Evaluation of a Post Discharge Telephone Intervention on 30-day Re-admission and Emergency Room Use in Patients with Diabetes A Pilot Program

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A thesis
submitted in partial fulfillment of the
requirements for the degree of

Master of Public Health (Health Services Health Education)

University of Washington
2016

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Program Authorized to Offer Degree:
School of Public Health-Health Services

University of Washington

Abstract

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Importance: Nearly nine million patients with diabetes are hospitalized annually in the United States, accounting for 23% of all hospitalizations and 43% of the total healthcare expenditure for diabetes. Patients with diabetes have higher thirty-day readmission rates, compared with readmission rates of patients without diabetes. Programs that aim to reduce thirty-day readmission rates for patients with diabetes can potentially improve care and cut costs.

Objective: The primary aim of the Novo Nordisc Diabetes Topics Taught (NNDTT) program was to determine whether participation in the program would reduce the rate of readmission and emergency room utilization and to determine whether participation in the program resulted in improved patient follow-up. Secondary aims were to understand patient recall of inpatient diabetes education and to identify any resulting changes in diabetes self-care management.

Design: The evaluation design is a quasi-experimental study comparing 30-day readmission rates, emergency room visits, and clinic encounters between discharged diabetic patients who completed at

least one post discharge NNDTT telephone interview and a group of discharged diabetic patients who did not complete any NNDTT post discharge telephone interviews.

Setting: Harborview Medical Center, an urban, academic medical center and safety net hospital located in King County, Washington.

Participants: English-speaking patients aged 18 and over admitted to the hospital for at least 24 hours who experienced two blood sugars > 180 mg/dl or one blood sugar < 70 mg/dl while hospitalized. All eligible patients had the diabetes education template "Diabetes Topics Taught" (DTT) activated in the electronic medical record by a member of the glycemic control team on day one of hospitalization and were discharged home after hospitalization.

Main Outcomes and Measures: Primary outcome measures were 30-day hospital readmission, emergency department utilization and post-discharge follow-up appointments. Secondary outcomes included self-reported retention of diabetes education topics discussed during the interviews.

Methods: Bivariate analysis was used to evaluate the NNDTT program using chi square test and Fischer's exact test for categorical characteristics and clinical outcome measures, and Student's t-test and Mann Whitney U test for continuous measures.

Results: Five hundred and thirty eight patients were eligible for the NNDTT program and 68 (12.6%) completed at least one telephone interview. There was not a significant difference between the non-interviewed and interviewed cohorts in readmission rates (17.6% vs. 11.7%; p-value = 0.29) or emergency room visits (14.7% vs. 7.3%; p-value = 0.22). A significantly higher proportion of patients in the interviewed cohort completed post discharge follow-up appointments as compared to the eligible group (19.1% vs. 5.6%; p-value < .001).

Conclusions: An expanded phone call interview focusing on diabetes self-management skills resulted in higher rates of follow-up encounters. There was not a significant difference in readmission rates or emergency room utilization.

ACKNOWLEDGEMENTS

This project would not have been completed without the help and support of my professors, colleagues, classmates, friends and family. I would like to express my sincere thanks to Dawn Corl and the Glycemic Control Team at Harborview Medical Center who provided guidance, encouragement, and inspiration Their patience support and faith that I would actually get this done was much appreciated. Thank you to my thesis committee for their thoughtful feedback and numerous revisions.

Bruce, Grace, Abby, Bob and Nancy, Mom and Dad, what can I say? You guys are the best. Thank you for believing in me and cheering me on. I love you all.

This thesis is dedicated to the memory of

Nancy Montgomery

Although you didn’t survive to see this paper completed you knew it would get done.

I can hear you saying Hooray!

BACKGROUND AND SIGNIFICANCE

The prevalence of diabetes in the United States has been increasing as the population has become more overweight and obese in recent years and this trend is expected to continue as the population ages. Recent estimates from the Centers for Disease Control and Prevention are that 29.1 million people (9.3%) in the United States have a diagnosis of diabetes of which 8.1 million (27.8%) may be unaware they have the condition (Centers for Disease Control and Prevention, 2014). People with diabetes require medication, monitoring of blood glucose, and close attention to diet to maintain normal blood glucose levels. Abnormal blood glucose over time can result in circulatory problems, decreased sensation in feet and legs, decreased immune function, and impaired vision. People with diabetes are more likely to be hospitalized for complications such as heart and kidney problems, infections, and falls. Nearly nine million patients with diabetes require hospitalization in the United States per year, accounting for 25% of all hospitalizations (American Diabetes Association, 2013a; Centers for Disease Control and Prevention, 2014).

Early readmission, defined as admission to the hospital within 30 days of discharge, occurs more often in patients with diabetes (Stone & Hoffman, 2010). The overall 30-day readmission rate of hospitalized patients is 8.5%-13.5%, while the 30-day readmission rate for patients with diabetes is 14.4%-22.7% (Rubin, Donnell-Jackson, Jhingan, Golden, & Paranjape, 2014; Rubin, 2015). In 2012 the estimated total direct medical costs of diagnosed diabetes were $176 billion. . Caring for hospitalized patients with diabetes is expensive. In 2012 hospital costs associated with diabetes in the United States were $124 billion of which an estimated $25 billion was attributed to 30-day readmission (American Diabetes Association, 2013a). A 5% reduction in the 30-day re-admission rate would result in 82,754 fewer admissions per year and an estimated annual cost savings of $1.2 billion (Healthcare Cost and Utilization Project (HCUP), 2012). Reducing early readmission of patients with diabetes has the potential to improve quality of care while significantly reducing health care costs (Jencks et al., 2009; Robbins & Webb, 2006).

Many believe hospital readmission rates are representative of health care quality and can be prevented through better care coordination and discharge planning efforts. (Axon & Williams, 2011; Jencks et al., 2009). The Hospital Readmission Reduction Program established in 2012 by the Patient Protection and Affordable Care Act authorizes the Centers for Medicare and Medicaid Services (CMS) to

decrease up to 3% of annual inpatient payments to hospitals that have greater-than-expected re-admission rates (Axon & Williams, 2011; GPO, 2010). In order to avoid reduced CMS payments many hospitals have prioritized interventions aimed at streamlining the transition from hospital to home (Barnett, Hsu, & McWilliams, 2015; Centeno & Kahveci, 2014; Kripalani, Jackson, Schnipper, & Coleman, 2007; Stevens, 2015).

RISK FACTORS AND CHARACTERISTICS ASSOCIATED WITH 30-DAY READMISSION

Patients with chronic medical conditions account for the majority of early hospital readmissions (Barnett et al., 2015; Rico et al., 2015; Rubin, 2015). A large Medicare study demonstrated that patients with medical conditions are readmitted more often than post-surgical patients and the most common diagnoses resulting in early readmission are congestive heart failure, pneumonia, and chronic obstructive pulmonary disease (Jencks et al., 2009). Risk factors for 30-day readmission include: poor discharge planning and follow-up, low care instructions compliance, inadequate family support, disease complications, and medical errors (Rico et al., 2015).

Only 13% of hospital admissions for patients with diabetes have diabetes listed as the primary diagnosis (American Diabetes Association, 2013a). Type-2 diabetes is often identified as both an independent risk characteristic and as a co-morbid condition associated with early readmission (Rico et al., 2015; Robbins & Webb, 2006; Rubin, 2015). Patients with diabetes are challenged with managing their underlying disease in addition to the demands of their acute illness. In a qualitative study, Rubin identified five factors contributing to early re-admission among patients with diabetes; 1) poor health literacy, 2) health system failure, 3) failure of expected protective factors, 4) social determinants of health impeding care, and 5) loss of control over illness (Rubin et al., 2014).

Factors contributing to health system failure include inadequate discharge planning, communication, and lack of post-discharge support and thus are frequent targets for improvement (Kripalani et al., 2007). Interventions incorporating patient-centered discharge education, coordination of care around discharge, and post-discharge support have demonstrated significant reductions in 30-day readmission for patients with chronic conditions such as congestive heart failure and hypertension (Rico et al., 2015). Several studies have demonstrated a reduction in early readmission rates among

inpatients who received diabetes self-management education (DSME). (Corl et al., 2015; Dungan, 2012; Healy, Black, Harris, Lorenz, & Dungan, 2013).

POST HOSPITALIZATION PHONE CALLS

Contacting patients by telephone at home after hospital discharge has the potential to identify post-discharge problems while they are still manageable, and the potential to reduce the need for readmission. A follow-up telephone call is a simple, inexpensive way to connect with patients and to review and reinforce discharge instructions and DSME. However, evidence is inconsistent regarding the effectiveness of post-discharge phone calls alone. A Cochrane systematic review of the effectiveness of telephone follow-up on readmission was inconclusive due to the various ways telephone follow-up was performed, the differences in outcomes measured, and the low methodological quality of many of the 35 studies included in the review (Mistiaen & Poot, 2006) Few studies have examined the effectiveness of follow-up phone calls to patients with diabetes and nearly all studies examined the effect of post discharge phone calls only within the first 72 hours of discharge from the hospital.

A distinction must be made between simple phone call programs and more complex telephone interventions. Both are often included as one component of transitional care programs (Naylor et al., 2004). Phone call programs typically include efforts to contact patients within 72 hours after discharge by a registered nurse (RN) who reviews various topics with patients who answer the telephone, such as whether the patient was able to pick up prescriptions, signs of infection, and pain control. Alternatively, the RN may leave a message with call back information, leaving the patient with the responsibility to contact the facility or their primary care provider if they are having any issues. In contrast, a telephone intervention is a deliberate attempt to monitor patients remotely in order to intervene before symptoms require an emergency room visit or a re-hospitalization. An intervention involves regular phone calls between providers and patients in an attempt to monitor changes in symptoms, medication, dietary adherence, and behaviors to improve self-care management. A telephone intervention can be in the form of health coaching, which is designed to offer support, answer questions, encourage healthy behaviors, and promote adherence to the plan of care by a member of the health care team on its own or as one component of a transitional care program (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015).

In transitional care programs, advanced practice nurses actively manage the transition of the patient from hospital to home by providing face-to-face home visits and telephone "visits" in between home visits. Transitional care programs have demonstrated success at reducing in 30-day re-admissions (Naylor et al., 2004). A recent quality improvement pilot study of hospitalized veterans with poorly controlled diabetes demonstrated that those who participated in a transitional telephone intervention had reduced 30-day readmission rates and improved glycemic control (Brumm, Falciglia, & Theisen, 2016) Telephone interventions are attractive methods of post discharge patient outreach due to their low costs particularly for medical centers serving socio-economically challenged patient populations.

THE NOVO NORDISK DIABETES TOPICS TAUGHT (NNDTT) PROGRAM

Harborview Medical Center has a traditional post discharge call program called Patient Care Manager (PCM) (Appendix 1). PCM calls are made by an RN working in the unit the patient was discharged from within 72 hours of hospital discharge. The questions involve pain control, access to prescribed medications, patient comfort, and signs of infection. RN's who make PCM calls do this in addition to their usual patient care assignments. Scripting is available to assess diabetes self-management but is seldom used in PCP calls.

The NNDTT program, funded by a $20,000 grant from Novo Nordisk Community Care initiative, was used to pay a Certified Diabetes Educator (CDE) who added four hours per week to her part-time work at the hospital. The primary aim of the NNDTT program was to determine whether there was a decrease in 30-day readmission and emergency room utilization between patients who participated in the telephone interview and those who did not. A secondary aim was to understand patient recall of inpatient diabetes education and to identify any resulting changes in diabetes self- management.

The NNDTT telephone intervention was provided in addition to the PCM call. The NNDDT program included patients who had blood glucose levels out of control during their hospitalization and were considered to be at risk for having difficulty with diabetes self-management when they returned home. NNDTT was a telephone intervention delivered by a CDE who assessed understanding and reinforced the diabetes topics taught during the patient's stay in the hospital. In the process of the interview the CDE consulted with other glycemic team members, intervened and advised patients as necessary. The program took place from January 1, 2014 to December 1, 2014. A series of three phone

calls were made weekly beginning seven days post-discharge following at least one overnight stay at Harborview Medical Center. The CDE used an open ended patient-centered survey derived from the inpatient diabetes education curriculum “Diabetes, What you Need to Know” (Appendices 1 and 2).

SETTING

Harborview Medical Center is a 413 bed, acute care academic medical center located in King County, Washington. In addition to being the Level I Trauma Center for Washington, Idaho, Montana, and Alaska, Harborview is the safety net hospital for vulnerable patients in King County, Washington. The hospital’s primary mission is to provide health care for patients King County is obligated to serve. Patients given priority care include persons incarcerated in the King County Jail, mentally ill patients, particularly those treated involuntarily, persons with sexually transmitted diseases, substance abusers, indigents without third-party coverage, non-English speaking poor, trauma, burn treatment, specialized emergency care, victims of domestic violence, and victims of sexual assault (Harborview's mission, 2016). Harborview patients are more likely to be beneficiaries of Medicare and Medicaid.

Social determinants impeding care include poverty, limited access to health services, lack of formal education, lack of social support, and poor health literacy effect Harborview’s mission population, placing these patients at higher risk for emergency room utilization and 30-day readmission. Urban academic medical centers like Harborview may be disproportionately affected by the financial penalties associated with early readmission (Joynt & Jha, 2013).

Harborview provides inpatient and outpatient care to approximately 4000 patients with Type 2 diabetes mellitus (DM2). Many of the patients with diabetes are from vulnerable populations placing them at higher risk for readmission. Patients with diabetes at Harborview are less likely to have a primary care provider, a health access issue that makes chronic disease management challenging. Due to socioeconomic considerations and lack of commercial insurance patients with diabetes at Harborview are more likely to have difficulty affording and accessing medications and supplies, such as meters and test strips, necessary to manage their disease. Harborview patients may not be able to afford the recommended diet or may not have access to healthy foods at their neighborhood grocery store. In addition, patients with diabetes begin cared for at Harborview may have decreased health literacy due to diverse cultural backgrounds, language barriers, and decreased education. Patients with diabetes from

vulnerable populations such as those identified in Harborview 's Mission Statement have unique challenges with diabetes self-management skills and are more likely to be living with poorly controlled disease as evidenced by high blood glucose levels (Robbins & Webb, 2006).

STUDY POPULATION AND SELECTION OF ELIGIBLE PARTICIPANTS

The target population for this program included adult patients with a diagnosis of diabetes who were admitted to Harborview Medical Center, were hospitalized for at least 24 hours, between January 1, 2014 and December 1, 2014 and were determined to be dysglycemic during their hospital stay. Patients where considered dysglycemic if their blood glucose was ≥ 180 mg/dl on two occasions during their hospitalization or ≤70 mg/dl on one occasion. Glycated Hemoglobin (HbA1c) levels of ≥ 8.5 mmol/mol were also indicative of dysglcemia. To be eligible for the NNDTT intervention patients also had to have a listed telephone number and had to be English speaking, due to lack of budgetary support for telephonic interpreters (Table 1).

ETHICS

Human subject's approval, which included waivers of consent and HIPAA authorization, was received from the University of Washington Investigations Board, (IRB # 50152) on July 30, 2015. All patient and hospital-level data were de-identified.

METHODS

The glycemic control team at Harborview is a group tasked with inpatient management and care transitions of patients with dysglycemia. The team is led by a medical director and includes an Advanced Registered Nurse Practitioner, a Masters Prepared RN CDE, and participants from pharmacy and nutrition support services. A member of the glycemic control team confirmed NNDTT program eligibility and activated the "Diabetes Topics Taught" (DTT) drop-down list in the electronic medical record if not already in use (Appendix 4). This drop down check list is used to document inpatient diabetes education from the curriculum "Diabetes What you Need to Know." Once activated the field was easily viewed by all caregivers facilitating the documentation of informal inpatient diabetes education from an RN staff nurse or diabetes education from a CDE. The drop down list provided a searchable documentation field

specific to diabetes care and education. Throughout a patient's hospital stay diabetes education can be documented anytime a staff member addresses medication, nutrition, or glucose monitoring by checking a box in the DDT drop down list. Ideally all patients with diabetes should have this dropdown list activated but this practice is inconsistent. Part of the NNDTT program was to confirm that each patient who was identified as eligible had the DDT dropdown list and had received Harborview's diabetes education curriculum, *Diabetes, What you Need to Know.*

Diabetes What you Need to Know is, an evidence-based curriculum designed in accordance with standards set by the American Diabetes Association (American Diabetes Association, 2013b). The curriculum uses a patient-centered approach that emphasizes teach-back methods and covers five self-management topics. The topics include glucose monitoring, medication administration, recognition and treatment of hypoglycemia, recognition and treatment of hyperglycemia, and meal planning. The tool is printed and filled out by the patient and educator during education sessions. A staff nurse or CDE is available to answer questions, fill in gaps, and reinforce patient specific instructions. The patient is given the completed form to take home as a resource in addition to standard discharge instructions which included follow-up medical and specialist appointments made by the RN discharge coordinators.

A member of the glycemic control team added all NNDTT eligible patients to a spreadsheet in a password-protected file. Discharge dates were updated daily. The CDE who performed the follow-up telephone interview used this spreadsheet to determine timing for telephone follow-up and to track interview responses. The NNDTT CDE was a registered dietician who made calls four hours per week after reviewing the spreadsheet and discharge dates to determine call timing. Prior to calling each patient the CDE would review the medical record to confirm the patient was within the correct time range for a call, read the discharge summary, and make note of any prescriptions and scheduled follow-up appointments. Each call took an average of 30 minutes. The interview script was designed so that patients would answer yes or no; however, patients often expanded on their answers or asked the interviewer about other non-diabetes related health needs. The expanded responses were added to a comments section for each participant.

The topics covered in the telephone interview included recollection of inpatient education, blood glucose monitoring, medication, hypoglycemia, hyperglycemia, meal planning and follow-up care.The CDE assessed whether the patient responses corresponded to what was in the medical record, and if

they did not match up, the CDE provided educational counseling. If the patient indicated they were discharged without a glucose meter or were having difficulty getting prescribed medications, the CDE was able to contact a member of the glycemic control team who could help the patient or schedule an appointment in the Diabetes Recent Discharge Clinic. The CDE did not have direct access to appointment templates and either called the clinic or directed the clinic to contact the patient. The CDE then followed up by checking the medical record to confirm appointments had been made and called patients to confirm needs had been met.

Calls were classified as missed opportunities if there was a notation which indicated the CDE reviewed the medical record and determined the timing was either too early or too late to initiate the call based on the seven day windows of opportunity. Calls were classified as "no attempt made" if no call was initiated and there was not a notation to indicate the CDE had reviewed the chart.

Frequency of emergency room use, readmission, and outpatient visits were obtained from the medical record using date of hospital admission and discharge as reference points. Readmissions from all causes were included as opposed to readmissions for same diagnosis. Only completed outpatient visits and emergency room encounters were included in the analysis. Each patient medical record was individually reviewed to verify the patient met eligibility criteria. The frequency of diabetes topics taught was determined by searching the field in the Diabetes Topics Taught (DTT) drop down list and a variable was created to determine a ratio of diabetes topics taught to length of stay.

STATISTICAL ANALYSIS

The NNDTT program outcomes were evaluated by comparing patients who were interviewed (completed at least one of the three NNDTT phone call interviews) to non-interviewed patients in a per protocol analysis. Bivariate analysis was used to evaluate the NNDTT program using chi square test and Fischer's exact test for categorical characteristics and clinical outcome measures, and Student's t-test and Mann Whitney U test for continuous measures. All statistical analyses were performed using SPSS version 22.0 (SPSS, Chicago,IL). All of the p-values were 2 tailed and P<. 05 was considered statistically significant.

Responses from the first interview were summarized by individual analysis of each interview. As designed the expected interview response was a yes or no, but during many of the interviews participants

indicated several responses and/or enhanced the responses with longer statements which were captured in a comments field. In addition, the CDE addressed concerns not addressed by the interview questions. *Diabetes Topics Taught* was used as a reference to determine whether responses fit with what was provided in the curriculum. A correct response was in alignment with curriculum education. A response was considered incorrect if it did not align with inpatient teaching or if the patient stated they did not know. The CDE provided educational counseling to patient's responding incorrectly.

RESULTS

Harborview's glycemic control team identified 538 patients with diabetes who were dysglycemic from January 1, 2014 until December 1, 2014 and were discharged to home/self-care. The CDE called 156 patients (29.0%) reaching 77 (14.0%) patients of whom 68 (12.6%) agreed to participate in the telephone interviews. Among the 68 interviewed participants (12.6%), completed at least one phone call seven days after discharge, 54 (10.0%) completed two phone calls 14 days after discharge, and 38 (7.0%) completed three phone calls at 30-days post discharge. A voice message was not left for the 79 (14.6%) patients who did not answer the telephone as there was not a dedicated telephone line or a person available to answer the returned calls. The patients not called, 386 (71.0%), were classified as either "no attempt made" 156 (29%) or "missed opportunities" 226 (42.0%).

The demographic characteristics of the NNDTT interviewed group 68 (12.6%) were not significantly different from the group that was not interviewed, 470 (87.4%) except for race. Both groups were predominantly middle-aged males who were Medicare or Medicaid recipients. Both groups were dysglycemic with a median HbA1C > 8.5 mmol/mol and had a median length of stay of four to five days. Diabetes education was provided on average once or twice per day to the patients in both groups. While the groups had nearly equal percentages of White Non-Hispanic patients, the NNDTT cohort had a smaller percentage of Black Non-Hispanic patients and a higher percentage of Hispanic and Asian-Pacific Islanders ($p = .018$) (Table 2).

There was not a significant difference between the interviewed and non-interviewed cohorts in readmission rates (17.6% vs. 11.7%; p-value = 0.29) or emergency room visits (14.7 % vs. 7.3%; p-value = 0.22). A significantly higher proportion of patients in the interviewed cohort completed 30-day post discharge follow-up appointments than the non-interviewed cohort (19.1 % vs. 5.6%; p-value < .001). The

majority of patients in both groups received a PCM call (89.7% vs 82.6%; p-value = .14) and, while very few patients were asked the scripted diabetes questions, a significantly higher percentage of the PCM calls in the interviewed group included the scripted diabetes questions (10.3 % vs 4.3%; p-value =.03; Table 2).

SUMMARY OF INTERVIEW RESPONSES

Due to the number of responses missing from the 14 and 30-day interviews which appeared to have taken the form of a check-in only the responses from the first interview were analyzed (Tables 3 a-f). Of the 68 patients interviewed 34 (50%) recalled receiving diabetes education while hospitalized, identified the role of the educator, or acknowledged receipt of any written materials at discharge. The most common response to the hardest thing after discharge was "nothing" (30%) followed by monitoring (17%) (Table 3a).

Patients reported consistent monitoring of blood glucose and had goals within an acceptable range. Those who self-reported blood glucose levels reported median blood glucose of 120 mg/dl with the majority of patients reporting blood sugars between 98.-150 mg/dl which are well within the acceptable range of 80-180mg/dl (Table 3b). The majority of NNDTT interviewed patients went home on insulin (80%), were able to accurately identify their medications, state the correct dosages and how, when, and where to refill their prescriptions (Table 3c).

Comprehension of hypoglycemia, hyperglycemia and emergency management topics were less well verbalized by patients. The majority could not describe symptoms of hypoglycemia (66%) what to do in the event of a single (85%) or prolonged (93%) episode of hypoglycemia. Only two patients (7.5%) could describe when to call 9-1-1. Most patients (84%) could not describe symptoms of hyperglycemia and even fewer (7.5%) could describe what to do in the event of an episode of hyperglycemia (Table3 d). The majority of patients reported eating 3 meals per day and could accurately state which foods raised and lowered blood sugars (Table 3e). Self-reports of emergency room usage were higher than what was found in medical record review (21% vs. 7.3%) and lower for readmission rates (9% vs. 11.7%). Self-reported outpatient visits were also higher (49%vs 20%) at 30 days (Table 3f).

In addition to providing education the CDE actively intervened 41 times with 34 (50%) patients during the interviews for issues that ranged from rescheduling appointments to triaging symptoms the

patient was having at the time of the call (Table 4). The CDE arranged follow-up care by making appointments or facilitating referrals for 16 (24%) of the patients in the NNDTT group. The CDE intervened with nine (13%) patients who were actively symptomatic. Symptoms included dizziness, nausea and vomiting, hypoglycemia, hyperglycemia, hypertension, and wound infection. As a nutritionist she was able to provide guidance about blood glucose management, medication dosages, and diet but for other clinical symptoms she contacted members of the glycemic control team to assist with management. The CDE provided other assistance, including helping five (7.5%) patients obtain prescriptions and two (2.9%) who needed clarification of medication instructions. Four patients (5.8%) were discharged without glucose monitors and five (7.3%) asked to have nutritional instructions mailed to them.

DISCUSSION

The NNDTT pilot program built upon the existing diabetes education program at Harborview Medical Center and the PCM follow-up calls. Results from recent a Quality Assurance project indicated that patients who had diabetes topics taught while hospitalized had fewer readmissions at 14 days (Corl et al., 2015). It was hoped that the NNDTT program would support the diabetes education received as an inpatient and extend the beneficial effects on reducing readmissions beyond 14 days.

Patients who participated in NNDTT program had more documented outpatient follow-up encounters after discharge than those who did not. This is an important finding as previous studies have documented that outpatient follow-up after discharge reduces emergency room utilization and 30-day readmission. Statistically significant differences between emergency room utilization and 30-day readmission between the NNDTT cohort and the non-interviewed cohort were not demonstrated but there was a numerical difference favoring the NNDTT group in that a smaller proportion of the NNDTT group were seen in the emergency room post-discharge or were readmitted between 8 and 30 days when the program was in effect.

Interventions provided to the patients in the NNDTT group may reflect gaps in care transitions of patients with diabetes worth further examination. In addition to counseling and education the CDE provided meaningful interventions or care coordination to half the patients in the NNDTT group. Ideally, many of these interventions, such as making appointments and scheduling referrals, could have been

performed while the patient was hospitalized. Lack of follow-up care is one factor implicated in high 30-day readmission rates so it would be worth exploring this trend closer to better understand and address care coordination barriers (Balaban, Weissman, Samuel, & Woolhandler, 2008).

The NNDTT program targeted patients who were dysglycemic during their hospitalization, yet four were discharged without a monitor, making diabetes self-management very challenging if not impossible particularly for patients who were taking insulin at home. It would be important to understand how to get glucometers to patients prior to discharge so that blood glucose can be monitored and dangerously high and low levels can be avoided.

Examining patient responses to the interviews reinforced findings that patients often do not recall what they were taught while hospitalized. Hospitalized patients may be sleep deprived, in pain, sedated, or nauseated, which limits their ability to fully participate in education (Stevens, 2015). They may be overwhelmed with the amount of information provided to them or because diabetes may not have been the primary reason for hospitalization education related to the acute illness may have been prioritized. Only half of the patients interviewed recalled receiving diabetes education during their inpatient stay. Education is documented in the drop-down list by checking a box in a checklist. One wonder's whether educators communicated to patients that they were being educated? Were patients aware that when receiving a dose of medication or having blood glucose check the RN was also providing education? Education sessions may be less frequent and as typical lengths of stay are shorter there are fewer opportunities for education.

Still, given so few of the patients seemed to understand hypoglycemia and hyperglycemia it raises the question whether the interview was clearly understood. It is also concerning how few of the patients were able to describe what to do when they were hypoglycemic or when to get help. It may be that patients who were interviewed had not experienced these symptoms so were caught off guard by the questions or that the questions themselves were not understood by the patients. The interview tool was not extensively tested to determine if questions were likely to be understood by patients. The majority of the counseling provided by the CDE during the interviews was about management of dangerously high or low blood glucose levels. Given all eligible patients were dysglycemic and that the majority of the interviewed were discharged on insulin they should have received education targeting blood glucose

management in the home environment. This apparent gap may inform future development of diabetes education materials to address this important self-management topic.

LIMITATIONS

Patients were not consented or informed about the program prior to discharge which may have contributed to the lower than expected participation. One component of successful transitional care programs includes patient engagement on admission (Hirschman et al., 2015). Although the demographic characteristics of the interviewed and non-interviewed groups were similar, participants largely self-selected by choosing to answer the telephone, which may have biased the results.

The NNDTT program yielded fewer participants than expected and the CDE spent more time than anticipated to prepare for and complete calls. The CDE was allocated four hours per week to make phone calls in the end she made two calls for every patient reached. Time was spent prepping for calls to patients who were not reached and messages could not be left as there was not a telephone or person dedicated to answering returned calls. Programs that have demonstrated some success at reducing readmission have multiple components and have resources dedicated to doing just this work (Centeno & Kahveci, 2014; Kripalani, Theobald, Anctil, & Vasilevskis, 2014). Calls were made seven days after discharge which may not have matched with the CDE caller's schedule resulting in many missed opportunities to contact patients.

There were numerous responses left blank in the second and third interviews which seemed to take the form of check-ins with patients. The CDE appears to have focused on covering specific areas of interest to the patient or followed-up on concerns from prior calls rather than going through the interview question by question. Future interventions may want to consider varying the interview questions by call to focus on topics such as glucose monitoring and medication management which can change over time.

The CDE did not have access to appointment templates or referral information and spent time being routed around the Harborview system in order to address the patient's needs. Also, triaging patient symptoms may have been outside the scope of the role of the CDE who was a dietician by training. A nurse may have had an easier time negotiating the intricacies of the system especially when the patient concerns were not about diabetes. This is a minor consideration as the CDE was able to address all patient concerns and consistently followed-up to confirm patient needs had been met.

Patients may have used caller ID to determine whether or not to pick up the phone so there may have been selection bias among those who answered the telephone, perhaps answering the telephone said more about a person's functional status or perhaps the patient picked up because they had concerns or questions. A higher percentage of the NNDTT cohort also completed PCM calls and a significantly higher percentage were asked diabetes questions. This may indicate a higher level of engagement among the NNDTT program participants.

A hard copy of *Diabetes What you Need to Know* is filled in and given to the patient, a copy of the completed document is not scanned or retained in the patient's medical record. Discharge summaries are useful in determining what was ordered at discharge but it would be helpful to have a record of the diabetes discharge education with specific instructions. Finally, because this was a per protocol analysis the results may not be representative of the general population where patients are likely to decline to participate or who are lost in follow-up.

CONCLUSIONS

Despite limitations and the less than hoped for participation, the NNDTT program provided care coordination as evidenced by the increased follow-up encounters in primary care by program participants. The program also provided useful information that will be used to evaluate diabetes education materials and discharge processes to work toward improving care transitions from hospital to home.

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Table 1 NNDTT Eligibility Criteria

Inclusion Criteria	
	Age ≥ 18 years Diagnosis of diabetes (ICD 9 Codes 250x) Two blood glucose levels ≥180 mg/dl or one blood glucose level ≤ 70 mg/dl HbA1c ≥ 8.5 mmol/mol English speaking person Discharge disposition to home/self-care
Exclusion Criteria	
	Died during the 30-day follow-up period Admitted to mental health unit Discharged to dispositions other than home/self-care

Table 2 Demographic Characteristics of Eligible Population n= 538

		Interviewed n (%)	Not interviewed n (%)	p-value
# of patients		68 (13)	470 (87)	
Gender	*Male*	49 (72.1)	297 (63.2)	0.15
Race	*White Non-Hispanic*	39 (57.4)	269 (57.2)	0.02
	Black Non-Hispanic	9 (13.2)	106 (22.6)	
	Hispanic	8 (11.8)	29 (6.2)	
	Asian Pacific Islanders	9 (13.2)	36 (7.7)	
	Native American	0	20 (4.3)	
	Middle Eastern	2 (2.9)	2 (0.4)	
	Unknown	1 (1.5)	8 (1.7)	
Insurance	*Commercial*	12 (17.6)	69 (14.7)	0.16
	Medicaid	23 (33.8)	170 (36.2)	
	Medicare	24 (35.3)	165 (35.1)	
	VA, L&I	5 (7.4)	12 (2.6)	
	Charity	5 (5.9)	54 (11.5)	
Patient Care Manager (PCM) *Call 72 hours post discharge*		61 (89.7)	388 (82.6)	0.14
Diabetes Self-Management Questions asked		7 (10.3)	20 (4.3)	0.03
		Mean (SD)	Mean (SD)	
Age, years		53.7 (13.6)	54.4 (13.76)	0.66
		Median (IQR)	Median (IQR)	
Length of Stay (LOS) days		4 (2,7.75)	5 (3,9)	0.38 *
HbA1C, mmol/mol		9.2 (7.65,11.1)	8.7 (7.5,10.8)	0.20
Ratio of LOS (days)-Diabetes Topics Taught (DTT)		1.19 (0.85)	1.79 (3.14)	0.46 *

Table's 3a-f Summary NNDTT Interview Responses

Table 3a Inpatient Education

Question	# of responses	Response		
		Yes n (%)	**No n (%)**	**Unsure n (%)**
Did you receive any DM education during your hospitalization?	68	35 (52%)	30 (44)	3 (4)
If yes, from whom? ***Respondents indicated more than one***	35			
RN		*20 (57)*		
RD		*7 (20)*		
CDE		*4 (11)*		
MD		*4 (11)*		
				10 (15)
Were you given written material?	53	32 (59)	19 (35)	2 (6)
What diabetes topics were discussed*? Fourteen respondents indicated more than one topic*				
Total number of responses	47			
Medication		18(38)		
Nutrition		12 (26)		
General Diabetes topics		4 (9)		
Glucose Control		4 (9)		
Hypoglycemia		3 (6)		
Hyperglycemia		2 (4)		
Monitoring		2 (4)		
Foot care		1 (2)		
Insulin pump		1(2)		
		Yes (%)	**No (%)**	**Unsure (%)**
Did you or your discharge nurse complete the diabetes discharge instructions together before you left?	49	32 (65)	17 (34)	11 (22)
Have you used this since discharge?	32	15 (47)	16 (53)	
Did RN fill out your specific medication doses?	30	13 (43)	16 (53)	1 (3.3)
What has been the hardest thing for you to deal with since your discharge? ***More than one topic identified***	53			
Nothing		17 (30)		
Monitoring		11(17)		
Medication		10(18)		
Nutrition		9 (16)		
Other not diabetes related; vision, fall, stress, pain control		4 (7.1)		
Glucose Control		4(7.1)		
Hyperglycemia		3 (5.3)		
Hypoglycemia		3 (5.3)		

Table 3b Glucose Monitoring

Question	Total responses	Yes n (%)	No (%)
Were you given a glucometer this admission?	68	16 (23)	52 (73)
Do you check your blood sugar?	68	59 (85)	11 (15)
If yes, how often?	59		
< 1 day		3 (6)	
1-2/day		14 (24)	
2-3/day		22(37)	
3-4/day		7 (12)	
4-5/day		9 (15)	
> 5 day		4 (7)	
What are your blood sugar goals?			
	68		
Glucose Goals within range of 80-180		40 (59)	
Glucose Goals <80 > 200		15 (22)	
Glucose goals not identified		13 (19)	
Patient Counseled		28 (41)	
		Median, (IQR)	
Self-reported blood sugar measurements mg/dl	58	120 mg/dl (98,150)	

Table 3c Diabetes Medication

	Total Response	**Yes n (%)**	**No Education provided n (%)**
Do you know the name of your diabetes medications?	64	60 (93)	4 (6)
Do you know the dose of your diabetes medication?	64	56 (88)	8 (12)
Are you taking insulin?	65	52 (80)	13 (20)
Do you know how to order refills?	59	50 (85)	9 (15)
Do you know when you will need a refill?	58	50(86)	8 (14)
Do you know where to refill your medication?	56	52 (93)	4 (7)

Table 3 d Hypoglycemia and Hyperglycemia

Hypoglycemia	Total Response	Response Correct *	Response incorrect * Education counseling provided (%)
How might you feel if your blood sugar is too low?			
Correct response; *Headache, Hunger, Shaking, Sweating, Fast Heartbeat, Irritability*	65	22 (34)	43 (66)
If your blood sugar is less than 70 what do you do? Correct response*; Drink juice, eat something sweet*	67	10 (15)	57 (85)
If blood sugar stays low after treatment, when should you call your provider? Correct response; *After treatment blood sugar is 70 twice in one day*	67	5 (7.5)	
When should you (or your family member) call 9-1-1? Correct response; *Poor coordination, blurred vision, confusion, difficulty staying awake seizures, If blood sugar < 70 twice in a row after treatment for one episode.*	68	2(3)	66 (97)
Hyperglycemia			
How might you feel if your blood sugar is too high? Correct response; *Blurry vision, thirsty, dry mouth, lethargy, confusion, headache, excessive urination, tired.*	68	11 (16)	57 (94)
What would you do if you have hyperglycemia Correct response; *Drink extra water, test blood sugar more often, take meds as prescribed, follow meal plan, get exercise*	66	5 (7.5)	61 (92.5)

Table 3e Nutrition

	Total Response	Response Correct *	Response incorrect * Education counseling provided (%)
How many meals do you eat each day? Correct response; *3 meals per day*	66	43 (65)	24(35)
Do you know which foods increase your blood sugar? Correct response; *Starchy vegetables, grains, fruits, juices, candy, cakes etc*.	60	31 (52)	29 (48)
Do you know which foods do NOT increase your blood sugar? Correct response; *Lean protein, non-starch vegetables*	45	26 (57)	23 (51)

*Correct responses aligned with education curriculum "Diabetes What You Need to Know"
Patients whose responses did not align with education curriculum received education counseling during the interview.

Table 3f Self-Reported Facility Usage

	Total	Facility use Yes n (%)	Facility use No n (%)	Assisted with appointment n (%)
When is your appointment with your PCP, or have you already seen your PCP since discharge?	68	49 (72)	19 (18%)	19 (18)
Have you gone to the Emergency Room since discharge? *Aggregated 30 days*	61	13 (21)	48 (79)	
Have you been readmitted to the hospital since discharge? *Aggregated 30 days*	64	6 (9)	58 (91)	

Table 4 Interventions provided to 34 patients during NNDTT Interviews

Intervention type	**n**
Scheduled Appointments	7
Triaged symptoms	9
Facilitated glucose meter	4
Mailed Nutrition Information	5
Made referrals	9
Clarified medication instructions	2
Facilitated prescriptions	5
Total Interventions	41

Table 5 Relationship between NNDTT Program and Facility Utilization

Facility Utilization after discharge	NNDTT Interview Completed n (%)	NNDTT Interview Not Completed n (%)	p-value
Readmitted 0-7 days	4 (5.9)	32 (6.8)	0.78
Readmitted 8-14 days*	5 (7.4)	54 (11.6)	0.55
Readmitted 15-30 days*	8 (11.7)	83 (17.6)	0.29
Emergency Room visits	4 (7.3)	69 (14.7)	0.22
Outpatient Clinic visits 0-30 days	13 (19.1)	26 (5.6)	< 0.01
Outpatient Clinic visits 30-60 days*	14 (20.6)	31 (6.6)	<0.01

*Non-cumulative

Appendix 1

StuderGroup
a Huron Healthcare solution

Section One: Getting Started

1.1: What is the Patient Call Manager℠?

The Patient Call Manager℠ is designed to automate the pre-visit and post-visit call process. It allows your organization to standardize the questions asked during these calls, provides staff with a fast and easy way to make the calls, record patient feedback, and allows leaders to create easy-to-read reports based on the data gathered.

Features:

- Fully HIPAA compliant tool
- Supports pre-visit, IP, ED, OP, and Observation patient classifications
- Easy "click and go" functionality
- Automated call documentation and electronic signature integrated into medical record
- Hospital-designed pre-visit and post-visit patient questions based on nursing unit, clinical department, diagnosis, doctor, etc.
- Automated email notification related to reward and recognition, adverse outcomes, and risk management
- Easy to pull reporting based on patient, callers, and/or unit/leader metrics
- Pre-defined call lists by: patient type, diagnosis, nursing unit or clinical department, day of discharge/visit, etc.

1.2: What is the purpose of post-visit phone calls?

The purpose of calls is to improve patient compliance, which improves clinical outcomes. Calls also show empathy; drive reduced preventable readmissions through increased compliance; raise HCAHPS; collect feedback for reward and recognition for departments, individuals, and physicians; and harvest process improvement. It also affords an opportunity for service recovery in cases when we have failed to meet a patient's or a family's expectations. It can result in reduced complaints/claims and is our last chance to fix a problem.

1.3: What types of questions are typically asked during post-visit phone calls?

Quality-centered questions, as you are calling to see how the patient is doing at home.

One of the primary purposes for discharge phone calls is to drive clinical outcomes. The main objective of introducing these calls is to check on the patient to increase patient compliance, improve clinical outcomes, and assist the patient with their transition from the hospital to the home environment. With 19 percent of patients being discharged having adverse events based on a study in 2003 in the *Annals of Internal Medicine*, we must make calls to prevent these from occurring. The most alarming part of the study was that out of the 19 percent having adverse events, 66 percent of those were adverse drug events, because patients are discharged not understanding their medications, side effects, or even how to appropriately use them. Each area can identify areas of focus to ask patients regarding clinical care.

Appendix 2 NNDTT Questionnaire

Inpatient Education

Did you receive any DM education during your hospitalization?
If yes, from whom?
How satisfied are you with the DM info that you received in the hospital?
Were you given written material?
What DM topics were discussed?
Did you or your discharge nurse complete the Diabetes Review Discharge instructions together before you left?
Have you used this resource since discharge?
Did RN fill out your specific medication doses?
What was the hardest thing for you after being discharged?

Monitoring

Do you check your blood glucose?
If yes,
How often?
What are your blood sugar goals?
What have your blood sugars been over the last 24 hours?

DM Medication

Do you know the name of your DM medications?
If yes,
What is the dose?
Is this dose a change or a new medication?
Do you know how to order refills?
Do you know when you will need a refill?
Where do you refill your medication?

Hypoglycemia

How might you feel if your blood sugar is too low?
If your blood sugar number is lower than 70, what will you do?
If your blood sugar stays low after treatment, when should you call your DM provider?
When should you (or your family member) call 9-1-1

Hyperglycemia

How might you feel if your blood sugar is too high?
What would you do if you have hyperglycemia?

Medical Follow-up

When is your appointment with your PCP, or have you already seen your PCP since discharge?
Have you been hospitalized again or gone to the emergency department since discharge?

Nutrition

How many meals do you eat each day?
What type of beverages do you drink every day?
Do you know which foods increase your blood sugar?
Do you know which foods do NOT increase your blood sugar?

Appendix 3

Diabetes: What You Need to Know

Discharge review before you leave the hospital

We want to be sure that we explained your diabetes instructions well, so that you know how to manage your diabetes when you leave the hospital! Please read this handout and ask your nurse if you have any questions.

Testing Your Blood Sugar

How often you need to test your blood sugar depends on many things.

- The best times to test my blood sugar level with my meter are:

  _____.
- My blood sugar goal is between _____ and _____.

You're Non-insulin Medicines for Diabetes

It is very important that you know the names of your diabetes medicines, your doses, and when to take them.

Name of your non-insulin diabetes medicine(s)	**Dose**	**Is this a new medicine or a change in dose?**

- Do **not** stop taking the medicine when you have taken all of the pills in the bottle. You will need to order refills.
- Talk with your diabetes provider to get refills **before** you run out.
- Call your clinic if you think you may be having side effects. Some of these side effects may be nausea or low blood sugar.

Long-acting Insulin

There are many different types and brands of insulin. We want to help you remember exactly which insulin you will use when you go home.

- Talk Look at the pictures of the different types of **long-acting insulin** below. **Circle** the picture of the one you will take when you go home.
- Fill in the units and time(s) you will take your long-acting insulin.

Lantus (**glargine**) vial or grey **Lantus SoloStar** pen with lavender on the label

- I will take _____ units at these time(s):

_____

Lantus SoloStar pen

Lantus vial

Levemir (**detemir**) vial or blue **Levemir FlexPen** with green on the label

- I will take _____ units at these time(s):

_____

Levemir FlexPen

Levemir vial

Novolin or Humulin N (**NPH**) vial or **Humulin N** pen with lime green button

- I will take _____ units at these time(s):

_____

Humulin N KwikPen

Novolin N (NPH) vial

Humulin N (NPH) vial

- You will need to have a prescription for either insulin syringes or insulin pen needles. This will depend on whether you use the vials or the prefilled pens.
- **Remember to safely dispose of your sharps.**

Mealtime Insulin

Some people with diabetes need to take both long-acting and mealtime insulin. If you are taking insulin before some or all of your meals:

- Look at the pictures of different types of **mealtime insulin** below. **Circle** the picture of the one you will take when you go home.

Fill in the units of mealtime insulin you will take before meals.

Humalog (lispro) vial or blue **Humalog KwikPen** with maroon on the label

- I will take _____ units right before meals

Humalog KwikPen

Humalog vial

Novolog (aspart) vial or dark blue **Novolog FlexPen** with orange on the label

- I will take _____ units right before meals

Novolog FlexPen

Novolog vial

Novolin R vial or **Humulin R (regular)** vial

- I will take _____ units **30 minutes** before meals

Novolin R (regular) vial

Humulin R (regular) vial

Apidra (glulisine) vial or pale blue **Apidra SoloStar** pen with lime green on the label

- I will take _____ units right before meals

Apidra SoloStar pen

Apidra vial

- You will need to have a prescription for either insulin syringes or insulin pen needles.

- **Remember to safely dispose of your sharps.**

Common Mixed Long-acting and Mealtime Insulin

Some people with diabetes take both long-acting and mealtime insulin as a pre-mixed insulin. If you are taking mixed long-acting and mealtime insulin before some or all of your meals:

- Look at the pictures of different types of **pre-mixed insulin** below. **Circle** the picture of the one you will take when you go home.

Fill in the units of pre-mixed insulin you will take before some or all of your meals.

Novolin or Humulin 70/30 vial or **Humulin 70/30** pen with orange button • I will take _____ units at these time(s): _____  *Humulin 70/30 pen*	 *Novolin 70/30 vial*	 *Humulin 70/30 vial*

Novolog Mix 70/30 vial or pen with dark blue pen and dark blue label • I will take _____ units right before I eat these meals: _____  *Novolog Mix 70/30 pen*	 *Novolog Mix 70/30 vial*

- You will need to have a prescription for either insulin syringes or insulin pen needles.
- **Remember to safely dispose of your sharps.**

What to Do if Your Blood Sugar Is Too Low

Insulin and oral medicines for diabetes work very well to lower blood sugar. Because of this, it is possible that your blood sugar could drop **too** low. This is called ***hypo****glycemia*. We want to be sure that you know what do if this happens.

Below are some important questions about blood sugar. When you know the answers to these questions, you can know that you will take the right steps to correct a low blood sugar reaction.

Feel free to look at the handouts you received to help answer these questions.

1. How might you feel if your blood sugar is too low?

2. If your blood sugar number is lower than 70, what will you do?

3. **Very rarely,** your blood sugar may stay too low even though you have taken extra sugar or juice and eaten a snack or meal. When should you call your diabetes provider?

4. When should you (or your family member) call 9-1-1?

Soon After You Have Been Discharged

Be sure you to do these things after you go home from the hospital:

Make an appointment to see your care provider within 1 to 2 weeks. Call UW Medicine Contact Center at 206-520- 5000 or your clinic for an appointment.

- To learn more about diabetes, ask your provider to recommend diabetes classes or appointments with diabetes educators.
- **If you have questions after you go home, be sure to call your clinic or discharge nurse.**

Frequently Asked Questions About Diabetes

What is diabetes?

When you eat, your body changes the food into a sugar called *glucose*. Your body uses this glucose for energy. But to use glucose as energy, your body needs insulin.

If you have diabetes, your body either does not make enough insulin or does not use it well. This means that the glucose stays in the blood, causing *high blood sugar* (also called *high blood glucose*). Too much glucose in the blood can cause serious health problems.

Is there a cure for diabetes?

Diabetes is serious and there is no cure. But having diabetes does **not** mean your life is over. Many people with diabetes live a long and healthy life. Now that you know you have diabetes, it is your job to take care of yourself.

Your health care team will help you. They will talk with you about a diet, activity, blood sugar testing, and medicine plan that you can follow to keep your blood sugars in a normal range.

What are the treatments for diabetes?

The main goal of treatment for diabetes is to keep your blood sugar (or glucose) in a normal range. To do this, we advise that you:

- Control how many carbohydrate foods you eat (foods that **increase** your blood sugar)
- Become more physically active
- Take your diabetes medicines as prescribed by your health care provider
- Test your blood sugar levels at home

What is the best way to test blood sugars?

Testing with a blood glucose meter will help you manage your diabetes. Testing will also help your health care team see if we need to adjust your medicines to match what your body needs.

The brand of meter you may receive depends on which brand your insurance covers. We know it is takes time and effort to test your blood, but people who test usually have the best blood sugar control.

- You will need:
  - **Test strips** that are made to work with your brand of meter
  - **Lancing supplies** (to get a small drop of blood from your finger)
- Ask your health care provider how often and when to test your blood glucose. When you are recovering from illness, the best time(s) to test is usually before 1 or more meal(s) or at bedtime.
- Always bring your meter and your diabetes log to your health care provider visits.
- You should plan to keep your blood glucose meter kit with you when you are away from home.

Important Tips About Blood Sugar Testing

- Wash your hands with soap and water before you test.
- Use the instructions included with your glucose meter.
- Know what your numbers mean and what your goal blood sugar is. Ask your health care team for more information if you are unsure.
- Only store test strips in the original container at room temperature.
- Test strips are costly, so use them carefully. Most insurance plans limit how many they will pay for each month.

If you are having a lot of high or low blood sugar results, call your diabetes provider to talk about this. You may need to test your blood sugar more often or adjust your diabetes treatments.

What is low blood sugar reaction?

A low blood sugar reaction is called **hypoglycemia**. It can occur in people who take medicines for diabetes.

It is important that you know how to recognize the symptoms of hypoglycemia. You will need to act quickly to get your blood sugar level back to normal. If you do not, you could have a much more severe reaction or pass out. Most times, it is very easy to correct a low blood glucose reaction.

The **usual causes** of low blood sugar reaction are:

- Missing or delaying a meal
- Taking too much medicine or taking it at the wrong time
- Getting more physical activity than usual
- Drinking alcohol without eating

Early symptoms of low blood sugar are:

- Headache
- Hunger
- Shaking

- Sweating
- Fast heartbeat
- Pale skin
- Irritability

Later, more severe symptoms are poor coordination, blurred vision, confusion, difficulty staying awake, seizures, even coma

What should I do to be prepared for possible hypoglycemia?

- Keep 3 packets of **real sugar** or small box of juice with you – at home, in the car, and at work – just in case you need it.
- Make sure to tell your family and friends that you could have a low blood sugar reaction so that they are prepared to help you.

What should I do if I think I have hypoglycemia?

- Check your blood sugar number with your glucose meter.
- If the result is less than 70 (or you do not have your meter with you), eat 3 packets (1 tablespoon) of **real sugar** or drink a small glass of juice right away.
- Check your blood sugar number again in 15 minutes.
  - **If it is more than 100 and you feel better**, have a healthy snack or eat a meal within the next hour.
  - **If it is still less than 70**, eat more sugar or juice and call for help. Repeat testing and sugar or juice every 15 minutes until help arrives.
  - **If you have symptoms** such as poor coordination, blurred vision, confusion, difficulty staying awake, or seizures, call 9-1-1.
- If you have a low blood sugar within 2 weeks after discharge, call the UW Medicine Contact Center at 206-520-5000 to talk with your diabetes care provider. You may need to have your medicine adjusted.

If my blood sugar number is:	**I will:**	**I will retest my blood sugar:**	**My repeat blood sugar number should be:**	**If my repeat blood sugar number is more than 100, I will:**
70 to 90	Eat a healthy snack or meal soon	1 hour after I finish eating	More than 100	• Go back to my regular routine
Less than 70	Eat 3 packets (1 tablespoon) of **real sugar** or drink a small juice	15 minutes after I ate the sugar	More than 100	• Eat a meal or healthy snack within an hour • Call my diabetes provider if my blood sugar number is less than 70 twice in 1 day
Less than 70 more than once in a row	Eat another tablespoon of **real sugar** or drink another small juice	15 minutes after I ate the sugar	If my blood sugar is less than 70 **more than twice in a row, I need to call 9-1-1**	• Keep eating sugar and retest every 15 minutes until help arrives

Here is a quick low blood sugar reference table:

What is high blood sugar reaction?

A high blood sugar reaction (***hyper****glycemia*) can also happen if you:

- Do not take your diabetes medicine, take too little, or take it at the wrong time
- Do not store your insulin properly or use it past 30 days
- Eat too much or do not eat a good balance of food
- Have an illness or infection
- Have trauma or stress (physical or emotional)

Some symptoms of high blood sugar are:

- Feeling thirsty
- Feeling hungry, tired
- Having to urinate often
- Dry or itchy skin
- Blurred vision

What should I do if I have hyperglycemia?

- Drink extra water
- Test your blood sugar more often
- Take your diabetes medicines as prescribed
- Follow your meal plan and get some exercise
- Call your diabetes care team if your blood sugars are still high

What should I eat if I have diabetes?

If you have diabetes, your food choices are vital for your health. A dietitian can help you plan meals to keep your blood sugars at the best level for you.

About Carbohydrates

Carbohydrates ("carbs") increase your blood sugar. Foods that are high in carbohydrates include:

- Grains (pasta, rice, bread, and cereal)
- Beans
- Starchy vegetables (potatoes and corn)
- Milk and yogurt
- All fruit and fruit juice

Protein foods (including meat, tofu, and eggs) and non-starchy vegetables do not increase your blood sugar. It is best to eat balanced meals that include small amounts of carbohydrates, lean protein, and non-starchy vegetables.

Helpful Tips

- Keep your blood sugar levels as close to normal as possible. This helps your body function normally.
- Follow these guidelines to help keep your blood sugar stable:
    - Eat 3 meals each day.
    - Do **not** skip meals.
    - Drink water when you are thirsty.
    - Avoid all sweetened beverages. This includes regular soda, fruit juice, sports beverages, and hot chocolate.
    - Keep your diet consistent. This means eating similar amounts of food at similar times of the day. This can help your doctor prescribe the most effective diabetes medicine for you.
    - Limit salt and high-fat "junk" foods
- Talk with your dietitian to learn more about reading nutrition labels and planning your meals to include foods you like and can afford. We are here to help you.

Meal and Snack Ideas

Sample Breakfast

With 3 to 4 servings of carbohydrates (45 to 60 grams)

- 1 to 2 scrambled eggs
- 1 piece of fruit or ½ cup of fruit
- 2 slices whole-grain toast with butter
- 1 cup coffee or tea or 1% or nonfat milk

Sample Lunch

With 4 servings of carbohydrates (60 grams)

- Tuna salad sandwich: 2 to 3 ounces light canned tuna with mayonnaise, lettuce or spinach, tomato, and 2 slices whole-grain bread
- 1 serving fruit
- ½ cup raw carrot sticks
- 1 cup 1% or nonfat milk

Sample Dinner

With 4 servings of carbohydrates (60 grams)

- 3 ounces lean meat (7% to 9% fat), grilled or baked (3 ounces of meat is about the size of the palm of your hand)
- ⅔ cup brown rice
- 1 cup steamed broccoli
- 1 cup 1% or nonfat milk
- 1 piece of fruit or a ½ cup fruit

Optional Snacks

With 1 serving of carbohydrates (15 grams)

- 1 to 2 ounces cheese (1 ounce of cheese is about the size of your thumb) with 5 to 7 whole-wheat crackers
- 1 piece of fruit or ½ cup fruit with 1 to 2 ounces nuts (about 1 handful)
- 1 to 2 tablespoons of natural peanut butter on 1 slice whole-grain bread

Are there different types of diabetes?

The most common kinds of diabetes are:

- Type 1 diabetes
- Type 2 diabetes

- Gestational diabetes

Type 1 Diabetes

- Used to be called Juvenile Onset Diabetes Mellitus or Insulin Dependent Diabetes Mellitus (IDDM)
- Usually occurs before the age of 30 (but sometimes occurs after 30)
- The pancreas no longer makes any insulin
- 5% to 10% of people with diabetes have type 1 diabetes

Type 2 Diabetes

- Used to be called Adult Onset Diabetes Mellitus or Non-Insulin Dependent Diabetes (NIDDM)
- Can occur at any time of life, beginning in adolescence
- The pancreas still makes some insulin
- Occurs more often in overweight people
- Other family members may have diabetes
- 80% to 90% of people with diabetes have type 2 diabetes

Gestational Diabetes

- Found for the first time during pregnancy
- Increases your risk for developing type 2 diabetes later in life, especially if you are overweight

Who is on my diabetes health care team?

Diabetes care is hard work, but you are not alone. Your health care team will help you. Be sure to ask for help when you need it.

Your diabetes health care team includes:

- Your primary care provider (PCP) and team (nurse, dietitian, pharmacist, social worker). These providers help you make changes in your daily life and medicines to control and manage your diabetes.
- Specialists to keep your eyes, blood vessels, kidneys, and feet healthy.
- A financial counselor, if you do not have insurance or coupons to pay for health care.
- The American Diabetes Association, if you want to know about community events, or you need more information or legal advocacy. Call 1-800-DIABETES.

References: American Diabetes Association, UW Medicine Health Online, Harborview and UW Medical Center Endocrinology and Glycemic Teams Reviewed 4/2014

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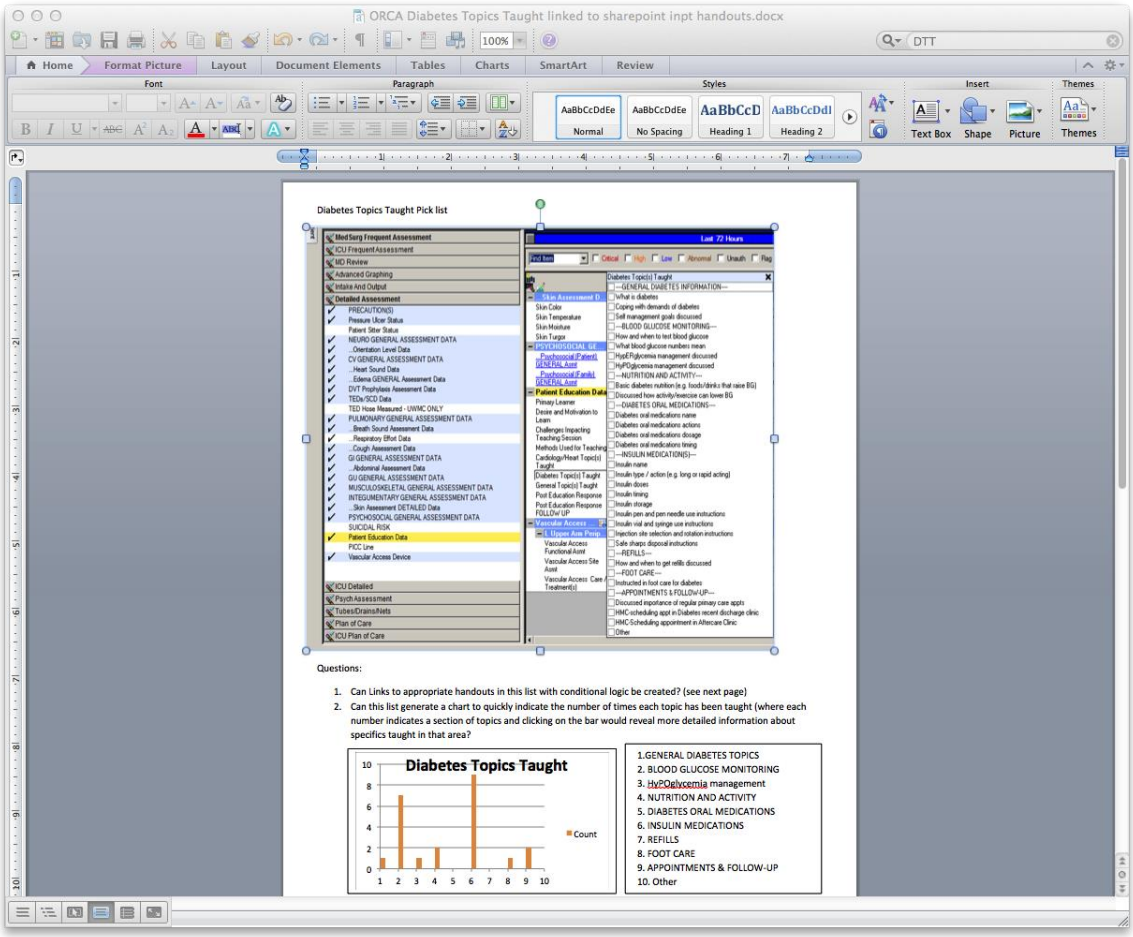
Appendix 4 Diabetes Topics Taught



GENERAL DIABETES INFORMATION—
Refer to “Where Do I Begin” ADA booklet in Diabetes Teaching Kits or obtained from unit or pharmacy
Link Diabetes Supplement
Link Actions to Take
--BLOOD GLUCOSE MONITORING—
Refer to instructions in glucose meter kit
Link: What does my BG mean?
Link HYPOglycemia handout
--NUTRITION AND ACTIVITY
Refer to “Where Do I Begin” ADA booklet in Diabetes Teaching Kits or obtained from unit or pharmacy
Link Diabetes Supplement
--DIABETES ORAL MEDICATIONS
Refer to “Where Do I Begin” ADA booklet in Diabetes Teaching Kits or obtained from unit or pharmacy
--INSULIN MEDICATIONS
Have “Print all insulin related handouts” and “print individual handout” options
Link About Insulin
Link How much Long lasting insulin do I take?
Link How much fast acting insulin do I take?
Link How to take your insulin with an insulin pen
Link How to take your insulin with a syringe
Link How to safely dispose of sharps
Link Locations for Sharps container Drop-off
--FOOT CARE—
Link Foot care
--APPOINTMENTS & FOLLOW-UP
Link Actions to Take

Link Diabetes Recent Discharge Clinic flyer
--OTHER
Link to High Blood Glucose Emergencies
Link to Pancreatitis