we deduced that patients with both uncontrolled hypertension and uncontrolled diabetes likely have medication adherence challenges, and we elected to measure clinical outcomes. More team members or time allocated may expand capabilities. Contacting pharmacies for medication refill history can be time intensive. By the end of our study, our EMR platform gained the ability to capture refill data, improving efficiency.

Many patients in our clinic are indigent or have financial, literacy, other access barriers, which adds to the vulnerability of this older population. In the US, significant healthcare disparities exist for vulnerable populations, leading to worse outcomes.[17] These patients may face stigmas or challenges to care such as financial barriers, having low health literacy, or being under- or uninsured. Since we did not depend on payer data for our intervention, we provided the medication self-management service to patients regardless of insurance or financial status, minimizing healthcare disparities.

All 50 patients who met inclusion criteria were enrolled and followed for 1 year. Population numbers were not exactly 50 at every follow-up interval for various reasons. Patients may not be due for follow-up appointments at the exact intervals expected for research, considering that the study was conducted in a clinical setting rather than a research environment. Additionally, patients may have cancelled or not shown for their appointments. If a patient cancelled or did not show for an appointment, team members re-scheduled the appointment. Also, patients who improved toward clinical goals required less frequent follow-up as time progressed.

The number of medications did not change significantly, likely due to our focus on adherence to currently prescribed medications. In some cases, therapy was de-escalated. This suggests that working with patients to adhere to first-line therapies can obviate the need to intensify therapy to achieve disease state goals. We did not quantify interventions due to the wide variety of scenarios encountered. For instance, discussing timing of when medications were taken during the day, travel contingencies to taking medications, switching to combination medications for regimen simplicity, customizing dietary interventions, and including family members and caregivers into home care illustrate the variety of interventions performed. Other clinic settings may have more feasible environments and methods for tracking numbers and types of interventions.

Medications should be titrated cautiously for patients who have a history of non-adherence. Patients may inadvertently risk overtreatment (hypotension or hypoglycemia) when going from not regularly taking medications to adhering to multiple medications as prescribed. It is possible that evaluating lifestyle during follow-up calls made an impact on our outcomes. However, lifestyle management services in our clinic did not change during the time of the study. Figures 2 and 3 illustrate the association between this quality initiative and blood pressure and A1C improvements. There were no other new hypertension or diabetes quality initiatives implemented during the time of our study. Improvements in blood pressure and A1C beyond those achieved in our study should be explored using non-pharmacologic approaches.

In general, systolic blood pressure reductions of the magnitude seen in our study can reduce the risk of death from stroke and ischemic heart disease by about 50%.[18] In diabetic patients, this magnitude of blood pressure reduction is

associated with a reduced risk of all-cause mortality by 50% and cardiovascular mortality by 70%.[19] Similarly, each 1% reduction in A1C can reduce the risk of diabetes-related death by 21%, myocardial infarction by 14%, and microvascular complications by 37%.[20] Studies are needed to evaluate the impact of these initiatives on cardiovascular outcomes.

Conclusions

An interprofessional medication self-management program in an internal medicine primary care residency clinic improved blood pressure and glucose for underserved older patients with both uncontrolled hypertension and uncontrolled diabetes.

Affiliated Institutional Review Board

This study received expedited review approval from Cone Health Institutional Review Board. Patient consent was waived due to the quality improvement process utilized, minimal risk involved with patients included in the study, de-identification of data, and secure data management, in compliance with the Declaration of Helsinki.

Disclosure

The authors report no conflicts of interest in this work.

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