

Integration of Personalized Health Planning and Shared Medical Appointments for Patients with Type 2 Diabetes Mellitus

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Objectives: This study describes the feasibility of implementing personalized health planning (PHP) within shared medical appointments (SMAs) for patients with type 2 diabetes mellitus. The PHP-SMA approach was designed to synergize the benefits of SMAs with those of PHP, enabling greater patient engagement focused on meeting individualized therapeutic goals in a group setting.

Methods: Patients were assigned randomly to a PHP-SMA or a standard eight-session SMA series. Standard SMAs included an interactive educational curriculum delivered in group medical encounters. The PHP-SMA included the addition of a patient self-assessment, health risk assessment, shared patient-provider goal setting, creation of a personal health plan, and follow-up on clinical progress. Clinical and patient-reported outcomes and qualitative data from focus groups with patients, providers, and administrative staff were used for evaluation. Qualitative data explored facilitators and barriers to implementation of the PHP-SMA. The Consolidated Framework for Implementation Research was used to provide insight into implementation factors.

Results: PHP was successfully integrated into SMAs in a primary care setting. Patients in the PHP-SMA ($n = 12$) were more likely to attend ≥ 5 sessions than patients assigned to the standard SMA ($n = 7$; 58% PHP, 28.5% control). Qualitative data evaluation described the advantages and barriers to PHP, the team-based approach to care, and patient participation. The PHP-SMA group experienced reductions in hemoglobin A1c, low-density lipoprotein, blood pressure, and body mass index, as well as successful attainment of health goals.

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Initial results were presented at the American Public Health Association conference, October 31–November 2, 2016, Denver, and the Association for American Medical Colleges Integrating Quality conference, June 8–9, 2017, Chicago.

This pilot demonstration project was supported in part by a Clinical Care Innovation Pilot Award from the Association for American Medical Colleges. S.K.H. is the owner and manager of Metta Solutions. The remaining authors did not report any financial relationships or conflicts of interest.

Accepted May 15, 2018.

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0038-4348/0-2000/111-674

DOI: 10.14423/SMJ.0000000000000892

Conclusions: The PHP-SMA is a proactive and participatory approach to chronic care delivery that synergizes the benefits of PHP within SMAs. This study describes the components of this intervention; collects evidence on feasibility, acceptability, and clinical outcomes; and identifies implementation barriers and facilitators. The PHP-SMA warrants further evaluation as an approach to improve health outcomes in patients with common chronic conditions.

Key Words: chronic care, patient-centered care, personalized health planning, shared medical appointment, type 2 diabetes mellitus

More effectively preventing and managing chronic diseases are among the greatest challenges to our nation's health and economy. The burden of chronic diseases continues to grow and falls disproportionately on vulnerable populations.¹ The chronic care model recognizes that effective management of a chronic disease requires patients to be engaged in their health self-management and decision making.^{2,3} Achieving this is a challenge in primary care, where clinicians must balance the goal of quality improvement with the financial constraints of the fee-for-service reimbursement system. Type 2 diabetes mellitus, like many chronic conditions, requires self-management,⁴ patient activation,^{5,6} peer support,^{7,8} and care coordination⁹ to achieve the best outcomes, yet this type of care can be difficult to provide within a conventional, time-constrained visit. The patient-centered medical home (PCMH) is a validated organizational

Key Points

- Personalized health planning (PHP) was successfully adapted to be delivered within a series of shared medical appointments (SMAs).
- Patients were randomized into a PHP-SMA group and a standard SMA group without the PHP process to compare patient acceptability and feasibility while simultaneously collecting preliminary evidence on clinical efficacy.
- PHP-SMA patients set more health goals and saw greater improvements in patient activation than patients in the standard SMA group.
- The PHP-SMA warrants further evaluation as an approach to improve health outcomes for patients with type 2 diabetes mellitus and other common chronic conditions.

structure based on chronic care model elements, with an emphasis on supporting self-care efforts of patients in care plans.¹⁰ To fully realize the potential of the PCMH, proactive, personalized, and participatory care delivery models must be developed to provide a coherent approach to improve the prevention and management of chronic diseases.

This study adapted personalized health planning (PHP), an evidence-based intervention designed to engage patients in creating and achieving meaningful personal health-related goals, to be delivered within shared medical appointments (SMAs). The primary objective of this study was to determine the feasibility of integrating PHP into SMAs while simultaneously evaluating implementation factors. PHP is an approach to care that focuses on primary and secondary prevention of common chronic diseases through the identification of each patient's health risks, desired health goals, strategies to enhance their engagement, development of a plan to achieve therapeutic goals, and coordination of care.^{11,12} The effectiveness of PHP has been studied in diverse populations and settings. PHP was compared with usual care in a randomized controlled trial to reduce the cardiovascular risk factors of patients.¹³ The research team used an integrative approach that emphasized self-care, mindfulness stress reduction practices, psychosocial well-being, and health coaching. The success of PHP in reducing cardiovascular risk factors in this trial provided a rationale and guidance as a model for how to integrate PHP into SMAs to improve chronic disease management. The PHP framework also has been applied to multimorbid, homebound Medicare patients,¹⁴ a primary care provider (PCP) network to reduce emergency department visits and inpatient admissions,¹⁵ and diverse Veterans Administration clinical settings.¹⁶

SMAs bring together patients with a shared chronic condition for longer billable visits in a group setting, and they show promise for the management of type 2 diabetes mellitus.^{17,18} A meta-analysis of 17 studies that compared diabetes mellitus SMAs with usual care shows an association between participation in a diabetes mellitus SMA and a reduction in hemoglobin A1c (HbA1c) levels (mean -0.55 percentage points) and lower systolic blood pressure (mean -5.22). The meta-analysis indicated that there is heterogeneity among components of diabetes mellitus SMA interventions and that the intervention components often are poorly defined, leading to varying effect sizes.¹⁷ SMAs have had only modest uptake¹⁹ in part because of the heterogeneity and ambiguity of their characteristics and the strategies used to implement them.

To address SMA adoption challenges associated with intervention heterogeneity and ambiguity, PHP provides a detailed and structured approach that could make SMA interventions more effective and acceptable to patients. The structure of the PHP approach also may simplify future replication and dissemination efforts because the intervention components are clearly defined. There also was reason to believe that because PHP is a patient-centered and personalized goal-oriented process, it could synergize well with the additional time and peer support

offered through an SMA. This study explores the feasibility of integrating PHP into a diabetes mellitus SMA series and implementing the series to leverage the complementary advantages of PHP and SMAs.

The intent of this work was to develop a replicable approach to facilitate uptake in diverse clinical settings and to provide practitioners with insights into how to offer an SMA intervention that is responsive to the clinical needs, personal values, and preferences of patients through a collaborative PHP process.

Methods

Setting and Participants

The Duke Family Medicine Center is a National Committee for Quality Assurance–recognized level 3 PCMH that provides comprehensive primary care services. Our study team included a family medicine physician, health coach, registered nurse, pharmacist, and scheduler. A study coordinator assisted with data management and obtaining informed consent. This clinical research study was reviewed and approved by the Duke University institutional review board.

Recruitment

Patients could participate if they were older than age 18 years with a diagnosis of type 2 diabetes mellitus and an HbA1c score $>7.0\%$ in the last year. Individuals were excluded if they had type 1 diabetes mellitus, were pregnant, had undergone an amputation, or were receiving renal dialysis. Recruitment occurred through both an existing waitlist and an electronic medical record–based query of eligible patients. Providers were sent a list of eligible patients and asked to recommend each patient for an SMA based on the following criteria: English language capability, functional hearing and eyesight, and perceived willingness to participate in a group visit. Recommended patients were mailed a recruitment letter, followed by a telephone call. Interested individuals were then consented on the telephone call. A single blind randomization of recruited patients occurred using the randomize function in Microsoft Excel (Microsoft, Redmond, WA). Patients were randomly assigned to either a PHP-SMA group or a standard SMA group (Fig.). Groups were filled to a closed cohort of eight patients.

Standard SMA Series

There were 8 standard SMA sessions offered for 7 months. Each session was 120 minutes long and occurred approximately monthly, similar to the median length (120 minutes) and median dosage (7.5 visits) found in a systematic review of randomized controlled trials of diabetes mellitus SMAs.¹⁷ The first 30 minutes were used for intake, taking vitals, and medication adjustments and reconciliation. The subsequent 60 to 90 minutes were used to cover educational content, generate group discussion, set goals, and complete individual physical examinations. Individuals were

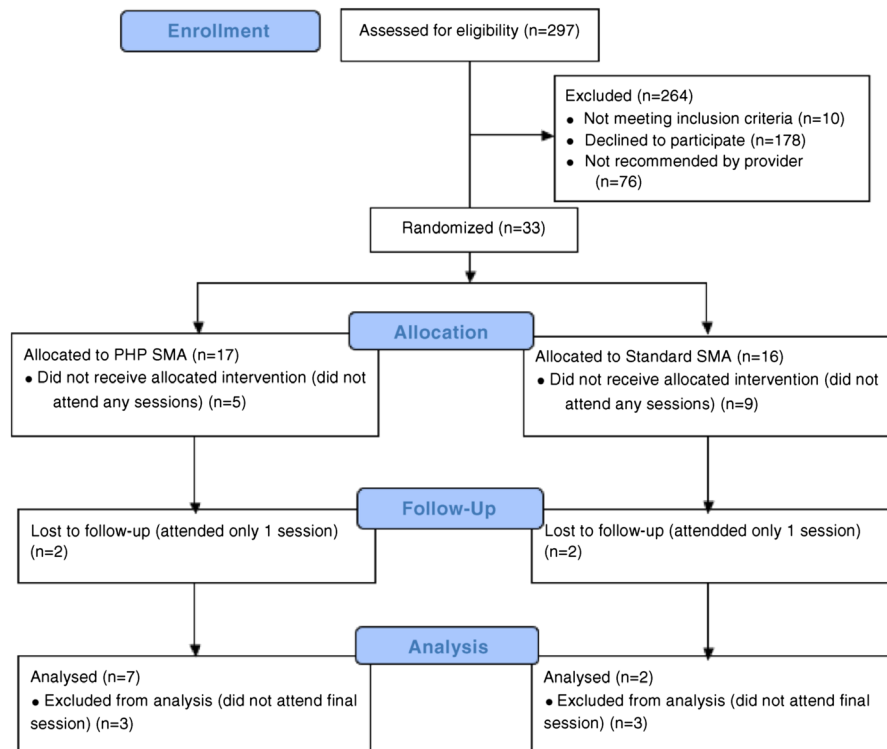


Fig. The CONSORT flow diagram illustrates the recruitment, randomization, follow-up and data analysis for the PHP-SMA group and the standard SMA group. CONSORT, Consolidated Standards of Reporting Trials; PHP, personalized health planning; SMA, shared medical appointments.

pulled out of the group one by one to complete the individual physical examination. The standard SMA approach included patient educational content, group discussion, medication reconciliation, and a physical examination. Educational content was based on the American Diabetes Association education priority areas (diabetes mellitus pathology, nutrition, physical activity, medications and adherence, monitoring glucose, healthcare decision making, and psychosocial issues). The scheduler made reminder telephone calls to patients for each session. The family medicine physician pulled patients from the group for individual physical examinations in the classroom behind a privacy partition and set basic clinical goals (eg, weight loss, HbA1c reduction targets). The health coach assisted with intake, facilitated discussion around educational content, and led the follow-up on goal progress in a group setting. The registered nurse assisted briefly at the beginning of the session with taking vitals and conducting intake. The pharmacist reconciled medications and made medication adjustments individually with each patient during intake.

PHP-SMA Series

The PHP-SMA series were delivered at the same dosage and frequency, with the same educational content as the standard SMA series. The PHP-SMA differed in its emphasis on shared patient-provider goal setting and tracking progress (through a more structured process of health self-assessment, shared goal setting, and a personal health plan), a participant personal health plan notebook to document health goals and progress, and a 5-minute

mindfulness practice at the beginning of each session. The PHP process has five distinct elements that lead to the formation of a tailored health plan to support lifestyle modification and care coordination (Table 1). An integrative approach to self-care was emphasized throughout the program. At the first session, patients completed a health self-assessment to identify current and desired states of self-care, motivating values, and preferences, and to begin thinking about their health-related goals. By the second session, the provider's clinical risk assessment, a therapeutic plan, and the patient's self-assessment informed the shared goal setting process. The family medicine physician engaged in a more intensive shared goal-setting process individually during the second session physical examination using health risk information, health history, and diagnoses from the patients' medical record and the completed patient self-assessment. This resulted in health goals that were clinically relevant and meaningful to the patient with a personal plan to achieve them. These goals were revisited at each session by the health coach, who also facilitated the group discussion surrounding educational content and engaged with patients to set intermediary goals or "action steps" based on progress.

Evaluation

The primary objective of the study was to evaluate feasibility and describe factors affecting implementation. A mixed-methods approach was used, incorporating both qualitative and quantitative data. The secondary objective of the study was to

Table 1. PHP-SMA structure

PHP element	SMA session no.	Content description/course title
Patient health self-assessment	1	Patient defines his or her needs, preferences, and goals for personal health
Health risk assessment	1	Provider identifies patient's short- and long-term health risks and creates therapeutic plan
Shared goal setting	2	Patient and provider set shared goals to address clinical needs in a patient-centered manner
Personal health plan	2	Signed by patient and provider, tracks goals over time, and is revisited at each session
Care coordination and follow-up	3–8	Health coach facilitates group discussion focused on goal progress and social support; goals documented and tracked in EMR Educational content covered ^a What is Diabetes, Diet & Nutrition, Moving the Body & Rest, Stress and the Mind Body Connection, Medications, Personal Relationships & Your Healthcare Team

SMA sessions: 90–120 minutes once per month for 7 months; 6–8 patients, MD/PA, health coach, pharmacist, nurse. Standard SMA does not contain any PHP elements. EMR, electronic medical record; MD, Doctor of Medicine; PA, physician assistant; PHP, personalized health planning; SMA, shared medical appointments.

^a*Both standard SMA and PHP-SMA covered these educational topics at different paces. PHP-SMA spent an entire session on goal setting (session 2), whereas standard SMA did not.*

collect preliminary evidence on the impact of the PHP-SMA on relevant clinical and patient reported outcomes.

For the primary objective, quantitative data focused on the collection of measures associated with feasibility and acceptability, such as retention and patient satisfaction. The research team hypothesized that if the PHP-SMA was acceptable and of greater perceived value to patients, then the PHP-SMA would be better attended than the standard SMA and have high patient satisfaction scores. Patient satisfaction was collected at the end of the final session through a feedback form and Likert scale questions. Patients were asked to rate their experience in the SMA program from a scale of 1 (poor) to 6 (very satisfied). Qualitative data collection occurred through a series of focus groups and structured interviews with clinicians, staff, and patients to provide context for the empirical quantitative findings and further explore themes associated with feasibility such as patient acceptability, practicality for staff and clinicians, and contextual factors.

Detailed project notes were taken to capture barriers to participation and other implementation factors related to recruitment and retention. Focus groups and structured interviews were audio-recorded, transcribed, and coded. The Consolidated Framework for Implementation Research (CFIR) was used to identify implementation factors from transcriptions.²⁰ CFIR is a consolidation of 20 published sources from 13 disciplines reporting on factors associated with effective implementation of interventions. CFIR consists of five main domains and nested constructs (Table 2) that were used to systematically guide and analyze implementation efforts. The interview guides were designed to explore the CFIR domains and solicit input based on perspective (clinical, administrative, or patient). A directed approach to content analysis was used through identified CFIR domains and nested constructs. Two coders identified themes in the interview transcripts and the barriers to participation notes. Specifically,

codes were designated a priori based on CFIR domains and constructs. Two members of the study team trained in qualitative research methods coded half of the transcripts individually and then reviewed as a group to come to consensus on the consistent application of codes and refinement of the codebook. A third coder, also a member of the study team, reconciled differences, and the final codes were applied to all of the transcripts for interpretation.

The secondary objective was to collect preliminary evidence on the impact of the PHP-SMA on clinical and patient reported outcomes of interest. Patient-reported outcomes included patient demographics, the 13-item Patient Activation Measure,²¹ Diabetes Empowerment Scale-Short Form,²² General Self-Rated Health (GSRH),²³ the Patient Health Questionnaire-2,²⁴ and a visual goal progress scale developed by the study team. The Patient Activation Measure measures health self-management and patient engagement and is associated with better health self-management behaviors,²⁵ outcomes,^{5,26–28} fewer hospitalizations,^{5,29} and better patient satisfaction.⁵ The Diabetes Empowerment Scale-Short Form measured diabetes-specific health self-management skills.^{21,30} The GSRH is a single-item measure of self-reported health (1–excellent to 5–poor) that is predictive of mortality risk³¹ and healthcare expenditures.²³ The PHQ-2 is a depression screening tool included as part of the usual care for medical visits.²⁴ The visual analog scale for goal progress measured self-reported progress on goals and was administered at the third and seventh sessions. Patients rated their progress on goal(s) they had set on a six-point scale: I have changed my goal, I have made no progress toward my goal, I am making progress toward my goal, I have achieved my goal, I have exceeded my goal, and I have greatly exceeded my goal. The primary clinical outcomes of interest were HbA1c, body mass index, blood pressure, and low-density lipoprotein. Patients were included for analysis if they completed

Table 2. Consolidated framework for implementation research domains and nested constructs

CFIR domain	Definition	Nested constructs used	Example quotation
Intervention characteristics	Key attributes of the intervention	Relative Advantage, Design Quality & Cost	Provider: “I think that’s the beauty of adding the PHP into the group setting. PHP couldn’t be done in a 15-minute appointment very easily. It can be in the group setting.”
Outer setting	External factors that contribute to implementation	Needs & Resources of those Served by the Organization, External Policy & Incentives	Health coach: “Within the patient-centered medical home, that’s supposed to be where those dots are connected, and I think this is a model that can facilitate that. And that’s really the intention behind building personal health plans for patients.”
Inner setting	Factors associated with implementation site culture, climate, and structure	Relative Priority, Networks & Communication	Administrator: “You really need that team approach so that somebody is looking at the numbers, somebody is looking at the cost, somebody is looking at the patient care aspect, somebody is looking at recruitment.”
Characteristics of individuals	How actions and behaviors of individuals influence implementation	Knowledge & Beliefs about Intervention, Self-Efficacy	PCP: “It gave me a sense that we could actually make a difference for people with chronic disease, but that it takes an investment of time and resources and some planfulness.”
Process	How the intervention is planned and executed, how individuals engage with it	Innovation Participants, Engaging	Patient: “My doctor told me about [the PHP SMA] and she had said it would be good for me to get into an activity that I wanted to get into and she gave me the number to call, and so I called in.”

PCP, primary care provider; PHP, personalized health planning; SMA, shared medical appointments.

the program and attended the first and final sessions to collect baseline and postintervention data. The small sample precluded the use of inferential statistics. Paired *t* tests were used to determine whether the mean difference between the baseline and post-intervention is statistically significantly different from zero.

Results

Qualitative Analysis

CFIR was used to organize qualitative data from focus groups with both PHP and standard SMA patients and the care team. Themes identified from the patient focus groups (*n* = 8: 3 standard SMA patients and 5 PHP-SMA patients), staff and clinicians (*n* = 6: a family medicine physician, nurse, health coach, pharmacist, scheduler, and clinic administrator) and recruitment notes are organized under each domain. Nested constructs are italicized (Table 2).

Intervention Characteristics

Patients. Participants in both the PHP and standard groups indicated the “relative advantage” of the SMA as compared with a traditional one-to-one encounter with their PCP, with one patient noting that the group received “information sharing as well as learning about diabetes itself that isn’t done during a regular

doctor’s appointment.” Added time and attention also were relative advantages. Accountability and social support were identified as key advantages. Accountability to other group members “meant a little bit more than being accountable to professionals” and social support from group members was “a very strong draw... it’s a motivation.” Patients also mentioned that the presence of a health coach was positive.

Care Team. “Relative advantage” of the PHP-SMA over traditional care also was a theme for the care team. The health coach said, “It’s just a better way of doing patient-centered chronic care than the traditional primary care encounter ... it takes the burden off of those [traditional] visits to try to cover a huge spectrum of things you need to cover to do chronic care well.” The PCP expressed that PHP could be done more easily in a longer group appointment. The health coach and the PCP expressed concerns about the cost of both patients and the clinic. They highlighted exploring how to minimize copayments for the program and analyzing how to most cost-effectively deliver the program as priorities. An internal cost analysis conducted by the study team indicated that the clinic would cover its cost for PHP-SMA by billing for six to eight patients per session, depending on whether the provider was a physician or other advanced practice provider. Larger reimbursements are available to clinics that have access to a diabetes-certified educator to serve as the health coach.

Outer Setting

Patients. All patient comments on outer setting were subcoded into “needs and resources of those served by the organization.” Patients believed that the PHP-SMA may be well suited for individuals with prediabetes mellitus, that “[Prediabetes is] when you’re going to get people and really make a difference.” Cost for each session proved to be a major barrier for participants. One patient said, “I’m on a fixed income, I’m a retiree, and sometimes it gets a little expensive when you’re charting out what you can spend each month ... maybe if they could throw a little something in each month, like maybe \$10 for transportation or something. Don’t you think that would help?”

When notes on barriers to participation were analyzed, the most commonly reported barriers to participation were scheduling conflicts (with family commitments or other health-related appointments), transportation, and cost of the copay. These align with what was reported in focus groups and provider interviews. Recruitment experience suggests that groups should be overfilled to account for attrition.

Care Team. The care team discussed the PHP-SMA within the context of “external policy and incentives.” The administrator mentioned the importance of the services offered by the program for PCMH accreditation, and the health coach said that the PHP-SMA should be a “fixture” as we “move towards population health and value-based care.” The PCP said, “We’re moving into a world where we have to be better at [chronic care] ... so [the PHP-SMA] gave me a sense of ability to innovate and try new things.”

Inner Setting

Patients. Respondents commented on inner setting infrequently because they were not aware of the clinic’s overall structure and climate.

Care Team. Members of the care team highlighted “networks and communication,” mentioning that a team-based approach to implementation is important, and that communication between all of the members of the team and multiple clinical champions is necessary for success. “It cannot be one person because the key word is ‘sustainability.’ If that person ever leaves or something ever happens, everything falls apart,” said an administrator.

Characteristics of Individuals

Care Team. The care team discussed their respective roles within the PHP-SMA, subcoded as “knowledge and beliefs about the innovation.” The provider and health coach highlighted the differences and key aspects of each of their roles in leading the PHP-SMA sessions. “The coaching role gives the patient room to set their own goals and to set their own progress method. And we in medicine tend to think of ourselves as the people who say this is the problem and this is what you should do to fix it,” said the PCP. The health coach

said, “My focus was on health behavior change and lifestyle modification.” The PCP played a more clinical role: “having [the health coach] there freed me up to focus on the medical

Table 3. Characteristics of participants and attendance

	Standard SMA, n = 7	PHP SMA, n = 12
Demographic characteristics		
Age, y, mean (SD)	55.1 (14.5)	59.4 (10.5)
Female, no. (%)	5 (71.4)	8 (66.7)
Race/ethnicity, No. (%)		
White non-Hispanic	1 (14.3)	3 (25)
Black non-Hispanic	6 (85.7)	8 (66.7)
Hispanic	0	1 (8.3)
Marital status, no. (%)		
Married	1 (14.3)	0
Widowed	1 (14.3)	1 (8.3)
Divorced	1 (14.3)	5 (41.7)
Never married	4 (57.1)	6 (50)
Education, no. (%)		
Less than high school	1 (14.3)	1 (8.3)
High school	1 (14.3)	2 (16.7)
Some college	3 (42.9)	6 (50)
College degree or more	2 (28.6)	3 (25)
Employment status, no. (%)		
Employed with wages	1 (14.3)	3 (25)
Unemployed	2 (28.6)	0
Student	1 (14.3)	0
Retired	2 (28.6)	5 (41.7)
Unable to work	1 (14.3)	4 (33.3)
In past year, had ≥30 days without health insurance, no. (%)		
Currently covered by health insurance plan, no. (%)	7 (100)	12 (100)
Clinical characteristics		
Body mass index, mean (SD)	35.8 (4.3)	38.8 (9.9)
HbA1c, mean (SD)	8.6 (1.2)	8.0 (1.5)
Systolic blood pressure, mean (SD)	159 (16.1)	137 (15.7)
Diastolic blood pressure, mean (SD)	93.6 (13.1)	80.4 (13.0)
Attendance by session, No. (%)		
1	6 (85.7)	8 (66.7)
2	5 (71.4)	11 (91.7)
3	2 (28.6)	4 (33.3)
4	3 (42.9)	7 (58.3)
5	2 (28.6)	5 (41.7)
6	2 (28.6)	8 (66.7)
7	2 (28.6)	7 (58.3)
8	3 (42.9)	6 (50)
Retention, no. (%) ^a	2 (28.6)	7 (58.3)

HbA1c, hemoglobin A1c; PHP, personalized health planning; SD, standard deviation; SMA, shared medical appointment.

^aDefined as the proportion of patients that attended ≥5 sessions.

record keeping and the physical exam and making sure we were dealing with the clinical issues while the group continued.”

Process

Patients. Process codes were assigned to the “innovation participants” nested construct. Patients indicated that their PCP was important in their process of engaging with the intervention. One said, “I think I would have done it either way, but I agree that it helped to have not a push from the doctor but a reinforcement.”

Care Team. Care team members echoed the sentiments of patients, emphasizing the importance of the PCP in engaging and encouraging their patients to participate in the PHP-SMA.

Quantitative Analysis

The patient population in both standard and PHP-SMA groups was predominantly unmarried, female, and African American (Table 3). The proportion of patients that attended ≥ 5 sessions of the PHP-SMA (58%) was greater than the standard SMA (28.5%; Table 3). Because of the small sample size of patients in the standard SMA group that completed the full 7-month intervention, analysis could not detect a statistically

significant difference in means of the baseline and postintervention outcomes. This limits the ability to draw any conclusions on the impact of the standard SMA on the outcomes of interests. Patients in the PHP-SMA group reported high levels of satisfaction with the program (average rating of 5.3 of 6). Results indicate that PHP-SMA patients experienced clinically significant improvements in HbA1c, depression symptoms, blood pressure, cholesterol, GSRH, diabetes empowerment, and patient activation. The improvements in diastolic blood pressure, HbA1c, diabetes empowerment, and GSRH were statistically significant at 0.01 to 0.05 alpha levels (Table 4). PHP-SMA patients set more goals and had greater success achieving them (Table 5).

Discussion

The PHP-SMA was developed and implemented in a primary care outpatient clinic setting. This model synergizes peer support, education about diabetes mellitus, integrative approaches, and intensive goal setting to create a personalized health planning experience within a group. A strength of the PHP-SMA model is that it provides a safe and supportive environment for patients with type 2 diabetes mellitus to share their experiences

Table 4. Baseline and postintervention clinical and participant self-report outcomes

	Group	Baseline mean	Postintervention mean	Difference in means	
Clinical outcome measures					
HbA1c, mg%	Standard (n = 2)	7.7	7.2	-0.5	
	PHP (n = 6)	8.6	7.8	-0.8	*
LDL cholesterol level, mg/dL	Standard (n = 2)	134.5	137	2.5	
	PHP (n = 4)	85.8	72	-13.8	
DBP, mmHg	Standard (n = 2)	90.5	86	-4.5	
	PHP (n = 5)	87.2	79.8	-7.4	**
SBP, mmHg	Standard (n = 2)	159	159.5	0.5	
	PHP (n = 5)	139.6	134.6	-5	
Baseline BMI, kg/m ²	Standard (n = 2)	34.5	34.3	-0.2	
	PHP (n = 5)	42.16	41	-1.16	
PHQ-2	Standard (n = 2)	1	2	1	
	PHP (n = 5)	1.2	0	-1.2	
Patient-reported outcome measures					
PAM-13	Standard (n = 2)	59.6	62.4	2.8	
	PHP (n = 5)	62.6	77.8	15.2	
Diabetes Empowerment Scale	Standard (n = 2)	4	4	0	
	PHP (n = 5)	3.9	4.3	0.4	*
General Self-Rated Health	Standard (n = 2)	4	3.5	-0.5	
	PHP (n = 5)	3.4	2.6	-0.8	**
Patient satisfaction	Standard (n = 2)	—	4.5	—	
	PHP (n = 6)	—	5.3	—	

Baseline data collected at session 1, postintervention data collected at session 8 for LDL, DBP, SBP, BMI, and PHQ-2. Postintervention data collected at session 7 for HbA1c. Baseline collected at session 1; postintervention collected at session 8 for PAM-13, Diabetes Empowerment Scale, and General Self-Rated Health. BMI, body mass index; HbA1c, hemoglobin A1c; DBP, diastolic blood pressure; LDL, low-density lipoprotein; PAM-13, Patient Activation Measures-13; PHP, personalized health plan; PHQ-2, Patient Health Questionnaire; SBP, systolic blood pressure.

* $P < 0.1$, ** $P < 0.05$, *** $P < 0.01$.

Table 5. Patient self-reported goal progress

Visual goal progress scale	Standard SMA, n = 3	PHP SMA, n = 8
Total goals set	13	41
Av no. goals set per participant	4.33	5.125
Goal progress, %		
No progress	38.4	0
Making progress	46.2	56.1
Achieved	15.4	34
Exceeded	0	2.4
Greatly exceeded	0	7.3
Goal category		
Medication adherence	0	3
Nutrition	6	12
Exercise/physical activity	1	11
Stress reduction/mental health	1	2
Other	5	13

PHP, personalized health planning; SMA, shared medical appointment.

and support meaningful individualized therapeutic goal setting. Of central importance to facilitating peer support and accountability is creating an environment for patient-driven discussions. The primary aim of this study was to determine the feasibility of the approach based on patient acceptability, retention, and qualitative data on implementation factors. Patients were more likely to attend the PHP-SMA, indicating that the experience was more acceptable to patients. Furthermore, the patient satisfaction ratings of the PHP-SMA were high. Qualitative data analyzed using CFIR underscores the importance of accounting for contextual factors, barriers, and opportunities for implementation. A specific challenge was recruitment and retention with commonly reported barriers to participation, including transportation, cost of copayments, and scheduling challenges. Recruitment challenges should be expected, and experience suggests that an incentive for participation or reduction in cost sharing could mitigate financial barriers. Another recruitment strategy identified is buy-in from PCPs to encourage patients to participate in the program. Key factors promoting successful implementation include interest in providing comprehensive, team-based proactive care and sufficient clinic resources to accommodate group visits. Patients, clinicians, and staff expressed that an advantage of this approach when compared to usual care is that it emphasizes the value of a collaborative, team-based approach. The stakeholders who were interviewed identified sustainability as a challenge moving forward without committed clinical champions and communication to key stakeholders.

The secondary aim of this study was to collect preliminary data on the effect of the PHP-SMA approach on relevant clinical and patient-reported outcomes. These initial results suggest that the PHP process facilitates goal setting and attainment. The PHP-SMA group experienced clinically significant improvements

in the outcomes of interest, with a notable 0.8 reduction in HbA1c, better general self-reported health, higher levels of activation, and an increase in diabetes self-efficacy. The sample size of the standard SMA group prevented any meaningful statistical analysis or interpretation of the change in the reported outcomes.

There are limitations to this research. Although a positive impact on clinical outcomes was suggested, there is not a sufficient sample size to demonstrate this conclusively. Because demonstrating an impact on clinical outcomes was not the primary aim of this study, we conducted a treatment only on the treated analysis, which involved analyzing only the outcomes of the patients who completed the PHP-SMA and standard SMA programs and attended both the first and final sessions (Table 4). The small sample size of patients who participated in the study also resulted in differences in the two groups despite random assignment; this limitation could bias results. There also are limits to external validity, given that only one outpatient clinic participated. Further research is required to investigate the effectiveness of this approach in diverse clinical settings. Despite these limitations, this study makes key contributions.

To our knowledge, no standardized, evidence-based program to deliver personalized goal setting like PHP has been adapted, integrated, and delivered through a diabetes SMA. PHP is feasible in an SMA and can provide practitioners with a structured personalized goal setting process that responds to the needs, preferences, and values of the patient. This work aimed to synergize the complementary attributes of the PHP and SMA to amplify their positive benefit on health outcomes and facilitate uptake in diverse clinical settings.

Conclusions

This work provides preliminary evidence of the ability of PHP to amplify the benefit of SMAs for patients with diabetes mellitus. Qualitative and quantitative data suggest that the PHP approach is feasible and synergistic with SMAs as a clinical delivery mechanism, with the intensive goal setting and care planning element of PHP adding value to the diabetes mellitus SMA experience. Future research should explore the effectiveness of the PHP-SMA for improving health outcomes and addressing other common chronic conditions.

Acknowledgment

We gratefully acknowledge Cindy Mitchell for assistance preparing and editing this manuscript.

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