

ORIGINAL RESEARCH

A nurse-led transitional care intervention to prevent readmissions in a low-income-serving urban U.S. hospital

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Abstract

Background: Diabetes-related hospital readmissions within 30-days are costly and an indicator of suboptimal care resolution. Nurse-led transitional care interventions may improve glucose control and reduce emergency department recidivism following hospital discharge in very low-income populations.

Methods: An intention-to-treat design with randomization of participants ($n = 108$) compared conventional care to transitional care coordination that included diabetes specialty appointments, monthly support telephone calls, medication management, and tailored diabetes self-management education. Both the control and intervention group received a diabetes specialist and primary care appointment.

Results: There was a significant difference between the control and intervention groups ($P = 0.018$) from baseline to study-end with the intervention group experiencing a 1.9% mean change (SD, $P = 0.003$) in A1c in those with baseline poor glucose control ($A1c > 9\%$) and a trend toward all cause emergency department recidivism ($P = 0.06$). Both the control and intervention groups benefitted from linkages to specialist care, but the nurse-led group had greater outcome improvements.

Conclusion: Hospitalized patients with poor glucose control ($A1c > 9\%$) benefit from a nurse-led intervention to provide tailored transitional care and diabetes self-management education. Results of this study showed clinical improvements in glucose control and reduction in 30-day hospital readmissions.

Keywords: *Diabetes; glycemic control; transitional care; hospital readmissions; care coordination; tailored education; intervention*

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Nurses play a central role in reducing hospital readmissions. Nurses need more information regarding what interventions reduce hospital readmissions due to diabetes. Hospital readmission within 30-days is an indicator of sub-optimal quality thought to be due to ineffective initial treatment, poor discharge planning, and inadequate post-acute care.¹ Emergency department recidivism is a gateway to readmission. Diabetes is an independent risk factor for hospital readmissions.² Type 2 diabetes accounts for 95% of the 8 million hospital stays due to diabetes in the United States (U.S.), with almost 33% of populations from low-income communities.³ This is a report on the outcomes of a project that compared patients who received nurse-led transitional care coordination services and diabetes self-management education with those who received only conventional care in a U.S. northeast coast urban very-low-income community. Self-management of diabetes consists of the necessary behaviors a patient utilizes to monitor and treat his/her own diabetes independently with the guidance of his/her medical providers.

Conventional care is what is ordinary within the U.S. Healthcare system and included any needed glucose correction interventions and a scheduled follow-up appointment in the primary care and diabetes specialty clinic for a date following hospital discharge. The goal of the program was to demonstrate that glucose control and 30-day emergency department recidivism could be reduced by offering access to specialty clinic appointments, support, medication management, and group and/or individual diabetes self-management education.

Hospital readmissions adversely affect patient outcomes in the U.S. and increase financial burden to institutions when penalized for the readmission by payers.¹ The U.S. hospital readmission rate is up to 20.4% within 30 days of discharge and costs 25 Billion dollars.² Diabetes-related emergency department visits per 10,000 adults increased by 55.6% in the U.S. since 2008, with higher utilization rates in Medicaid and Medicare recipients.⁴ Medicaid, for low-income and poverty-affected populations, and Medicare, for aging and disabled populations, are the primary socialized insurance providers in the U.S.,

which are funded by tax payers. Because Medicaid and Medicare are public programs, they receive the most attention with regard to cost-reduction efforts. Generally, diabetes is a costly condition, with the annual costs of diabetes in the U.S. at \$412.9 Billion, accounting for one in every four healthcare dollars spent.⁵ Black Americans also have a three-fold increase in utilization of the emergency department for diabetes-related compared to White adults⁴ and pay more for direct healthcare expenditures.⁵ Similarly, women over the age of 65 pay double that of any other age group on healthcare.⁵ Non-Hispanic Black Medicaid enrollees have higher hospital utilization rates compared to White enrollees.⁶ In very low income populations and Black populations, emergency department utilization for both hyperglycemia and hypoglycemia is trending upward.⁷ From 2006 to 2015, lower-income populations represented 40% of all hyperglycemic-event-related hospitalizations.⁸ However, emergency department visits due to diabetes in urban areas are often associated with hypoglycemia.⁹

Emergency department utilization is a recognized proxy for lack of access to care.⁴ Those who do not have access to primary or specialist care following hospital discharge are at a disadvantage because they must rely on their own assessment and interpretation of symptoms and may encounter difficulty reconciling medication discrepancies, prescription errors, lack of access to refills, and/or lack of access to appropriate medication intensification. Similarly, access to healthcare resources is further complicated for those of very-low-socioeconomic status with diabetes who lack diabetes self-management education. Diabetes self-management education provides the necessary skills for daily disease management to prevent hospitalization. Avoiding hospital readmissions is important because it is linked to increased mortality.¹⁰ One in five people experiences suboptimal or unsafe care during the discharge period due to prompt reduction in continuity of care and coordination difficulty.¹¹

According to the National Transitions of Care Coalition, seven key elements are necessary for ensuring safe transitions, including medication management, transition planning, patient/family engagement and education, communication during transfers, follow-up care, healthcare provider engagement, and shared accountability across providers and organizations.¹² Medication reconciliation is thought to be a key factor in preventing 30-day readmissions. Examples of medication reconciliation behaviors that benefit the poor and underinsured include returning patients to pre-hospital regimens when possible to avoid wasting previously filled prescriptions, and consideration of prescription cost as a barrier to adherence.¹³ Communication during hand-off is another safety concern. Transitional care delivery models, such as the Naylor Nursing Model, have been shown to be

effective at assisting Medicare beneficiaries with home self-management and those transitioning to sub-acute and long-term care facilities by improving communication during facility-to-facility handoffs.¹⁴

There is little available evidence of transitional care models effectively improving health outcomes in the younger adults returning to home for chronic disease self-management under conditions of poverty. In the U.S., Medicaid populations differ from Medicare populations in terms of age, income, and healthcare utilization patterns.¹⁵ For example, Medicaid beneficiaries are less likely to have a regular source of primary care than Medicare beneficiaries.¹⁵ One transitional care intervention that utilizes advanced practice nurses to assist with medication reconciliation, self-management support, and care coordination that has been successful at reducing hospital-related Medicare costs and improving disease-specific outcomes is the Naylor Model.¹² Utilization of care transition teams that assess risks and social determinants of health can reduce hospital readmissions up to 18%.¹ Other transitional care models include specific clinics for diabetes-reduced readmission, and reduced length of stay for those readmitted by 1 day, but not emergency department care rate changes.¹⁶

This is a report on the outcomes of a transitional care intervention to reduce diabetes-related readmissions. The central hypothesis of this study was that when compared to conventional hospital-based care, those who receive the additional services of a transitional diabetes care coordinator after hospitalization would have a reduction in 30-day readmission and emergency department recidivism and glycosylated hemoglobin.

Methods

Study design and population

This was a one-year intervention comparing two randomized groups with an intention-to-treat design recruiting hospitalized adults with diabetes in an urban minority-serving academic teaching hospital located in a north-east coast community in the metropolitan New York City area. The project was approved by the Institutional Review Board for the protection of human patients under expedited review with informed written consent forms. Under the intention-to-treat model, all participants received conventional care meeting the standards of care plus an expedited diabetes specialist appointment in the clinic and a primary care appointment within 2 weeks before leaving the hospital. The intervention group received conventional care plus tailored nurse-led transitional care. The tailored nurse-led care included an invitation to a group diabetes self-management education session by a certified diabetes care and education specialist (formerly known as a Certified Diabetes Educator). If the group care was deferred

by the patient, they were provided with individual diabetes education. The education was tailored according to the American Association of Diabetes Educators standards of self-management education (<https://www.adces.org/diabetes-education-dsmes/adces7-self-care-behaviors>). In the clinic setting after discharge, diabetes self-management education was reinforced in addition to receiving expedited specialist care by their physician.

All participants received a free starter-glucose meter with test strips and a pamphlet on controlling diabetes from the National Institute of Health while hospitalized. Participants were instructed in the use by the bedside nurses prior to discharge. The patients were educated on self-monitoring of glucose benefits and provided with target parameters and information of treating hypoglycemia. Data were not collected for the project using the monitors. All participants received a gift card to a food store for \$20 as a token of appreciation for participation at study end (1-year post-enrollment) when returning to complete end-of-study surveys.

All of the participants received at least the conventional care and were linked to diabetes specialist care. The hospital staff delivered routine care to all patients according to current standards of care. Hospital bedside nurses and registered dietitians provided the self-management education as a usual standard of care, while the patient was hospitalized, since the hospital has no certified diabetes educators on staff.

The intervention group that received the nurse-led transitional care had tailored education, medication reconciliation, and to reinforce the benefits of attending a specialist visit. A contingency plan for those who did not come to the group meeting was an individualized telephone call to problem-solve and reinforce diabetes self-management essentials, medication reconciliation as needed, and specialist appointment reminders. Given the real-world nature of the study, the telephone call was deemed valuable because many patients have no transportation, are unable to miss work, have child care responsibilities, and are concerned with walking through unsafe neighborhoods.

Each patient in the tailored intervention group also received a planned monthly telephone call for the length of the study, which was 1 year. Each planned phone call involved goal-setting to improve adherence based on patient-preference, provision of resource allocation for diabetes self-management, and assistance with appointment-making with the diabetes specialist physician. Patients were invited to also call the diabetes educator if assistance was needed.

Measures

Glycosylated hemoglobin was measured using the Siemens (formerly Bayer) DCA 2000 advance analyzer by fingerstick at baseline. In addition, 3-, 6-, and 9-month glucose measures if it coincided with a clinic visit, with all patients

being asked to complete a 12-month glycosylated hemoglobin. The Bayer DCA [trademark R in circle here!] 2000 analyzer is a Clinical Laboratory Improvement Amendment of 1988 (CLIA-)waived and correlates closely with glycosylated hemoglobin diagnostic tests collected by venipuncture.¹⁷ Paper-and-pencil survey measures included a demographic questionnaire.

Recruitment and selection criteria

Recruitment occurred over an 8-month period and offered to all hospitalized patients on medical floors who could read and speak English fluently and who were admitted with diabetes as a primary diagnosis. The diagnosis of diabetes was confirmed in the medical record with the patients permission by an advanced practice nurse. Those with type 1, type 2, or diabetes due to other causes were included. We excluded those with impaired glucose tolerance or transient hyperglycemia (i.e. attributable to steroid use), pregnancy, and children under the age of 18 years. A glycosylated hemoglobin cut-off was not used for recruitment in order to provide access to all who had a diagnosis of diabetes and could benefit from improved glucose control. Those with anemia, hemoglobinopathies, or other factors that affect red blood cell turnover that would not allow for accurate interpretation of glycosylated hemoglobin were not included in the statistical analysis of glucose control but were not excluded fully from the study to allow for emergency department recidivism as the primary outcome. In addition, only those who reported not being under the care of a diabetes specialist or endocrinologist were enrolled in the project. A final exclusion included those going to a rehabilitation center and long-term/subacute care facilities because self-management is not typically done by the patient in that context, and they would not have access to attending to post-discharge specialty care clinic visits. The inclusion and exclusion of the sample is depicted in Consort-style Fig. 1.

Statistical analysis

Power was determined a priori based on the number of medical hospital beds ($n = 75$) during the study time period (8-months), and the hospital's estimates that 60% of patients have hyperglycemia during admission provided a reach of 240 patients during the study period. The sample size of 100 (50 each group) was estimated to allow for a 20% response rate and provide 80% power at an alpha level of 0.05 to detect a 0.05% change in glycosylated hemoglobin using a standard deviation of ± 3 using a t -test.

Data were entered into SPSS version 18.0.¹⁸ Missing data were handled using an intention-to-treat method, whereby no change from baseline was assumed for those who did not complete study-end data or were lost to

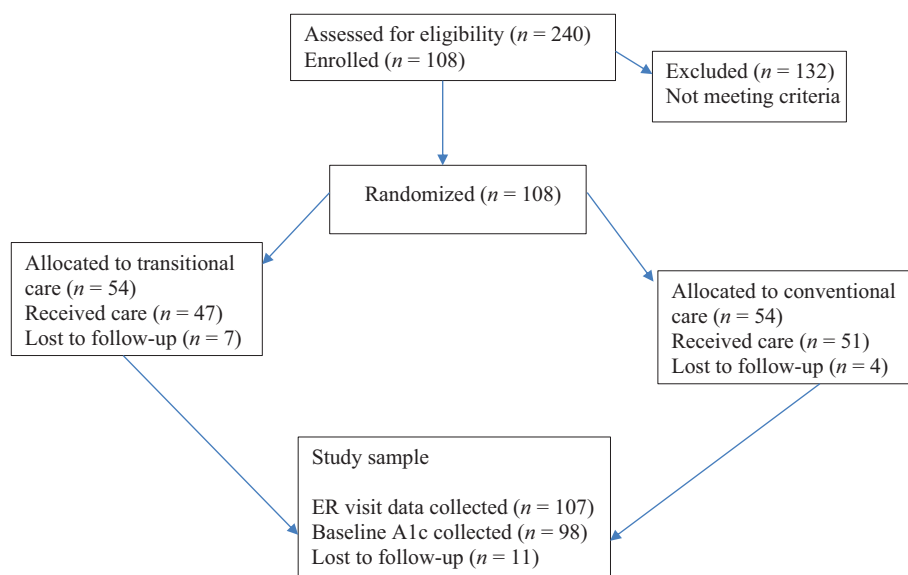


Figure 1. Enrollment inclusion and exclusion criteria.

follow-up for the outcome, with the last data value being carried forward.¹⁹ Mean scores were calculated, and difference between means was estimated using *t*-tests. Analysis of variance was used to detect difference in means on demographic variables for glycosylated hemoglobin, emergency department, and physician. Regression analyses were completed to better understand differences between the control and intervention group by regressing study-end glycosylated hemoglobin onto baseline values.

Results

Glycosylated hemoglobin values on those with dehydration or elevated hematocrit levels, anemia, or receiving a blood transfusion were not analyzed at baseline. There were $n = 107$ participant's data analyzed for hospital emergency department readmissions and $n = 98$ participant's with usable glycosylated hemoglobin data analyzed. There were $n = 11$ patients considered completely lost to follow-up and were treated as drop outs. Emergency department visit frequency and reasons were obtained from the medical record.

Patient characteristics

The sample included $n = 108$ randomized participants. Some participants were lost to follow-up ($n = 11$), and some participants did not have all the data elements collected, resulting in $n = 98$ remaining patients to compare on pre- and post-glucose levels (intervention $n = 47$, control $n = 51$). The demographics for the sample included those with a self-reported race as follows: 62% Black, 10% White, 6% mixed, and 4% other with 18% unreported. Ethnicity was reported as 13% Hispanic and 57% non-Hispanic. Most of the sample was from very low income, with 52% generating below \$20,000 from all sources and

12% generating an income of \$21–\$39,000. The sample was young with 21% being age 40–49, 34% being 50–59, and 60 and over being 21% of the sample. Men represented 53% of the sample. Educational status included 21% completing high school and 15% having some college education. The average duration of diabetes was 9 years, yet only 24% reported ever having received formal diabetes education before. No significant difference between the control and intervention group existed at baseline for age, gender, education, income, ethnicity, race, immigration status, or treatment for depression. There was also no difference detected between groups for having ever visited an endocrinologist before or for ever having received diabetes self-management training. The sample demographics are presented in Tables 1 and 2 depicts self-reported diabetes-related complications and co-morbidities.

About 50% of the sample were treated with insulin, and 21% of those taking diabetes pills reported they did not know the names of their diabetes pills. Very few ($n = 7$) of the intervention participants chose to attend a post-hospital group visit, and $n = 16$ ended up having a one-to-one visit with the transitional care nurse due to low group turn-out. The average glycosylated hemoglobin (HbA1c) for the entire sample was 9.6 (SD 3.3, with a range from 5.0 to 18.3), with approximately 32% of the control sample and 35% of the intervention sample having had an HbA1c below 6.9% at baseline. Poorest glucose control, defined as an A_{1c} over 9%, was evident in 53% of control and intervention groups equivalently at baseline, with no significant differences detected between groups.

Healthcare utilization patterns

Prearranged 2-week clinic appointment attendance was as follows: control group attended a primary care visit at a

Table 1. Demographic characteristics by group

Characteristic	Control	Intervention
Age		
18–21	0 (0)	1 (2)
22–29	2 (4)	0 (0)
30–39	3 (6)	9 (17)
40–49	14 (29)	9 (17)
50–59	20 (42)	17 (33)
60–69	8 (17)	11 (21)
70–79	0 (0)	4 (7)
Income		
< \$20,000	26 (63)	30 (68)
\$21–29,000	1 (2)	6 (13)
\$30–39,000	4 (9)	2 (4)
\$40–49,000	1 (2)	1 (2)
\$50–69,000	0 (0)	0 (0)
> \$70,000	2 (4)	0 (0)
Education		
< 8th Grade	4 (12)	3 (5)
9–12 Grade	9 (28)	4 (7)
12th grade completed	10 (31)	12 (22)
Some college/grade	6 (18)	10 (18)
College graduate	3 (9)	1 (1)
Ethnicity		
Hispanic	10 (24)	4 (7)
Non-Hispanic	27 (65)	35 (66)
Race		
Black	31 (70)	35 (66)
White	4 (9)	7 (13)
> 1 race	4 (9)	3 (5)

Reflected in *N* (%). Not all respondents disclosed income, race, or ethnic status.

rate of 29% and diabetes specialist at 88%; intervention group attended a primary care visit at a rate of 72% and a diabetes specialist 35%. It is possible that the intervention group felt they did not need to follow-through with the diabetes specialist because the services of the transitional diabetes nurse were meeting their specialized needs and were likely referred to primary care by the interventionist more diligently as a result of identification of symptoms for comorbid conditions.

There was no significant difference between groups in utilization of the emergency department for specifically for diabetes-related complications, but there was a significant difference for comorbidities being a cause of emergency department recidivism ($F = 8.2$, $P = 0.02$) (intervention group [$M = 2.7$, $SD = 1.2$] compared to 5% for control group [$M = 5.2$, $SD = 3.1$]). This may be associated with the higher utilization of primary care services in the control group, and the primary care providers were able to address co-occurring acute conditions. It is

Table 2. Diabetes-related complications and comorbidities by group

Diabetes-related complications		
Complication	Control	Intervention
Amputation	3 (6)	5 (9)
Visual loss	9 (19)	11 (21)
Kidney disease	6 (12)	12 (23)
Heart disease	13 (27)	17 (33)
Stroke	5 (10)	10 (19)
Erectile dysfunction	6 (12)	9 (17)
Digestive disorder	5 (10)	10 (19)
Neuropathy (lower)	16 (34)	24 (47)
Neuropathy (upper)	6 (12)	9 (17)
Comorbidities*		
Breathing	15 (32)	21 (41)
Blood	2 (4)	8 (15)
Bone	6 (13)	14 (27)
Heart	26 (56)	33 (64)
Skin	6 (13)	6 (11)
Thyroid	2 (4)	4 (7)
Infection	13 (28)	9 (17)
Thinking	16 (34)	12 (23)
Walking	21 (45)	22 (43)
HIV	3 (6)	0 (0)
Addiction	0 (0)	2 (3)
Other	11 (8)	4 (21)

Reflected in *N* (%). Not all respondents disclosed income, race, or ethnic status.

*Patients were asked 'What other health problems that you have make it difficult to take care of your diabetes?' Options were by system, not specific disorders.

possible that the intervention group attending the specialist visits did not feel they needed to attend the primary care clinic and inadvertently neglected their other health-care needs while prioritizing their diabetes care.

At 1-year, however, the emergency department recidivism for any cause was 2% in the control group ($M = 3.2$, $SD = 4.9$) compared to 1% in the intervention group ($M = 1.2$, $SD = 1.2$) with a trend toward significance in differences ($F = 4.3$, $P = 0.06$) for the hospital of discharge where recruitment took place for this project.

Our findings are similar to that of other transitional care models that include specific clinics for diabetes, where rates of emergency department care remain unchanged despite medical care access.¹⁶ This maybe because in an academic medical center, care is often limited to daytime hours, and low-income populations often cannot miss work to attend to care. Preventable emergency department visits are not uncommon in low-income populations, which is a preference.²⁰ Future projects should account for factors associated with recidivism, such as chemical dependency, mental illness, and acuity indexes.¹⁹

Emphasis on primary care visits maybe beneficial at reducing all cause recidivism.

Glucose control improvements

The control group's baseline HbA_{1c} was $M = 8.6$ (SD 2.7) and at study end was $M = 9.0$ (SD 3.2) with no significant difference from baseline to study-end ($F = 1.5, P = 2.4$). The intervention group's baseline HbA_{1c} was $M = 9.7$ (SD 3.1) and at study end was 8.8 (SD 2.8), with a mean change of 0.9 (SD 2.2) with a significant difference noted from baseline to study-end ($t = 2.3, P = 0.01$), a robust effect. When the entire range of glucose values was included in the analysis and compared to one another, there was no significant difference between the control and intervention group detected ($t = 0.13, P = 0.28$). Since both groups had improvements and a wide range of glucose control, we conducted a second analysis to determine if means could be detected using a glycosylated hemoglobin cut-off defined as poor control (HbA_{1c} $\leq 9\%$). Since the largest reduction in HbA_{1c} would be expected to be detected in those with a baseline value over 9%, we conducted analyses to see if there was a significant difference between the control and intervention groups when only those with HbA_{1c} levels over 9% are included in the analyses. There was a significant difference between the control and intervention groups at the 1 year study-end data collection point ($F = 5.9, P = 0.018$) with the control group ending with an average change of 0.67% from baseline to study-end (SD 1.3, $t = 3.6, P = 0.001$) and the intervention group experiencing a 1.9% mean change (SD 2.7, $t = 3.3, P = 0.003$). When HbA_{1c} for those with a value under 9% were considered at the 1-month and 3-month mark, no significant changes were detected between groups.

Again both groups had improvements due to early medical care and large effect sizes with significant reductions, but the transitional care group had more robust improvements. This may indicate that although everyone appears to improve early on after hospitalization and

medical intervention, sustainable effects for those with the worst glucose control at baseline do benefit from a year-long transitional care intervention. Plausible explanations for difficulty detecting significant differences between glucose control at lower levels of HbA_{1c} include the fact that everyone received a glucose-lowering intervention during hospitalization and would be expected to improve. Also, all patients received a follow-up appointment for specialist medical care, not just the transitional care intervention group. Another factor that may have made it difficult to detect effects is the wide range in variability in HbA_{1c} that remained at study end due to the intention-to-treat approach (minimum 5.0, maximum 18.0), with it being difficult to detect statistical effects in HbA_{1c} movement in values $<9\%$ (20).

Many participants did not return for follow-up visits at prescribed intervals and were difficult to reach given frequent telephone number and address changes. Finally, the timeline for study-end assessment being 1-year may be too long for a very low-income sample. Many participants are lost to follow-up due to the transient population affected by housing instability. Some patients may have dropped out of care due to feeling better and competing demands, such as childcare, focus on caring for other chronic comorbid conditions, and return to employment. This was especially true for the control group of whom the transitional care interventionist did not have routine contact. The intervention group may have relied on telephone contact.

The large effect and significant reduction in HbA_{1c} (0.9%) in the intervention group are consistent with other projects that show higher HbA_{1c} reductions in those with glycosylation levels over 9% using enabling interventions and also are noted in those treated with insulin.²¹ The impact of the intervention in this study trends toward a 1% decline in HbA_{1c}, which is considered clinically relevant, since it is associated with a 40% reduction in microvascular complications.²¹⁻²⁵ Table 3 presents the demographic factors, and Table 4 depicts the

Table 3. Demographic factors associated with differences in mean at study-end A_{1c} by group

Characteristic	Group × Factor		Factor × Study-End A _{1c}	
	Baseline	Control	Intervention	
Age	$F = 0.39, P = 0.53$	$F = 1.2, P = 0.39$	$F = 0.96, P = 0.55$	
Gender	$F = 0.90, P = 0.34$	$F = 1.2, P = 0.38$	$F = 4.5, P = 0.004^{**}$	
Ethnicity	$F = 1.2, P = 0.26$	$F = 4.2, P = 0.03^*$	$F = 3.7, P = 0.01^{**}$	
Race	$F = 0.71, P = 0.40$	$F = 2.5, P = 0.05^*$	$F = 2.2, P = 0.06$	
Income	$F = 1.5, P = 0.21$	$F = 1.7, P = 0.024$	$F = 1.0, P = 0.52$	
Education	$F = 0.65, P = 0.42$	$F = 0.33, P = 0.096$	$F = 0.82, P = 0.66$	
US birth	$F = 0.86, P = 0.35$	$F = 1.8, P = 0.16$	$F = 0.66, P = 0.83$	
Marital status	$F = 0.78, P = 0.37$	$F = 0.57, P = 0.83$	$F = 1.6, P = 0.83$	
Duration of diabetes	$F = 0.40, P = 0.52$	$F = 2.3, P = 0.08$	$F = 0.55, P = 0.90$	

*Significant < 0.05 ; ** < 0.01 , ($n = 98$).

Table 4. Complications associated with differences in mean at study-end A_{1c} by group

Complication	Group × Factor		Factor × Study-End A_{1c}	
	Factor	Baseline	Control	Intervention
Diabetes complications				
Amputation		$F = 0.37, P = 0.54$	$F = 1.3, P = 0.29$	$F = 0.96, P = 0.056$
Vision loss		$F = 0.08, P = 0.76$	$F = 0.68, P = 0.79$	$F = 1.3, P = 0.27$
Kidney failure		$F = 1.8, P = 0.17$	$F = 1.0, P = 0.50$	$F = 0.92, P = 0.59$
Heart failure		$F = 0.36, P = 0.54$	$F = 1.1, P = 0.40$	$F = 0.90, P = 0.61$
Stroke		$F = 1.5, P = 0.22$	$F = 1.0, P = 0.50$	$F = 1.0, P = 0.48$
Gastroparesis		$F = 1.5, P = 0.22$	$F = 2.3, P = 0.07$	$F = 1.7, P = 0.14$
Neuropathy		$F = 1.7, P = 0.19$	$F = 1.4, P = 0.25$	$F = 3.3, P = 0.01^{**}$
Depression		$F = 0.27, P = 0.60$	$F = 2.0, P = 0.12$	$F = 2.0, P = 0.09$
Self-care training		$F = 0.05, P = 0.81$	$F = 1.5, P = 0.23$	$F = 2.4, P = 0.05^*$

*Significant < 0.05; **< 0.01, (n = 98).

diabetes-related complications associated with changes in glycosylated hemoglobin at study end. The control group had significant improvements by race and ethnicity, whereas the intervention group had significant difference by gender, ethnicity, and for those reporting neuropathy and previous self-management training. Improvements in self-management training may imply diabetes education effects are cumulative.

Discussion

The project attempted to test the feasibility of translating elements of the Naylor Model of Transitional Healthcare in the return-to-home from hospital context for diabetes self-management by using an advanced diabetes management nurse and certified diabetes educator to serve as a transitional care coordinator to improve care coordination, linkage to specialized care, and assistance with medication management to promote regimen adherence. The nurse-led transitional care interventions that have included assistance with appointments and clinical assessments have been associated with decline in hospitalizations, emergency department use for diabetes glucose levels, and improvement in functional status.²⁶

In this project, the intervention group appears to have received a significant benefit of a decline in HbA_{1c} utilization of the emergency room over a 1-year period. Those with the poorest glycemic control on recruitment fared best at study-end, with the greatest decrease in HbA_{1c} seen in the intervention group. Transitional care nursing interventions may help keep people linked into specialized diabetes care early on by providing support with problem-solving. There were no significant between group differences detected in this study in those with an A_{1c} below 9%. An HbA_{1c} over 9% is consistent with the determination of poor glucose control according to quality measures used by the National Committee for Quality Assurance.²⁷

Clinical practice recommendations

In those with glucose levels closer to good control, specialist and primary care appointments may be adequate for transitional care, whereas those with poor control benefit from the additional longer-term and tailored diabetes self-management education, medication management, and monthly telephone calls delivered by a diabetes-specialized advanced practice nurse. Early improvement in diabetes control, perceived mastery of diabetes education, and feeling they no longer needed a program to help them manage their diabetes may be threats to program attrition.

Conclusion

Hospitalized patients who are provided with diabetes specialty care within 2 weeks of hospital discharge benefit from having a reduced rate of emergency department visits and hospital readmission. Patients with poor glucose control ($A_{1c} > 9\%$) benefit the most from additional tailored nurse practitioner-delivered transitional care services. It is unclear if those with an $HbA_{1c} < 9\%$ benefit from glucose control improvements due to nurse-led tailored transitional nurse practitioner care above and beyond being provided with access to a diabetes physician specialist along with primary care provision post-discharge. In this project, the intervention included a team approach that includes collaboration between a diabetes physician specialist and a diabetes advanced practice nurse and certified diabetes educator coordinating transitional care in those with poor glucose control ($A_{1c} > 9\%$) and patients from a very-low-income population benefited by having improved glucose control and reduction in emergency department recidivism rates within 30-days of hospital discharge.

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