

Effects of an Enhanced Primary Care Program on Diabetes Outcomes

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Case management, peer health coaching, and other team-based systems of care, such as the patient-centered medical home, have been implemented throughout the United States in an effort to improve care coordination and patient outcomes in the ambulatory setting.¹⁻⁹ These types of programs are often created and implemented by healthcare delivery systems, but insurance companies have played an increasing role in developing and funding strategies to improve chronic disease management as well.¹⁰ The term "enhanced primary care" refers to a team-based care model that aims to improve care processes and outcomes.¹¹ This multi-disciplinary team model includes the use of clinical tools such as practice guidelines, patient monitoring and tracking systems, and measures of resource use.

Team-based care models often focus on management of chronic diseases, such as type 2 diabetes (T2D), because of the higher morbidity, mortality, and costs associated with chronic disease.¹² T2D has proven particularly challenging to manage in the primary care setting, with less than 20% of patients with T2D achieving targets for glycated hemoglobin (A1C), low-density lipoprotein cholesterol (LDL-C), and blood pressure.¹³ Although team-based care coordination programs for patients with T2D have shown promise,^{8,9} disease management remains suboptimal, particularly for vulnerable populations.¹²

Racial, ethnic, and economic disparities in T2D prevalence, care, and outcomes in the United States cause a disproportionate burden of disease in vulnerable populations.^{14,15} Arguably, patients with the highest risk for poor outcomes may benefit most from the additional resources provided by an enhanced primary care team. In this study, we aimed to determine the impact of a newly implemented insurance company-sponsored team-based enhanced primary care program (Buena Salud) on process measures, patient outcomes, and healthcare utilization for a low-income racial and ethnic minority population of patients with T2D.

METHODS

We conducted a controlled before-and-after study to assess the effect of the Buena Salud program on T2D process, outcome, and

ABSTRACT

OBJECTIVES: To evaluate the effectiveness of Buena Salud, a multidisciplinary enhanced primary care program for Medicaid Managed Care patients at a community health center serving a low-income Hispanic community.

STUDY DESIGN: Controlled before-and-after observational study.

METHODS: We extracted data from the electronic health record for patients aged 18 to 64 years with a) type 2 diabetes (T2D) enrolled in the Buena Salud program between August 2011 and January 2012 and b) randomly selected control patients with T2D who had been seen at the study health center during the same time frame. Outcomes included process measures (eg, number of glycosylated hemoglobin measures in a year), target lab and blood pressure values, and utilization measures (eg, emergency department visits). Demographics and other potential confounders were also extracted. We used a difference-in-differences (DID) analysis to estimate the effect of the intervention.

RESULTS: A total of 72 Buena Salud patients with T2D and 247 control patients with T2D were included in the analysis. The Buena Salud group had a greater increase in the percentage of patients with guideline-concordant measurement of microalbumin/creatinine (DID = 22.2%; $P = .008$), a trend toward fewer hospitalizations than controls, and a mean rise in diastolic blood pressure. We did not find differences in other outcome or utilization measures.

CONCLUSIONS: A recently implemented enhanced primary care program had minimal impact on T2D process, outcome, and utilization measures for patients in this study. However, there were some promising trends, and it is possible that the intervention may demonstrate more of an effect as the program matures.

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TAKEAWAY POINTS

As risk for population health is increasingly being shared, insurance companies are exploring the use of interdisciplinary care teams in primary care to improve chronic disease and population health management. In this study, we evaluated the outcomes of a new insurance company–sponsored enhanced primary care program, Buena Salud, in a controlled before-and-after study. Buena Salud targeted Hispanic patients with diabetes at a community center serving a mostly low-income population. We found limited effects on diabetes outcomes, including process, utilization, and patient outcome measures, in the program's first year of existence.

- ▶ Implementation studies of team-based primary care programs may enhance program effectiveness outside of an experimental setting.
- ▶ Policy makers may want to allow more time for programs implemented in a natural setting to mature before determining effectiveness.
- ▶ Policies that address the social determinants of health may be necessary for enhanced primary care programs to have sustained substantial impact.

utilization measures. Although the Buena Salud team provided support for patients with other chronic diseases and promoted preventive care, this analysis is limited to patients with T2D.

Design, Setting, and Participants

Buena Salud is a bilingual enhanced primary care program for Medicaid Managed Care patients. The program was financed by the Health New England insurance company and implemented by Brightwood Health Center (BHC), an urban community health center with a largely Hispanic population (88%) insured primarily by either Medicaid (59%) or Medicare (28%). More than 50% of BHC patients prefer Spanish as their spoken language, and 17% of adult BHC patients have T2D. Patients were generally enrolled in Buena Salud through a referral from their primary care provider, but they also could have been enrolled through a periodic auto-enrollment process or through self-referral.

The Buena Salud enhanced primary care team consisted of 2 registered nurse care managers, 2 medical assistants trained as community health workers, and a caseworker. The care team was unusual compared with many managed care teams in that each team member was bilingual (Spanish/English) and from the same racial/ethnic group as the majority of BHC patients. The Buena Salud intervention was based on the Chronic Care Model, which focuses on 6 areas that can optimize chronic disease care: self-management support, healthcare delivery system design, decision support, use of clinical information systems, organization of healthcare, and community support.^{16,17}

The Buena Salud team offered patients education and coaching for disease self-management, provided additional contact with patients in the clinic and at home, interfaced with diabetes specialists for decision support, used electronic health registries to identify patients in need of care and services, and utilized linkage to community-based support services (**eAppendix** [eAppendices available at ajmc.com]). A total of 450 patients were enrolled in the Buena Salud program between August 2011 and January 2012. Each Buena Salud nurse was expected to actively manage up to 50

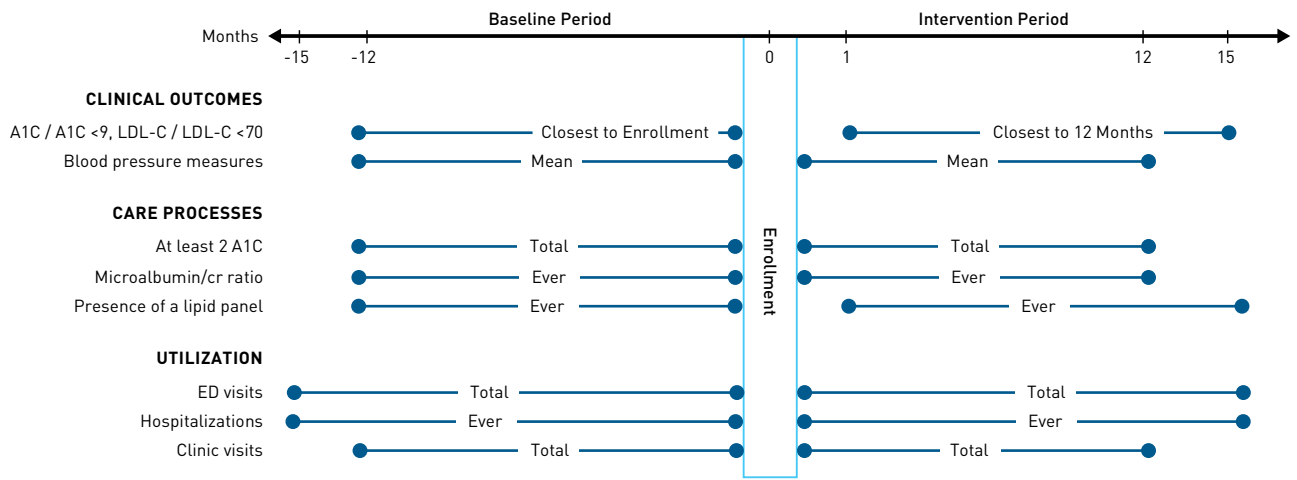
of these patients at any given time, not all of whom had T2D. Care intensity varied depending on individual need, but was not formally documented by the team.

We reviewed eligible patients' electronic health records (EHRs) to extract data pertinent to the study aims. Eligibility was defined as follows: 1) all BHC patients aged 18 to 64 years with T2D who were newly enrolled in the Buena Salud program between August 1, 2011, and January 31, 2012 (intervention); and 2) all BHC patients aged 18 to 64 years who had T2D, had been seen for a clinical encounter at BHC between August 1, 2011, and January 31, 2012,

and were not enrolled in Buena Salud (potential controls). All intervention and control patients were cared for in the same clinical setting. From the list of potential controls, we randomly selected 3 patients with T2D who had been seen in the clinic in the same month that a Buena Salud patient had been enrolled. We selected controls in this manner rather than matching on variables such as age, race/ethnicity, or gender for 2 reasons: 1) the population attending the clinic is relatively homogeneous for these measurable variables and 2) selecting patients seen in a similar time frame reduces the potential for differences in unmeasured confounders related to temporal changes in practice at the health center. Buena Salud patients and controls also must have had at least 1 visit to BHC in the 12 months prior to the enrollment/index visit so that baseline data could be extracted. Because there were fewer patients with T2D enrolled in Buena Salud than anticipated, we had slightly higher than a 3:1 ratio. This study was approved by the Baystate Institutional Review Board, which waived informed consent.

Time Period Studied and Outcome Variables

We identified target clinical outcomes, care processes, and healthcare utilization measures for patients with T2D using the national American Diabetes Association diabetes care guidelines that were in place in 2011 when the study was designed and systematic reviews of studies that included diabetes process and outcome measures.¹⁸⁻²² Clinical outcome measures included values for A1C, LDL-C, systolic blood pressure, and diastolic blood pressure (DBP). Care processes included the number of times A1C, microalbumin/creatinine ratio, and lipids were measured. Utilization measures included emergency department (ED) visits and unplanned hospitalizations, defined as any hospitalization other than for a nonemergent procedure (**Figure**). Baseline data were collected from the year prior to enrollment/index visit, beginning with the first day of the month in which they were enrolled, and the intervention period was defined as a window ranging from 12 to 15 months following the enrollment/index month. Timing of this window varied slightly for different outcomes in order to account for the earliest time after

FIGURE. Process, Outcome, and Utilization Measures and Timing

A1C indicates glycated hemoglobin; Cr, creatinine; ED, emergency department; LDL-C, low-density lipoprotein cholesterol.

enrollment that the intervention would have been expected to affect the outcome measured and to provide grace periods for guidelines requiring a certain frequency of a measure (Figure). The overall duration of follow-up was chosen so that we could capture the maximum number of Buena Salud patients in the study. In addition to T2D process and outcomes data, we also extracted demographic information and data regarding potential confounders (eg, comorbidities and the number of years a patient received care at BHC) (Table 1).

Data Extraction

We first oriented data extractors to the study's data dictionary and extraction protocol, which included where to locate pertinent data in the EHR. After establishing baseline consistency using standardized extraction forms, 2 extractors also independently reviewed 20 randomly selected EHRs to assess inter-extractor consistency at 6 and 18 months into the course of data extraction to test whether consistency was maintained. Study data were collected and managed using REDCap electronic data capture tools.²³

Analysis

Participant characteristics are presented as means and standard deviations (SDs) for continuous variables and as frequencies and percentages for categorical variables. To estimate differences between the groups studied, we used a difference-in-differences (DID) approach (the difference between the pre-post change in the Buena Salud group compared with the control group). Study outcomes were modeled using generalized estimating equations with exchangeable correlations and robust standard errors (clustering on patient). Continuous outcomes were modeled using the identity link, Gaussian family binary outcomes were modeled using the

logit link and binomial family, and count outcomes were modeled using the log link and negative binomial family. Models were estimated with main effects for the intervention group and time period, with an interaction term between these 2 representing the DID. Because Buena Salud participants were frequency-matched to controls based on enrollment month, we used enrollment month as an indicator variable in the model. This term was not significant in the models, so it was removed.

Predicted outcomes and 95% confidence intervals (CIs) are presented in their original metrics (eg, mm/Hg for blood pressure) using Stata's "-margins-" postestimation command. Statistical significance was set at an alpha of <0.05. Multivariable models included potential confounders (eg, demographic data, comorbidities, and number of years receiving care at BHC). Using Wald tests, models were reduced to include variables that were significant at the <0.05 level. To control for possible residual confounding and for face validity, we retained age, mental health, and substance use in all models. Original power calculations estimated that if at least 100 Buena Salud patients and 175 controls were included, this sample size would provide >85% power to detect a medium effect size (Cohen's $d = 0.40$) at an alpha of <0.05. Clinically, this would be the equivalent of a DID estimate for A1C of 0.75, assuming a pooled SD of change of 1.70. Our achieved sample size was less than the estimated 100, but there was still 85% power to detect the same effect size. The analysis was conducted using Stata version 13.1 (StataCorp LP, College Station, Texas).

RESULTS

A total of 319 patients with T2D were included in the study: 72 in the Buena Salud (intervention) group and 247 in the control group.

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The median age was 53 years (interquartile range, 45-59 years), 63.6% were female, and Spanish was the preferred language for 57.7% (Table 1). Most (estimated 90%) of the Buena Salud patients were referred to the program by a healthcare provider, with fewer (estimated 10%) enrolled via auto-enrollment or self-referral. Baseline differences between the groups included the following: control group patients were older (aged 54 vs 50 years), more likely to be infected with HIV (11.3% vs 2.8%), and less likely to have been diagnosed with anxiety or depression (49.8% vs 73.6%) (Table 1). Baseline A1C was also lower in the control group (7.8%; SD = 2.1) compared with the Buena Salud group (8.1%; SD = 2.2), and the baseline number of ED visits per person per year for those with any visit was lower in the control group (2.1 per year; SD = 3.5) compared with Buena Salud (3.5 per year; SD = 3.7). Baseline unplanned hospitalizations differed, with 17.8% of controls and 26.4% of Buena Salud participants having had at least 1 hospitalization in the year preceding enrollment. All other variables were similar at baseline. Extractor agreement was greater than 90%.

Clinical Outcomes

A1C. There was no difference in the change in A1C values between intervention and control patients in either unadjusted or adjusted models (absolute DID = 0.38; 95% CI, -0.13 to 0.88; $P = .15$) (Table 2). The difference in the change in the percent of patients achieving the target A1C was -0.9% (95% CI, -10.4% to 8.6%; $P = .85$) in unadjusted models and -1.4% (95% CI, -10.8% to 8.1%; $P = .78$) in adjusted models (Table 2).

Blood pressure and lipids. With the exception of DBP, we found no differences in the change in hemodynamic or lipid profiles between the control and Buena Salud groups in unadjusted or adjusted models (Table 2). For DBP, there was a significant difference of 2.5 mm/Hg (95% CI, 0.8-4.3; $P = .004$) in both the adjusted and unadjusted models. This reflected a rise in mean DBP for the Buena Salud group and a fall for controls (Table 2).

Process Measures and Utilization

We found that the percentage of Buena Salud patients having A1C measures did not change during the study period and that although the percent of controls with the recommended number of measures dropped, the change between the 2 groups was not

TABLE 1. Baseline Characteristics of Participants

Characteristic	Total (n = 319)	Control (n = 247)	Intervention (n = 72)
Male	116 (36.4%)	93 (37.7%)	23 (31.9%)
Preferred language			
English	134 (42.0%)	106 (42.9%)	28 (38.9%)
Spanish	184 (57.7%)	140 (56.7%)	44 (61.1%)
Other	1 (0.3%)	1 (0.4%)	0 (0.0%)
Chronic health conditions			
HIV infection	30 (9.4%)	28 (11.3%)	2 (2.8%)
Substance use	58 (18.2%)	45 (18.2%)	13 (18.1%)
Suboxone use	20 (6.3%)	17 (6.9%)	3 (4.2%)
Tobacco use	90 (28.2%)	67 (27.1%)	23 (31.9%)
Anxiety or depression	176 (55.2%)	123 (49.8%)	53 (73.6%)
Other mental health problems	68 (21.3%)	55 (22.3%)	13 (18.1%)
Obesity	229 (71.8%)	176 (71.3%)	53 (73.6%)
Homeless	6 (1.9%)	4 (1.6%)	2 (2.8%)
Age, years			
Mean (SD)	51.3 (9.1)	51.6 (9.4)	50.3 (7.9)
Median (range)	53 (26-65)	54 (26-65)	50 (31-63)
Years receiving care at Brightwood			
Mean (SD)	3.6 (0.9)	3.7 (0.9)	3.4 (1.0)
Median (range)	3.9 (0.3-4.8)	3.9 (0.3-4.8)	3.7 (0.5-4.8)
Charlson Comorbidity Index score			
Mean (SD)	2.6 (1.9)	2.7 (2.0)	2.4 (1.4)
Median (range)	2 (1-15)	2 (1-15)	2 (1-8)

SD indicates standard deviation.

statistically significant (Table 3). Similarly, Buena Salud saw a 4.2% increase in patients with guideline concordant LDL-C measures while controls dropped by 5.7%, for a DID of 9.8%, but this was also not a significant change (Table 3). There was a significant difference in the percent of patients with the recommended number of microalbumin/creatinine ratio measures: the Buena Salud group increased by 25% (95% CI, 11.4%-38.8%) compared with a 2.8% increase (95% CI, -4.6% to 10.2%) among controls ($P < .01$). Change in the annual rate of ED visits did not differ between groups, but unplanned hospitalization rates decreased by 2.8% (95% CI, -13.7% to 8.1%) in the Buena Salud group and increased by 8.9% (95% CI, 2.9%-15.0%) among controls, resulting in a DID of 11.7% ($P = .06$). The difference remained the same in adjusted models, but the P value increased to .11 (Table 3).

DISCUSSION

In this controlled before-and-after study, we found that a team-based enhanced primary care program, Buena Salud, did not appreciably improve T2D process, outcome, or utilization mea-

TABLE 2. Before and After Buena Salud Clinical Outcomes

	N	Control Change (95% CI)	Intervention Change (95% CI)	DID (95% CI)	P
A1C measures					
Change in absolute value					
Unadjusted	314	-0.24 [-0.46 to -0.02]	0.14 [-0.32 to 0.59]	0.38 [-0.13 to 0.88]	.145
Adjusted ^a	314	-0.24 [-0.47 to -0.02]	0.13 [-0.33 to 0.59]	0.38 [-0.13 to 0.88]	.147
A1C ≤9 (yes/no)					
Unadjusted	314	0.3% [-4.8 to 5.4]	-0.6% [-8.6 to 7.4]	-0.9% [-10.4 to 8.6]	.845
Adjusted ^b	313	0.4% [-4.8 to 5.6]	-0.9% [-8.9 to 7.0]	-1.4% [-10.8 to 8.1]	.777
Blood pressure measures					
Change in mean SBP					
Unadjusted	319	-0.8 [-2.0 to 0.4]	0.6 [-1.9 to 3.1]	1.4 [-1.4 to 4.2]	.316
Adjusted ^c	319	-0.8 [-2.0 to 0.4]	0.6 [-1.9 to 3.1]	1.4 [-1.4 to 4.2]	.311
SBP <130 (yes/no)					
Unadjusted	319	-0.9% [-5.6 to 3.9]	-5.3% [-17.0 to 6.5]	-4.4% [-17.1 to 8.3]	.513
Adjusted ^d	319	-0.8% [-5.6 to 3.9]	-5.3% [-17.2 to 6.5]	-4.5% [-17.3 to 8.3]	.510
Change in mean DBP					
Unadjusted	319	-1.8 [-2.6 to -1.0]	0.8 [-0.8 to 2.3]	2.5 [0.8 to 4.3]	.004
Adjusted ^e	319	-1.8 [-2.5 to -1.0]	0.8 [-0.8 to 2.3]	2.5 [0.8 to 4.3]	.004
DBP <80 (yes/no)					
Unadjusted	319	2.9% [-2.2 to 8.0]	4.6% [-6.9 to 16.0]	1.7% [-10.9 to 14.2]	.807
Adjusted ^f	319	2.9% [-2.2 to 8.0]	4.4% [-6.7 to 15.6]	1.5% [-10.8 to 13.8]	.812
Lipid measures					
LDL-C absolute value					
Unadjusted	268	0.3 [-4.6 to 5.1]	-1.0 [-9.4 to 4.5]	-1.2 [-11.0 to 8.5]	.805
Adjusted ^g	268	0.0 [-4.8 to 4.8]	-0.5 [-8.9 to 8.0]	-0.5 [-10.2 to 9.2]	.922
LDL-C <70 (yes/no)					
Unadjusted	268	0.6% [-6.2 to 7.3]	-3.1% [-15.4 to 9.2]	-3.7% [-17.7 to 10.4]	.608
Adjusted ^h	268	0.9% [-5.7 to 7.5]	-5.1% [-17.5 to 7.3]	-6.0% [-20.1 to 8.1]	.406

A1C indicates glycosylated hemoglobin; CI, confidence interval; DBP, diastolic blood pressure; DID, difference-in-differences; ED, emergency department; LDL-C, low-density lipoprotein cholesterol; SBP, systolic blood pressure.

^aAdjusted for years of care, language, age, mental health, and substance use.

^bAdjusted for baseline ED visits, language, age, mental health, and substance use.

^cAdjusted for age, mental health, and substance use.

^dAdjusted for language, age, mental health, and substance use.

^eAdjusted for language, obesity, age, mental health, and substance use.

^fAdjusted for tobacco use, obesity, homelessness, age, mental health, and substance use.

^gAdjusted for language, sex, homelessness, age, mental health, and substance use.

^hAdjusted for baseline ED visits, age, mental health, and substance use.

tures for low-income Hispanic patients during the program's first 15 months of existence compared with patients with T2D who did not participate in the program. Positive effects included a greater increase in the percent of patients with the appropriate number of measurements of microalbumin/creatinine ratios. There was also a trend toward fewer unplanned hospitalizations for Buena Salud patients compared with controls.

Diabetes affects nearly 10% of the US population and generated \$245 billion in healthcare costs in 2012, a 41% increase from 2007.²⁴ Numerous studies have tested innovative approaches to improving

care for the patients from populations with the worst T2D outcomes. For example, investigators assessed the effectiveness of a computer-based support system in the context of primary care team-based management of T2D in a controlled natural experiment. Similar to the current study, which also could be categorized as a natural experiment, the investigators found improvement in process measures, such as rates of microalbumin/creatinine and A1C testing in the intervention group (n = 435) compared with controls (n = 435) after 12 months, but a limited effect on patient outcomes or healthcare costs.²⁵

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TABLE 3. Before and After Buena Salud Process and Utilization Outcomes

	N	Control Change (95% CI)	Intervention Change (95% CI)	DID (95% CI)	P
A1C = 2+ at 12 months pre- vs total 12 months post (yes/no)					
Unadjusted	319	-5.3% [-13.0 to 2.5]	0.0% [-15.0 to 15.0]	5.3% [-11.5 to 22.1]	.531
Adjusted ^a	319	-5.3% [-13.0 to 2.5]	0.0% [-14.3 to 14.3]	5.3% [-11.0 to 21.6]	.524
Lipid panel ever within 12 months pre- and 15 months post (yes/no)					
Unadjusted	319	-5.7% [-13.3 to 1.9]	4.2% [-8.9 to 17.2]	9.8% [-5.3 to 24.9]	.195
Adjusted ^b	318	-5.7% [-13.3 to 2.0]	4.2% [-8.8 to 17.1]	9.9% [-5.2 to 24.9]	.195
Microalbumin/creatinine ratio ever within 12 months (yes/no)					
Unadjusted	319	2.8% [-4.6 to 10.2]	25.0% [11.2 to 38.8]	22.2% [6.5 to 37.8]	.009
Adjusted ^c	319	2.8% [-4.6 to 10.2]	25.1% [11.4 to 38.8]	22.2% [6.7 to 37.8]	.008
ED visits (annual rate)					
Unadjusted	173	-0.7 [-1.2 to 0.1]	-1.5 [-2.4 to -0.6]	-0.8 [-1.8 to 0.2]	.377
Adjusted ^d	173	-0.7 [-1.1 to 0.2]	-1.2 [-1.8 to -0.5]	-0.5 [-1.2 to 0.3]	.319
Hospitalizations ever within 15 months pre- and post (yes/no)					
Unadjusted	319	8.9% [2.9 to 15.0]	-2.8% [-13.7 to 8.1]	-11.7% [-24.1 to 0.8]	.055
Adjusted ^e	319	8.6% [2.8 to 14.5]	-3.1% [-15.2 to 9.0]	-11.7% [-25.1 to 1.7]	.106

A1C indicates glycated hemoglobin; CI, confidence interval; DID, difference-in-differences; ED, emergency department.

^aAdjusted for years of care, HIV status, age, mental health, and substance use.

^bAdjusted for language, age, mental health, and substance use.

^cAdjusted for Charlson Comorbidity Index score, baseline hospitalizations, age, mental health, and substance use.

^dAdjusted for baseline hospitalizations, sex, age, mental health, suboxone use, and substance use.

^eAdjusted for Charlson Comorbidity Index score, baseline ED visits, years of care, age, mental health, and substance use.

In another study conducted with 165 Mexican American patients in rural Texas, the investigators tested whether the addition of a nurse case manager to a diabetes education and self-management program improved patient outcomes by addressing sociocultural barriers to accessing the successful self-management program.¹ The study used a pre-post controlled design, similar to the current study except that it was a prospective cohort. The outcomes included changes in A1C, fasting blood sugar, lipids, blood pressure, diabetes-related knowledge, health behaviors, and body mass index over a 6-month time period. The study found no difference in changes in outcome measures between groups.

Conversely, in a randomized clinical trial of 299 patients in 6 health centers serving low-income patients in San Francisco, the investigators tested the impact of trained peer health coaches on A1C levels.⁸ Patients in the peer health coach group experienced an absolute reduction in A1C of 1.1% while controls' A1C levels

dropped by only 0.3% ($P = .01$, adjusted). The same research team also tested the effect of medical assistants trained as health coaches in a randomized clinical trial of 441 patients with T2D in 2 safety net primary care clinics in San Francisco.²⁶ They found that patients in the intervention group had lower A1C and lipid levels after 6 months of exposure to the intervention, but that DBP changes did not differ between groups. The results of prior studies and the current study suggest that team-based interventions to improve diabetes care and outcomes may be successful in the controlled setting of a randomized clinical trial, but that it may be challenging to translate these interventions into practice.

What factors might be responsible for the very modest intervention effects seen in the current study? Although some randomized clinical trials have shown improvements in A1C in as little as 6 months, an enhanced primary care model implemented outside of a clinical trial may require a longer exposure to the intervention for an effect to be realized. The current study tested Buena Salud's effectiveness in its first 15 months of existence. It is possible that it may take longer than this for the team to optimize the care it provides.²⁷ We followed patients for a relatively brief period after enrollment, and it may take more time for team members to develop trusting relationships with care recipients. We learned through interviews with the Buena Salud team that there was no systematic process

for documenting their interactions with patients during the time period studied. This meant that we could not accurately measure the intervention doses that individuals received.

In a small study such as this, variation in expertise amongst the Buena Salud team members also could have influenced the outcomes observed. This study's strengths included the following: comparison with a control group, use of a DID analysis that adjusted for secular trends in care and outcomes, and risk adjustment using a broad array of clinical and demographic data. The latter allowed us to address the nonrandom assignment of patients to intervention and control groups.

Limitations

First, this was an observational study and not a randomized clinical trial. The Buena Salud program was intended to provide support for the sickest patients, as evidenced by the measured baseline

differences found between Buena Salud patients and controls, but there may have been other unmeasured important differences not accounted for in our extensive risk adjustment. Second, this study evaluated patients from 1 health center. Although this allowed us to focus on the population of interest, the intervention might have different effects in other populations or in other health centers with a similar population. Third, many primary care interventions are intended to decrease costs while improving care quality and outcomes. We elected not to explore cost savings in this study with a relatively short follow-up period because additional expenditures may be needed in populations that experience significant health disparities and high burdens of chronic disease, particularly in the early phase of an intervention.²⁸ Fourth, we had a substantial amount of missing LDL-C data, due largely to many lipid screens having only total and high-density lipoproteins documented. Finally, several diabetes guidelines have changed since the study's inception, making some of the cut-points and screening frequencies used for analyses appropriate for the time period during which data were collected, but inconsistent with current diabetes care guidelines.

CONCLUSIONS

A team-based enhanced primary care program delivered by a multidisciplinary bilingual team that was linguistically and culturally concordant with the majority of patients enrolled in the program had a limited effect on care processes, outcomes, and utilization for low-income Hispanic patients with T2D. Care should be taken in drawing conclusions from outcomes assessed in the first year of a new program since there is likely a learning curve to engaging and partnering with patients in this context. Longitudinal effectiveness and implementation studies will contribute additional important information to our understanding of the potential benefits of enhanced primary care team interventions for vulnerable patients with T2D. ■

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eAppendix. The *Buena Salud* Intervention

Who was enrolled in the *Buena Salud* program?

Medicaid Managed Care patients insured by Health New England Insurance Company were eligible to be enrolled in *Buena Salud*. Targeted enrollment in the first year of the program focused on the highest risk patients.

Buena Salud Team Member Roles

The *Buena Salud* enhanced primary care team consisted of 2 registered Nurse Care Managers, 2 medical assistants trained as Community Health Workers, and a Case Worker. The essential tasks for each role were as follows, with some flexibility depending on patient needs and team member availability.

The **Nurse Care Managers** were the primary contacts for the most clinically complex patients. They were each expected to actively manage a panel of 50 patients. Their primary role was to conduct the following supportive interventions:

- Initial home visit (if allowed by the patient) to establish relationship/build trust
- As part of the initial assessment, as well as ongoing care, they conducted the following:
- Home environmental assessment (physical space and family and agency supports)
- Medication reconciliation
- Medication teaching
- Identification and reduction of barriers to care
- Establishment of patient directed goals
- Follow-up care included a weekly home visit (for medication refills) or telephone support until the patient was independently managing care

The Nurse Care Managers could be contacted directly by providers for assistance with their more clinically complex patients or by the other the clinical care team members, serving as a resource for information or skilled nursing assistance.

The **Community Health Workers (CHW)** provided the following services:

- Reviewed registries contained in the electronic health record and insurer data quarterly, focusing on specific care parameters or gaps in care including:
- Diabetes healthcare maintenance: ordered labs by protocol and scheduled visits as needed
- Adults: ensuring a visit with the primary care physician at least once every 12 months
- Children <24 months of age: ensuring a visit with primary care provider within the past 4 months
- Mammography within guideline recommendations
- Reviewed inpatient and emergency department usage daily
- Arranged follow-up with the primary care attending or urgent provider as needed
- Consulted with the primary care provider or Nurse Care Manager for actively care managed patients following discharge
- Provided chronic disease and healthy lifestyle education as requested by the primary care provider or the Nurse Care Manager.

The **Case Worker** was coordinated behavioral health/mental healthcare, assessed social service needs, and maintained enrollment in the program.

- Behavioral Health Liaison: followed up on referrals to behavioral health weekly until the patient was connected to a behavioral health resource
- Member List: Reviewed monthly to assess who might need new patient appointments and to identify established patients who would benefit from education about the services available with through the program and the insurer.
- Redetermination List: Reviewed monthly to maintain program enrollment.

Care Intensity

The most clinically complex patients received the most intensive care, which generally included at least weekly phone contact, monthly home visits, and often additional contact in between.

Patients who experienced periods of acute need that required aggressive intervention or stabilization had multiple contacts with the *Buena Salud* team members during the acute period, but then less intensive contact or no contact once the acute issue resolved. The least complex patients received routine medical care with little additional interface with the *Buena Salud* team. Patients care needs were dynamic, with intensity shifting over time.