Curr Diab Rep (2017) 17: 52
DOI 10.1007/s11892-017-0876-1

Practical Recommendations for Transitioning Patients with Type 2 Diabetes from Hospital to Home

Amy C. Donihi[1]

Published online: 1 June 2017

Abstract
Purpose of Review The purpose of this review is to provide practical evidence-based recommendations for transitioning hospitalized patients with type 2 diabetes (T2DM) to home.
Recent Findings Hospitalized patients who have newly diagnosed or poorly controlled T2DM require initiation or intensification of their outpatient diabetes regimen. Potential barriers to medication access and continuity of care should be identified early in the hospitalization. Throughout hospitalization, patients should receive diabetes education focused on basic survival skills and tailored to learning needs. Patients should leave the hospital with personalized discharge instructions that include a list of all medications and follow-up appointments with both the outpatient diabetes provider and a diabetes educator whenever possible.
Summary An approach to transitioning patients with T2DM from hospital to home that focuses on optimizing the patient's discharge diabetes regimen, anticipating patients' needs during the immediate post-discharge period, providing survival skills education, and ensuring continuation of diabetes care and education following hospital discharge has the potential to improve glycemic control and reduce emergency department visits and hospital readmissions.

This article is part of the Topical Collection on *Hospital Management of Diabetes*

✉ Amy Calabrese Donihi
amydonihi@pitt.edu

[1] Department of Pharmacy and Therapeutics, University of Pittsburgh School of Pharmacy & University of Pittsburgh Medical Center (UPMC), MUH NE Suite 628, 200 Lothrop Street, Pittsburgh, PA 15213, USA

Keywords Type 2 diabetes mellitus · Hospital discharge · Hospital readmission · Inpatient diabetes · Transitional care · Transitions of care

Introduction

Hospitalization is a time of significant change for patients with type 2 diabetes (T2DM). Although 72% of patients take oral medication(s) to manage their T2DM as outpatients [1], current guidelines and consensus statements recommend holding noninsulin therapy at the time of hospital admission and using insulin for achieving glycemic targets during hospitalization [2–5]. Patients with T2DM who are using insulin therapy prior to admission typically require adjustment of their insulin regimen, either with insulin type or with dose (or both). This is done to avoid hyperglycemia and hypoglycemia in the acute care setting, and oftentimes because the patient's home insulin type is not available on the inpatient formulary. Patients newly diagnosed with T2DM require initiation of glucose lowering therapy as well as diabetes self-management education.

The time of transition from the inpatient to outpatient setting for patients with diabetes, regardless of the primary reason for hospitalization, is frequently associated with preventable adverse events and hospital readmission [6, 7]. Conditions that caused alteration in glycemic control during hospitalization are often not fully resolved by the time of hospital discharge. Both inpatient and previous outpatient diabetes regimens may be too aggressive or not aggressive enough as patients continue to recover from their acute illness or surgery at home and return to their usual diet and activity level [7]. In a survey of 19 US hospitals, Rodriquez and colleagues found that only a quarter of hospitals with established glycemic management programs had a standardized protocol for providing patients with diabetes education and follow-up

instructions regarding medications and continuity of care [8]. This number is likely lower when all hospitals are considered since the hospitals surveyed had well-established glycemic control teams.

In 2012, >25% of all inpatient hospitalization days were incurred by people with diabetes [9]. Patients with diabetes, regardless of the primary reason for hospitalization, are at increased risk for readmission compared to those without diabetes [10•, 11]. Using a patient-centered approach to optimize therapy, anticipate needs, provide education, and ensure continuation of care following hospitalization has the potential to reduce hospital readmissions for many patients with T2DM. The objective of this review is to provide clinicians with practical evidence-based recommendations for transitioning hospitalized patients with T2DM to home.

Optimizing the Patient's Discharge Diabetes Regimen

Hospitalization can serve as an opportunity to identify and initiate treatment for patients with previously undiagnosed T2DM or optimize the treatment regimen of patients with poorly managed T2DM [4]. Unfortunately, several studies have shown that outpatient diabetes medications are frequently discontinued during hospitalization and not restarted at time of discharge [12, 13]. In a study of patients with T2DM who were treated with insulin prior to and during hospitalization, those who continued insulin therapy at discharge had lower rates of hospital readmission, similar rates of hypoglycemia (defined as an ICD-9 diagnosis code), and improved survival during the 12 months following hospitalization [14]. Despite evidence demonstrating that intensification of the diabetes regimen at hospital discharge in patients with elevated A1c is associated with fewer readmissions [15, 16], adding new diabetes medication or altering the prior outpatient regimen occurs infrequently [17–20].

Only one prospective study has evaluated strategies for designing a discharge diabetes regimen for patients with T2DM. Umpierrez and colleagues designed and evaluated an algorithm for selecting discharge diabetes medications based on admission A1c for T2DM patients taking no diabetes medications, oral antidiabetes (OAD) agents, or ≤0.4 units/kg insulin prior to hospitalization [21••]. In this study, patients admitted with an A1c <7% were discharged on their pre-admission medications (oral agents and/or insulin), those with an A1c between 7 and 9% were discharged on their pre-admission oral agents plus 50% of the inpatient basal insulin dose, and patients with an A1c >9% were discharged on the combination of their pre-admission oral agents plus 80% of the inpatient basal insulin dose or on a basal-bolus insulin regimen. After 12 weeks, the A1c was reduced by 0.1% in patients with a baseline A1c <7%, 0.8% when baseline A1c 7–9%, and 3.2% when baseline A1c >9%. The percentage of patients who experienced hypoglycemia defined as a blood glucose (BG) <70 mg/dL varied according to therapy in the patients who were discharged on OAD (22%), basal insulin alone (25%), OAD plus basal insulin (30%), and basal-bolus insulin (44%). Although few patients experienced severe hypoglycemia (defined in this study as BG <40 mg/dL), the risk of hypoglycemia that is associated with intensifying the patient's diabetes medications by adding insulin at discharge is potentially worrisome. Of note, the American Diabetes Association (ADA) now defines "clinically significant hypoglycemia" as a BG <54 mg/dL and the glucose alert value is defined as BG ≤70 mg/dL [2].

The goal of any diabetes regimen is to effectively achieve and maintain glycemic targets while minimizing side effects such as hypoglycemia [5, 22•, 23•]. Regardless of severity, symptomatic hypoglycemia is associated with a higher risk for cardiovascular events, hospitalization, and mortality in patients with T2DM [24–27]. In addition, patients who experience hypoglycemia report higher rates of depression and lower quality of life [28, 29]. In a telephone survey of patients discharged on long-acting insulin conducted 1 week following hospital discharge from an academic medical center in California, 30% of patients reported at least one episode of BG <70 mg/dL [30]. Wei and colleagues found that hypoglycemia occurred in 46% of patients with an average A1c of 10.3% discharged from the hospital with insulin therapy [31•]. Hypoglycemia related to insulin and other diabetes medications is a leading cause of emergency department visits for adverse drug events among older adults [32].

Additional randomized controlled studies are needed to determine how to effectively intensify diabetes regimens after hospitalization while minimizing the risk of hypoglycemia [33, 34]. Table 1 provides a suggested approach for optimizing diabetes medications for patients with T2DM at hospital discharge based on both the A1c [21••] and the most recent American Diabetes Association/European Association for the Study of Diabetes (ADA/EASD) position statement and the American Association of Clinical Endocrinologist (AACE) consensus statement for pharmacological management of patients with T2DM [22•, 23•]. Patients who have poorly controlled diabetes at the time of hospital admission require intensification of their outpatient regimen at hospital discharge, but this intensification does not necessarily mean that all patients require continuation of the insulin regimen started during hospitalization [16, 20]. The suggestions for insulin dosing (50–80% of the inpatient regimen) included within Table 1 are based on the algorithm developed by Umpierrez and colleagues [21••] and assumes that insulin has already been titrated in the inpatient setting to achieve good glycemic control given the patient's current clinical status.

Use of correction-dose insulin to supplement either basal only or basal-bolus regimens after hospital discharge is not

Table 1 Suggested approach to prescribing diabetes medications for patients with T2DM at hospital discharge

Home diabetes medication regimen	A1C <8%	A1C 8–9%	A1C >9% (unless meets criteria in next column)	A1C >9% *with* history of DKA and/or symptomatic hyperglycemia which caused hospitalization or significantly affects quality of life
None	Initiate metformin (*If metformin contraindicated, initiate another noninsulin agent)*	Initiate metformin *(If metformin contraindicated, initiate another noninsulin agent)*	Initiate metformin, if no contraindication ± second noninsulin agent[a]	Initiate metformin, if no contraindication and initiate basal-bolus therapy at 80%[b] of doses used in inpatient setting
1 or 2 noninsulin agents (oral or injectable)	Restart home diabetes medications at same dose[c]	Restart noninsulin agents[c] at increased dose, if not at max dose **OR** Restart noninsulin agents[c] and initiate another noninsulin agent **OR** Restart noninsulin agents[c] and initiate basal insulin once daily at 50%[b] of dose used in inpatient setting	Restart noninsulin agents[c] at increased dose, if not at max dose and initiate another noninsulin agent **OR** Restart noninsulin agents[c] and initiate basal insulin once daily at 80%[b] of dose used in inpatient setting	Restart noninsulin agents[d] and initiate basal-bolus therapy at 80%[b] of doses used in inpatient setting
3 noninsulin agents (oral or injectable)	Restart home diabetes medications at same dose[c]	Restart noninsulin agents[c] at increased dose, if not at max dose **OR** Restart noninsulin agents[c] and initiate basal insulin once daily at 50%[b] of dose used in inpatient setting	Restart noninsulin agents[c] and initiate basal insulin once daily at 80%[b] of dose used in inpatient setting	Restart noninsulin agents[d] and initiate basal-bolus therapy at 80%[b] of doses used in inpatient setting
Basal insulin (with or without noninsulin agents)	Restart home diabetes medications at same dose[c]	Restart noninsulin agents[c] (if any) and restart basal insulin at 50%[b] of dose used in inpatient setting *(If not already taking, can also consider initiating a GLP-1 RA, SGLT-2i, or DPP-4i)*	Restart noninsulin agents[c] (if any) and restart basal insulin at 80%[b] of dose used in inpatient setting *(If not already taking, can also consider initiating a GLP-1 RA, SGLT-2i, DPP-4i, or rapid-acting insulin before meals)*	Restart noninsulin agents[d] (if any) and initiate basal-bolus therapy at 80%[b] of doses used in inpatient setting
Basal-bolus therapy (with or without noninsulin agents)	Restart home diabetes medications at same dose[c]	Restart noninsulin agents[d] (if any) and initiate doses of basal-bolus therapy at 50%[b] of doses used in inpatient setting	Restart noninsulin agents[d] (if any) and initiate basal-bolus therapy at 80%[b] of doses used in inpatient setting	Restart noninsulin agents[d] (if any) and initiate basal-bolus therapy at 80%[b] of doses used in inpatient setting

Basal-bolus therapy basal insulin plus rapid-acting insulin before meals, *GLP-1 RA* GLP-1 receptor agonist, *SGLT-2i* SGLT-2 inhibitor, *DPP-4i* DPP-4 inhibitor

[a] There are no data to support urgency in achieving goal A1c, so adding a second agent at this time is not mandatory, as long as patient follow-up is assured [22•]

[b] Suggested percent assumes that doses of insulin were titrated in inpatient setting to achieve good glycemic control (without hypoglycemia) given patient's current clinical status. In general, if patient is resuming same diet and activity as prior to admission, and A1c >8%, then discharge insulin doses should be higher than previous home insulin doses. If insulin was not initiated during hospitalization, initiate insulin using weight-based dosing recommendations [see refs. 22•, 23•]

[c] If new contraindication to a diabetes medication used prior to admission, then switch to a different noninsulin agent, if possible. If not taking metformin, and there is no contraindication or previous intolerance, consider metformin

[d] If new contraindication to a diabetes medication used prior to admission, then discontinue it. Discontinue any sulfonylureas or meglitinides with basal-bolus therapy. If not taking metformin, and there is no contraindication or previous intolerance, consider adding metformin

generally recommended, especially at bedtime. In the hospital setting, correction-dose insulin may be helpful when used in combination with basal insulin to correct hyperglycemia in the patients who are not eating or as part of a temporary dose-finding strategy in insulin-naïve patients during times of unknown or rapidly changing insulin requirements [4, 35]. Correction-dose insulin in combination with basal insulin is also an effective alternative to basal-bolus insulin regimens for the initial management of hyperglycemia in hospitalized patients with T2DM who were previously well-managed with noninsulin therapies or low doses (<0.4 units/kg/

day) of insulin [36]. However, there is no evidence to support the safety or efficacy of correction-dose insulin in the outpatient setting. Patients with T2DM who require insulin at time of hospital discharge should be managed with scheduled doses of insulin that are then adjusted in the outpatient setting based on blood glucose patterns. Patients who are proficient at carbohydrate counting can be discharged to home on mealtime insulin doses that are based on an established insulin-to-carbohydrate ratio; however, initiating advanced carbohydrate counting is usually not feasible in the inpatient setting.

The selection of pharmacotherapy for glycemic management in the outpatient setting should take patient factors into consideration such as ability to follow recommendations, availability of support systems, and cognitive status as a way of ensuring patient safety [37]. Patients who are struggling to master safe and accurate insulin administration and injection technique may benefit from consideration of noninsulin options when discharge is imminent. Unless the patient has new symptomatic hyperglycemia [38], is at risk for ketoacidosis (DKA), or has underlying conditions (i.e., infections) that indicate a need for ongoing insulin therapy, noninsulin options may be preferred.

The decision to initiate insulin or to add mealtime insulin to existing basal insulin at discharge should be determined well in advance of the day of discharge to ensure that there is time to assess patients' ability to afford insulin as a treatment regimen and their ability to perform the necessary insulin administration and glucose monitoring skills [39, 40]. For some patients with physical or cognitive issues that interfere with safe insulin practice, the risks associated with insulin regimens may outweigh potential benefits.

Patients with visual impairment or issues with fine hand coordination often find insulin pens easier to use than vials and syringes because they do not need to draw up the insulin and remove air bubbles from the syringe. However, insulin pens require the ability to attach a pen needle before each injection, and remove the pen needle after the injection. Patients with tremor, cognitive impairment, or poor eyesight often have difficulty with these steps. Use of safety pen needles may be a solution for patients with dexterity issues; however, the priming step (air shot) that is required before dialing the dose with either a regular or a safety pen needle can still be challenging. Unless the patient has the opportunity to practice insulin self-administration in the hospital prior to discharge, there is no way to identify these potential issues and offer accommodations. For example, in situations where a patient is unable to independently put a needle on an insulin pen or draw insulin up in a syringe, it may be possible to train a family member or friend to assist the patient.

Anticipating Patients' Needs During the Immediate Post-discharge Period

Discharge planning should begin at the time of hospital admission [2, 4]. The patient's cognitive ability, current knowledge, health literacy level, numeracy skills, family support, and financial resources should be assessed for all patients with T2DM [4, 8]. As noted above, for patients who will be discharged to home and who are new to insulin, visual acuity and dexterity also need to be assessed. These assessments should take place on the day of hospital admission or as soon as the patient's condition is stable [41]. Early assessment allows sufficient time to address problem areas and secure additional resources and referrals that can be made available at time of discharge.

Appropriate discharge planning must also include assessment of potential barriers to following the prescribed therapy and obtaining post-discharge ongoing care. Nearly 50% of patients discharged from an urban hospital reported financial restraints, lack of health insurance, and lack of transportation that affected their ability to obtain follow-up care [42]. Rubin and colleagues conducted semi-structured interviews of 20 patients with diabetes who were readmitted within 30 days of a previous hospitalization to explore factors that had contributed to the readmission [43•]. They found that more than 50% of patients reported difficulty getting to follow-up medical appointments. Others reported not having sufficient help with nursing care, medications, and meals; 10% of patients were unable to obtain prescriptions for insulin following discharge. Readmissions among patients with diabetes are often related to social and economic issues such as patients' inability to obtain glucose monitoring supplies or diabetes medications [30, 44].

Involving the patient and patient's family and ensuring that they are comfortable with and able to follow discharge plans needs to be a priority. All medication changes need to be clearly communicated to the patient and included in the discharge summary that is shared with the patient's outpatient providers. Armor and colleagues found that 81% of patients who had their medications reconciled by a pharmacist in a family medicine clinic within 10 days of hospital discharge had at least one medication discrepancy between the patient's current medications and the list provided at hospital discharge [45]. As part of the discharge process, patients should be asked to repeat the generic and brand names, doses, and administration times for all medications and describe which medications taken prior to admission should be stopped or changed. Patients should learn the generic and brand name of their medications to reduce errors (e.g., taking metformin AND Glucophage® at the same time). Instructions should not include the words "continue all home medications" since this can lead to confusion, especially if medication reconciliation on admission was not adequately performed.

If a patient will be discharged on insulin, other diabetes medication(s), and/or glucose monitoring supplies that they have not previously used at home, an assessment of the patient's ability to afford these prescriptions should be performed before the patient leaves the hospital. Even patients who have health insurance may be underinsured, have high out-of-pocket costs for prescriptions, or difficulty obtaining prescriptions due to lack of formulary coverage for the specific brand or type (vial vs. pen) of insulin for which the prescription is written. Some hospitals provide patients with a 30-day supply of their outpatient medications at discharge for a reduced or no cost [46]. At other institutions, care coordinators (available to address these kinds of issues, for example, social workers, nurses, pharmacists, or diabetes educators) work with retail pharmacies to provide patients with information regarding the cost of their prescriptions before they are actually filled. If the cost is prohibitive, this allows time for the inpatient team to find less expensive therapeutic options before the patient leaves the hospital.

Providing patients with clearly written discharge instructions, in a language they are comfortable reading, that include all the components listed in Fig. 1 helps reinforce verbal instructions [47]. These discharge instructions should be delivered in a concise, simple, standardized, and easy to understand manner, and include a contact person or clinic that can be called if the patient has questions or concerns and does not already have an established diabetes provider. Table 2 is a checklist that can be completed throughout the hospitalization to ensure that patients know and have everything needed for a successful transition to home.

Providing Diabetes Education

Diabetes self-management education (DSME) improves health outcomes and glycemic control in patients with T2DM [48]. DSME is recommended at the time of new diagnosis of T2DM, annually, when new factors (such as diabetes complications, physical limitations, and social issues) influence self-management, and when care transitions such as hospital discharge occur [49]. Patients with pre-existing diabetes (diagnosis pre-dating hospital admission) who perceived that they did not receive effective self-management education prior to hospital discharge reported more difficulty at home and were more likely to have unplanned provider or emergency department visits or hospital readmissions within 30 days of hospital discharge [50•].

Hospitalization should serve as an opportunity to provide or reinforce DSME principles [51]. Unfortunately, teaching diabetes self-management skills in the inpatient setting is challenging because patients often do not feel well enough to engage in education, are under stress related to their hospitalization, and are in an environment with noise (e.g., alarms) and frequent interruptions that is not conducive to learning [29, 35]. Tests and procedures often take patients out of their rooms for a significant portion of the day, and patients may have inadequate rest, altered mental status, or poor concentration due to pain, pain medications, and other distractions [52•]. Even when patients are taught on the day of discharge, when they should feel better than any other time during the hospitalization, they often do not recall things they are taught [53]. In two randomized studies that assessed the impact of an inpatient diabetes education intervention, the investigators had low enrollment because many patients were too "overwhelmed by hospitalization" or in too much pain to participate [52•, 54]. Given today's short hospital lengths of stay (LOS) and the inability to bill for inpatient education services, delivering comprehensive DSME in the inpatient setting is not practical in many hospitals [55].

To avoid overwhelming patients with too much information at a time when their capacity to learn and absorb new material may be limited, diabetes-related education in the hospital setting should focus on basic "survival skills" [4]. Although there are some differences across programs in the number of skills included [56, 57••, 58], Table 2 summarizes the basic survival skills that must be discussed prior to discharge [2].

Dungan and colleagues identified inpatient diabetes education that begins prior to the day of discharge as a predictor for A1c reduction and outpatient follow-up [59•]. Education sessions should be short, focused, and spread-out throughout the hospital stay [60•]. Creating a checklist of survival skills can help to ensure that patients have mastered these skills by the time of discharge and are ready to assume basic diabetes self-management at home [40]. The discharge process should also include a mechanism for ensuring an appointment with a diabetes educator for comprehensive DSME after hospital discharge when the patient is feeling well and ready to fully engage in the education process [61•].

In the ideal setting, every patient with diabetes, or at least patients admitted with new or poorly controlled diabetes, should receive education from a diabetes educator during hospitalization. Patients who receive education from a diabetes educator have been observed to experience a lower frequency of readmission [62, 63] and improved post-discharge A1c [54, 59•, 63]. Unfortunately, many hospitals do not have a dedicated diabetes educator. Even in hospitals with a diabetes educator, the percentage of hospitalized patients with diabetes exceeds the ability of a single person (or even two or three) to provide adequate education for all patients with diabetes [44, 64].

Bedside (staff) nurses are in an excellent position to provide patient education since they are in and out of the patient's room multiple times each day to administer medication and perform other nursing care. Since they are near the patient at all times, they can identify teachable moments when the

Diabetes Discharge Instructions

Your diabetes provider is _____. He/she can be reached at _____.

Your follow-up appointment is _____ (date) at _____ (time).
Please call at least 24 hours in advance if you need to change this appointment.

CONTACT YOUR DOCTOR OR DIABETES PROVIDER IMMEDIATELY IF:

- You cannot eat or you are vomiting more than 1 time in a day
- Your blood glucose is above 240 mg/dl two times in one day
- Your blood glucose is less than 70 mg/dl two times in one day
- Your meter states "high"

If you are new to this provider and you do not have a doctor, call _____ if you have questions about your blood glucose or diabetes medications before your follow-up appointment.

The American Diabetes Association recommends that all people with diabetes see a diabetes educator after a hospital stay. You can call _____ to schedule an appointment.

Your A1C result is _____%. The A1C measures your average blood glucose for the past 2-3 months. Diabetes is diagnosed when the A1C is 6.5% or higher. The goal A1C for most people with diabetes is less than 7%, but your goal may be higher or lower. You should ask your diabetes provider what your goal is.

You should check your blood glucose _____ times a day at the following time(s): _____.

Your recommended goal blood glucose range is: _____.

When you are ready for hospital discharge, but before leaving the hospital:

1. Make sure you have prescriptions for all new medications that you need to take at home.
2. If you do not have a glucose meter at home, request prescriptions for a meter, test strips, and lancets. Ask your nurse or pharmacist to show you how to use a glucose meter, if you do not know.
3. If going home on insulin, make sure you have a prescription for pen needles or syringes. Ask your nurse or pharmacist to show you how to administer insulin, if you do not know.

Diabetes medications that you will take at home:

Name	Dose	When to Take	Possible side effects

Fig. 1 Example of standardized yet personalized written diabetes discharge instructions

patient is awake and able to mentally and physically participate in educational efforts. Diabetes education delivered by staff nurses who have the support of a diabetes nurse specialist has been shown to significantly reduce 7-day readmission rates [65]. Unfortunately, many hospital nurses report that they have inadequate support, limited opportunities for their own diabetes-specific education, and competing demands that interfere with their ability to provide necessary information to patients [61•, 66–70]. Hospital nurses report low confidence in providing accurate information on current diabetes therapies, feeling that this falls outside their area of expertise [61•].

One role of the diabetes educator is to serve as a resource and role model for other healthcare providers, including staff nurses [59•]. Diabetes educators can train "volunteer" bedside nurses to be diabetes nurse "champions" who lead educational efforts on their individual patient care units, and who in turn mentor the other staff nurses on their unit [58, 64, 69, 71, 72]. Diabetes educators can create care plans and tools that the bedside nurses can utilize for patient education. In one study, Korytkowski and colleagues found increased patient satisfaction and improved glycemic control during hospitalization in patients randomized to receive an individualized structured diabetes education plan created by a certified diabetes educator (CDE) and delivered by the nursing staff (despite the fact that there was no glycemic management intervention) [52•]. In a prospective nonrandomized study, Magee and colleagues evaluated the impact of a survival skills education intervention administered by CDE-trained assistants who administered a diabetes knowledge pre-test and instructed the patient to watch select videos on a DVD that covered topics related to their knowledge deficits [73••]. This intervention resulted in significant knowledge improvement based on post-test results, and an improvement in self-reported medication self-care behavior from baseline to 2 weeks following discharge. In a third study, Krall and colleagues empowered bedside nurses by providing a standardized teaching tool as well as access to brief patient education videos that focused on key self-management survival skills [61•].

These data demonstrate that bedside nurses, with readily available resources, can successfully provide diabetes survival skills education. If possible, other health professionals within the hospital should also be engaged to establish an interdisciplinary approach to diabetes education. Shah and colleagues randomized hospitalized patients with diabetes to a single 30- to 45-min pharmacist-provided counseling session in addition to nurse-provided education or nurse-provided education alone [46]. Patients in the pharmacist group had better medication self-care behavior following discharge, were more likely to keep follow-up appointments, and had a larger reduction

Table 2 Checklist for patients with type 2 diabetes who are being discharged to home.

	Date completed
Survival skills	
□ Met with dietician to discuss consistent eating habits and basic meal planning.	_____
□ Stated when blood glucose should be monitored and the goal home blood glucose range.	_____
□ Demonstrated correct use of glucose meter, including use of lancet device.	_____
□ Stated symptoms and treatment of hypoglycemia (if being discharged with insulin or an oral agent that causes hypoglycemia.)	_____
□ Stated criteria for when the diabetes provider should be called and when to seek emergency care.	_____
□ Repeated back name(s), dose(s) and administration time(s) for all discharge diabetes medications.	_____
□ Demonstrated correct use of insulin pen or insulin vial/syringe, and described injection site rotation, proper insulin storage, and proper disposal of needles and syringes (if being discharged with insulin.)	_____
Access to medications and supplies	
□ Has insurance coverage and/or means to afford and obtain all discharge diabetes medications and supplies. (Patient-specific coverage/cost of different brands and different types of insulin [pen vs. vial] is variable across insurance plans and locations.)	_____
□ Has a working glucose meter at home or given a prescription for a new meter, strips, and lancets.	_____
□ Has all discharge diabetes medications available at home or given prescriptions for diabetes medications.	_____
□ Received prescription for syringes or insulin pen needles (if new prescription for insulin given.)	_____
Access to follow-up care and education	
□ Stated who to call with issues, problems, or questions about the diabetes care plan.	_____
□ Has follow-up appointment with the outpatient diabetes provider scheduled.	_____
□ Has (or was given information to make) an appointment for comprehensive diabetes self-management education with a certified diabetes educator.	_____

in A1c within a 90-day follow-up period. Hardee and colleagues designed an interdisciplinary diabetes care model in a 909-bed tertiary care center [57••]. Within their model, bedside nurses provided key survival skills education, dieticians saw newly diagnosed patients with diabetes (as well as patients referred to them by nurses or medical providers), pharmacists provided education for complex patients and those with learning barriers, and case managers (social workers or nurses) ensured that discharge medications and glucose monitoring supplies were affordable to the patient. For example, a resource document describing community resources was developed for all neighboring counties which include requirements for referrals and type of payment accepted. These authors achieved cost savings without an increase in LOS or diabetes readmission rates compared to when the hospital had a team of five dedicated diabetes educators (who were only able to see a fraction of patients with diabetes).

In another report, Kimmel and colleagues found that nearly 100% of patients in their hospital received survival skills training when they assessed patient knowledge in a telephone call survey administered 7–10 days following discharge [30]. At their institution, staff nurses teach patients using diabetes teaching folders that are available in four different languages. A diabetes clinical nurse specialist provides continuing education for all nurses and sees patients who have learning difficulties only. A dietician instructs patients on meal planning, and a pharmacist completes a discharge insulin instruction card with the patient.

Ensuring Continuation of Diabetes Care and Education Following Hospital Discharge

Hospitalization has the potential to improve the long-term management of patients with T2DM by providing the opportunity to intensify treatment regimens and provide diabetes education and care coordination [74]. However, despite an intervention including inpatient diabetes management directed by an endocrinologist and intensive inpatient diabetes education from a nurse practitioner CDE, Wexler and colleagues found the observed improvement in A1c from baseline declined from −2.6% at 6 months post-discharge to −1.1% at 12 months post-discharge [54]. This waning of impact highlights the importance of continuity of care and diabetes regimen adjustments in the post-hospitalization time period [75].

Current guidelines recommend outpatient follow-up with the primary care provider (PCP), endocrinologist, or diabetes educator within 30 days of hospital discharge [2, 4, 35], but this may not be soon enough to prevent a diabetes-related readmission. Seggelke and colleagues conducted a pilot study randomizing 100 patients with diabetes, who lacked medical insurance or a PCP, into either a control or an intervention group upon discharge from the hospital [76•]. Patients in the intervention group were seen in a transitional care clinic within 2 to 5 days of hospital discharge. Patients originally admitted for a diabetes-related problem who had the earlier follow-up had fewer readmissions at 90 days (13 vs. 43%).

A goal of successful transition from hospital to home is prevention of hospital readmission and emergency department visits. Multimodal interventions that include monitoring and managing symptoms after discharge (via telephone follow-up or use of transitional care clinics) and providing patients with comprehensive DSME and social support are most likely to be effective in reducing readmissions [77, 78]. There are only a few published studies describing outcomes related to diabetes-specific transition of care programs, and they each used a multimodal approach including intensive diabetes education either prior to or following discharge, and telephone follow-up multiple times during the immediate post-discharge period [59•, 79, 80••]. Each of these studies found significant reductions of A1c for patients receiving the intervention compared to patients receiving usual care. In a 2016 study evaluating the impact of a diabetes transitional care program in a Veterans Affairs (VA) medical center, a nurse practitioner (NP) visited a convenience sample of 40 patients with uncontrolled diabetes (A1c >9%) in the hospital prior to discharge to educate them on survival skills and then provided continuity of care services until the patients had a follow-up appointment with their physician [80••]. Specifically, the NP called the patients weekly, starting 48–72 h after discharge, asked about symptoms, assessed medication adherence, and adjusted diabetes therapy based on individualized care plans. Patients were instructed to call the NP or a nurse care hotline (available 24 h/day, 7 days a week) if they had any problems. Patients who participated in the program had a mean A1c reduction from 11.3% at baseline to 9.1% when measured 2 to 8 months after time of enrollment. The 30-day readmission rate for these high risk patients was 10% which was less than the 14.3% overall readmission rate for *all* diabetes patients at that institution.

Conclusions

In summary, a patient-centered approach to optimize diabetes medications at discharge, anticipate and manage barriers to post-discharge success, provide survival skills education, and ensure continuation of diabetes care and education has the potential to improve glycemic control and reduce hospital readmissions for many patients with T2DM. The key components for transitioning patients with T2DM from hospital to home include the following:

1. Obtain A1c at time of admission (if not available from the past 2–3 months). Patients with poorly controlled diabetes require intensification of the outpatient regimen at hospital discharge.
2. Perform baseline assessment of patient's cognitive ability, vision, manual dexterity, current knowledge, numeracy skills, and family support early in the hospitalization.
3. Educate patient and/or patient's family throughout the hospitalization on basic diabetes survival skills, including insulin administration (if applicable). Education should be tailored to the learning needs identified on baseline and ongoing assessments.
4. Work with patient to identify and manage any potential barriers to a successful transition to home, including financial constraints, lack of an outpatient diabetes provider, transportation issues that impact attendance at follow-up appointments, and medication access issues.
5. Consider patient-specific factors when selecting a discharge diabetes treatment regimen. In patients without a history of diabetic ketoacidosis (DKA) or new symptomatic hyperglycemia, consider starting or intensifying noninsulin options or basal insulin, rather than starting basal-bolus insulin, to lower the risk of hypoglycemia immediately after discharge.
6. Provide patient with all supplies needed to self-manage diabetes at home, including medications (and pen needles or syringes if on insulin) as well as a blood glucose meter, test strips, and lancets. If prescriptions will be given for the patient to fill after discharge, ensure insurance coverage and/or affordability prior to the patient leaving the hospital.
7. Arrange follow-up with the outpatient diabetes provider. If new to insulin, early follow-up (within a few days of discharge) may stave off an ED visit or readmission.
8. Arrange appointment with a CDE for comprehensive DSME whenever possible.
9. Provide patient with clearly written personalized discharge instructions, in a language that they are comfortable reading, that includes a list of all diabetes medications and follow-up appointments. The instructions should also include a contact person for questions or issues, if the patient does not have an established diabetes provider.
10. Communicate the revised diabetes-related treatment plan to outpatient providers.

Acknowledgments The author gratefully acknowledges the helpful critical comments and expert suggestions of Mary Korytkowski, Jodie Reider, Jane Jeffrie Seley, and Linda Siminerio during the preparation of this manuscript.

Compliance with Ethical Standards

Conflict of Interest Amy C. Donihi declares that she has no conflict of interest.

Human and Animal Rights and Informed Consent This review article contains references to studies with human subjects, including some performed by Amy C. Donihi. Please refer to original articles for information regarding informed consent of study subjects.

References

Papers of particular interest, published recently, have been highlighted as:

- • Of importance
- •• Of major importance

1. Centers for Disease Control and Prevention. National Diabetes Statistics Report: estimates of diabetes and its burden in the United States, 2014. Atlanta: U.S. Department of Health and Human Services; 2014.
2. American Diabetes Association. Diabetes care in the hospital. Sec. 14. In Standards of medical care in diabetes—2017. Diabetes Care. 2017;40(Suppl 1):S120–S7.
3. Umpierrez GE, Hellman R, Korytkowski MT, Kosiborod M, Maynard GA, Montori VM, et al. Management of hyperglycemia in hospitalized patients in non-critical care setting: an endocrine society clinical practice guideline. J Clin Endocrinol Metab. 2012;97(1):16–38. doi:10.1210/jc.2011-2098.
4. Moghissi ES, Korytkowski MT, DiNardo M, Einhorn D, Hellman R, Hirsch IB, et al. American Association of Clinical Endocrinologists and American Diabetes Association consensus statement on inpatient glycemic control. Endocrine practice: official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists. 2009;15(4):353–69. doi:10.4158/ep09102.ra.
5. Handelsman Y, Bloomgarden ZT, Grunberger G, Umpierrez G, Zimmerman RS, Bailey TS, et al. American Association of Clinical Endocrinologists and American College of Endocrinology—clinical practice guidelines for developing a diabetes mellitus comprehensive care plan—2015. Endocrine practice: official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists. 2015;21(Suppl 1):1–87. doi:10.4158/ep15672.gl.
6. Hirschman KB, Bixby MB. Transitions in care from the hospital to home for patients with diabetes. Diabetes spectrum: a publication of the American Diabetes Association. 2014;27(3):192–5. doi:10.2337/diaspect.27.3.192.
7. Draznin B, Gilden J, Golden SH, Inzucchi SE, Baldwin D, Bode BW, et al. Pathways to quality inpatient management of hyperglycemia and diabetes: a call to action. Diabetes Care. 2013;36(7):1807–14. doi:10.2337/dc12-2508.
8. Rodriguez A, Magee M, Ramos P, Seley JJ, Nolan A, Kulasa K, et al. Best practices for interdisciplinary care management by hospital glycemic teams: results of a Society of Hospital Medicine Survey among 19 U.S. hospitals. Diabetes spectrum: a publication of the American Diabetes Association. 2014;27(3):197–206. doi:10.2337/diaspect.27.3.197.
9. American Diabetes Association. Economic costs of diabetes in the U.S. in 2012. Diabetes Care. 2013;36(4):1033–46.
10. • Rubin DJ. Hospital readmission of patients with diabetes. Curr Diab Rep. 2015;15(4):17. doi:10.1007/s11892-015-0584-7. **This overview describes risk factors for and potential ways to reduce hospital readmissions in patients with diabetes.**
11. Dungan KM. The effect of diabetes on hospital readmissions. J Diabetes Sci Technol. 2012;6(5):1045–52.
12. Lipska KJ, Wang Y, Kosiborod M, Masoudi FA, Havranek EP, Krumholz HM, Inzucchi SE. Discontinuation of antihyperglycemic therapy and clinical outcomes after acute myocardial infarction in older patients with diabetes. Circ Cardiovasc Qual Outcomes. 2010;3(3):236–42.
13. Lovig KO, Horwitz L, Lipska K, Kosiborod M, Krumholz HM, Inzucchi SE. Discontinuation of antihyperglycemic therapy after AMI: medical necessity or medical error? Joint Commission journal on quality and patient safety/Joint Commission Resources. 2012;38(9):403–7.
14. Wu EQ, Zhou S, Yu A, Lu M, Sharma H, Gill J, et al. Outcomes associated with insulin therapy disruption after hospital discharge among patients with type 2 diabetes mellitus who had used insulin before and during hospitalization. Endocrine practice: official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists. 2012;18(5):651–9. doi:10.4158/ep11314.or.
15. Wu EQ, Zhou S, Yu A, Lu M, Sharma H, Gill J, et al. Outcomes associated with post-discharge insulin continuity in US patients with type 2 diabetes mellitus initiating insulin in the hospital. Hospital practice (1995). 2012;40(4):40–8. doi:10.3810/hp.2012.10.1002.
16. Wei NJ, Wexler DJ, Nathan DM, Grant RW. Intensification of diabetes medication and risk for 30-day readmission. Diabetic medicine : a journal of the British Diabetic Association. 2013;30(2):e56–62. doi:10.1111/dme.12061.
17. Griffith ML, Boord JB, Eden SK, Matheny ME. Clinical inertia of discharge planning among patients with poorly controlled diabetes mellitus. J Clin Endocrinol Metab. 2012;97(6):2019–26. doi:10.1210/jc.2011-3216.
18. Montejano L, Vo L, McMorrow D. Transitions of care for people with type 2 diabetes: utilization of antihyperglycemic agents pre- and post-hospitalization. Diabetes Therapy. 2016;7(1):91–103. doi:10.1007/s13300-015-0148-5.
19. Bergenstal R, Fahrbach J, Iorga S, Fan Y, Foster S. Preadmission glycemic control and changes to diabetes mellitus treatment regimen after hospitalization. Endocr Pract. 2012;18(3):371–5. doi:10.4158/EP11166.OR.
20. Lee PH, Franks AS, Barlow PB, Farland MZ. Hospital readmission and emergency department use based on prescribing patterns in patients with severely uncontrolled type 2 diabetes mellitus. Diabetes Technol Ther. 2014;16(3):150–5. doi:10.1089/dia.2013.0168.
21. •• Umpierrez GE, Reyes D, Smiley D, Hermayer K, Khan A, Olson DE, et al. Hospital discharge algorithm based on admission HbA1c for the management of patients with type 2 diabetes. Diabetes Care. 2014;37(11):2934–9. doi:10.2337/dc14-0479. **Prospective study evaluating a strategy for designing a discharge diabetes regimen for patients with T2DM based on admission A1c.**
22. • Inzucchi SE, Bergenstal RM, Buse JB, Diamant M, Ferrannini E, Nauck M, et al. Management of hyperglycemia in type 2 diabetes, 2015: a patient-centered approach: update to a position statement of the American Diabetes Association and the European Association for the study of diabetes. Diabetes Care. 2014;38(1):140. **Published guidelines for pharmacological management of patients with T2DM.**
23. • Garber AJ, Abrahamson MJ, Barzilay JI, Blonde L, Bloomgarden ZT, Bush MA, et al. Consensus statement by the American Association of Clinical Endocrinologists and American College of Endocrinology on the comprehensive type 2 diabetes management algorithm—2016 executive summary. Endocrine practice: official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists. 2016;22(1):84–113. doi:10.4158/ep151126.cs. **Published guidelines for pharmacological management of patients with T2DM.**
24. Zoungas S, Patel A, Chalmers J, de Galan BE, Li Q, Billot L, et al. Severe hypoglycemia and risks of vascular events and death. N Engl J Med. 2010;363(15):1410–8. doi:10.1056/NEJMoa1003795.
25. McCoy RG, Van Houten HK, Ziegenfuss JY, Shah ND, Wermers RA, Smith SA. Increased mortality of patients with diabetes reporting severe hypoglycemia. Diabetes Care. 2012;35(9):1897–901. doi:10.2337/dc11-2054.
26. Goto A, Arah OA, Goto M, Terauchi Y, Noda M. Severe hypoglycaemia and cardiovascular disease: systematic review and

meta-analysis with bias analysis. BMJ. 2013;347:f4533. doi:10.1136/bmj.f4533.
27. Hsu PF, Sung SH, Cheng HM, Yeh JS, Liu WL, Chan WL, et al. Association of clinical symptomatic hypoglycemia with cardiovascular events and total mortality in type 2 diabetes: a nationwide population-based study. Diabetes Care. 2013;36(4):894–900. doi:10.2337/dc12-0916.
28. Green AJ, Fox KM, Grandy S. Self-reported hypoglycemia and impact on quality of life and depression among adults with type 2 diabetes mellitus. Diabetes Res Clin Pract. 2012;96(3):313–8. doi:10.1016/j.diabres.2012.01.002.
29. Sinclair A, Dunning T, Rodriguez-Mañas L. Diabetes in older people: new insights and remaining challenges. The Lancet Diabetes & Endocrinology. 2015;3(4):275–85. doi:10.1016/S2213-8587(14)70176-7.
30. Kimmel B, Sullivan MM, Rushakoff RJ. Survey on transition from inpatient to outpatient for patients on insulin: what really goes on at home? Endocrine practice: official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists. 2010;16(5):785–91. doi:10.4158/ep10013.or.
31.• Wei NJ, Nathan DM, Wexler DJ. Glycemic control after hospital discharge in insulin-treated type 2 diabetes: a randomized pilot study of daily remote glucose monitoring. Endocrine practice: official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists. 2015;21(2):115–21. doi:10.4158/ep14134.or. **Pilot trial in insulin-treated patients with type 2 diabetes that found high rate of hypoglycemia in the post-discharge transition period in patients randomized to daily remote glucose monitoring.**
32. Budnitz DS, Shehab N, Kegler SR, Richards CL. Medication use leading to emergency department visits for adverse drug events in older adults. Ann Intern Med. 2007;147(11):755–65. doi:10.7326/0003-4819-147-11-200712040-00006.
33. Umpierrez GE, Dungan K. Update on inpatient diabetes management: call for action. Diabetes Technol Ther. 2015;17(4):225–8. doi:10.1089/dia.2014.0283.
34. Peterson G. Transitioning from inpatient to outpatient therapy in patients with in-hospital hyperglycemia. Hospital Practice. 2011;39(4):87–95. doi:10.3810/hp.2011.10.927.
35. Clement S, Braithwaite SS, Magee MF, Ahmann A, Smith EP, Schafer RG. American Diabetes Association Diabetes in Hospitals Writing Committee: management of diabetes and hyperglycemia in hospitals. Diabetes Care. 2004;27. doi:10.2337/diacare.27.2.553.
36. Umpierrez GE, Smiley D, Hermayer K, Khan A, Olson DE, Newton C, et al. Randomized study comparing a basal-bolus with a basal plus correction insulin regimen for the hospital management of medical and surgical patients with type 2 diabetes: basal plus trial. Diabetes Care. 2013;36(8):2169–74. doi:10.2337/dc12-1988.
37. Ismail-Beigi F, Moghissi E, Tiktin M, Hirsch IB, Inzucchi SE, Genuth S. Individualizing glycemic targets in type 2 diabetes mellitus: implications of recent clinical trials. Ann Intern Med. 2011;154(8):554–9. doi:10.7326/0003-4819-154-8-201104190-00007.
38. Raz I, Mosenzon O. Early insulinization to prevent diabetes progression. Diabetes Care. 2013;36:S190–S7.
39. O'Malley CW, Emanuele M, Halasyamani L, Amin AN. Bridge over troubled waters: safe and effective transitions of the inpatient with hyperglycemia. J Hosp Med. 2008;3(5 Suppl):55–65. doi:10.1002/jhm.355.
40. Cook CB, Seifert KM, Hull BP, Hovan MJ, Charles JC, Miller-Cage V, et al. Inpatient to outpatient transfer of diabetes care: planning for an effective hospital discharge. Endocrine practice: official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists. 2009;15(3):263–9. doi:10.4158/EP.15.3.263.
41. Hodge C, Malaskovitz J. Addressing glycemic targets from diagnosis to discharge. Diabetes spectrum: a publication of the American Diabetes Association. 2014;27(3):169–73. doi:10.2337/diaspect.27.3.169.
42. Wheeler K, Crawford R, McAdams D, Robinson R, Dunbar VG, Cook CB. Inpatient to outpatient transfer of diabetes care: perceptions of barriers to postdischarge followup in urban African American patients. Ethn Dis. 2007;17(2):238–43.
43.• Rubin DJ, Donnell-Jackson K, Jhingan R, Golden SH, Paranjape A. Early readmission among patients with diabetes: a qualitative assessment of contributing factors. J Diabetes Complicat. 2014;28(6):869–73. doi:10.1016/j.jdiacomp.2014.06.013. **Analysis of interviews of patients with diabetes who were readmitted within 30 days of a previous hospitalization to determine factors contributing to the readmission.**
44. Leichter SB, August GL, Moore W. The business of hospital care of diabetic patients: 2. A new model for inpatient support services. Clinical Diabetes. 2003;21(3):136.
45. Armor BL, Wight AJ, Carter SM. Evaluation of adverse drug events and medication discrepancies in transitions of care between hospital discharge and primary care follow-up. J Pharm Pract. 2016;29(2):132–7. doi:10.1177/0897190014549836.
46. Shah M, Norwood CA, Farias S, Ibrahim S, Chong PH, Fogelfeld L. Diabetes transitional care from inpatient to outpatient setting: pharmacist discharge counseling. J Pharm Pract. 2013;26(2):120–4. doi:10.1177/0897190012451907.
47. Lauster CD, Gibson JM, DiNella JV, DiNardo M, Korytkowski MT, Donihi AC. Implementation of standardized instructions for insulin at hospital discharge. J Hosp Med. 2009;4(8):E41–2. doi:10.1002/jhm.489.
48. Chrvala CA, Sherr D, Lipman RD. Diabetes self-management education for adults with type 2 diabetes mellitus: a systematic review of the effect on glycemic control. Patient Educ Couns. 2016;99(6):926–43. doi:10.1016/j.pec.2015.11.003.
49. Powers MA, Bardsley J, Cypress M, Duker P, Funnell MM, Hess Fischl A, et al. Diabetes self-management education and support in type 2 diabetes: a joint position statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics. Diabetes Care. 2015;38(7):1372.
50.• LaManna JB, Bushy A, Norris AE, Chase SK. Early and intermediate hospital-to-home transition outcomes of older adults diagnosed with diabetes. The Diabetes educator. 2016;42(1):72–86. doi:10.1177/0145721715620020. **Study identifying factors affecting transition outcomes of older adults with diabetes.**
51. Nettles AT. Patient education in the hospital. Diabetes Spectrum. 2005;18(1):44.
52.• Korytkowski MT, Koerbel GL, Kotagal L, Donihi A, DiNardo MM. Pilot trial of diabetes self-management education in the hospital setting. Prim Care Diabetes. 2014;8(3):187–94. doi:10.1016/j.pcd.2013.11.008. **Randomized study evaluating impact of an individualized structured diabetes education plan created by a CDE and delivered by nursing staff.**
53. Donihi AC, Yang E, Mark S, Sirio C, Weber R. Scheduling of pharmacist-provided medication education for hospitalized patients. Hosp Pharm. 2008;43(2):121–6.
54. Wexler DJ, Beauharnais CC, Regan S, Nathan DM, Cagliero E, Larkin ME. Impact of inpatient diabetes management, education, and improved discharge transition on glycemic control 12 months after discharge. Diabetes Res Clin Pract. 2012;98(2):249–56. doi:10.1016/j.diabres.2012.09.016.
55. Leichter SB. The business of hospital care of diabetic patients: 1. Is it time to reconsider the model for educational services? Clinical Diabetes. 2003;21(2):78.
56. Dulipsingh L, Gaudian B, Spurrier W, Taylor L, Wakefield D, Rychlewicz S, et al. Educational intervention along with

standardization of diabetes care increased inpatient HbA(1c) testing: a pilot program. Conn Med. 2016;80(4):231–7.

57.•• Hardee SG, Osborne KC, Njuguna N, Allis D, Brewington D, Patil SP, et al. Interdisciplinary diabetes care: a new model for inpatient diabetes education. Diabetes spectrum : a publication of the American Diabetes Association. 2015;28(4):276–82. doi:10.2337/diaspect.28.4.276. **Description of a patient-centered interdisciplinary diabetes care model implemented at tertiary care teaching hospital after loss of a team of dedicated diabetes educators.**

58. Munoz M, Pronovost P, Dintzis J, Kemmerer T, Wang NY, Chang YT, et al. Implementing and evaluating a multicomponent inpatient diabetes management program: putting research into practice. Joint Commission Journal on Quality and Patient Safety. 2012;38(5):195–206.

59.• Dungan K, Lyons S, Manu K, Kulkarni M, Ebrahim K, Grantier C, et al. An individualized inpatient diabetes education and hospital transition program for poorly controlled hospitalized patients with diabetes. Endocrine practice: official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists. 2014;20(12):1265–73. doi:10.4158/ep14061.or. **Trial found significant reductions of A1c in patients with baseline A1c >9% who receive a combination of comprehensive inpatient education and post-discharge support.**

60.• American Association of Diabetes Educators. Role of the diabetes educator in Inpatient diabetes management. 2016. https://www.diabeteseducator.org/practice/practice-documents/practice-statements. **Position statement of the AADE on the role of the diabetes educator in inpatient diabetes management.**

61.• Krall JS, Donihi AC, Hatam M, Koshinsky J, Siminerio L. The nurse education and transition (NEAT) model: educating the hospitalized patient with diabetes. Clinical Diabetes and Endocrinology. 2016;2(1):1. doi:10.1186/s40842-016-0020-1. **Study describes challenges to providing inpatient diabetes education, and identifies strategies for providing bedside nurses with teaching tools and resources.**

62. Healy SJ, Black D, Harris C, Lorenz A, Dungan KM. Inpatient diabetes education is associated with less frequent hospital readmission among patients with poor glycemic control. Diabetes Care. 2013;36(10):2960–7. doi:10.2337/dc13-0108.

63. Koproski J, Pretto Z, Poretsky L. Effects of an intervention by a diabetes team in hospitalized patients with diabetes. Diabetes Care. 1997;20(10):1553.

64. Jornsay DL, Garnett ED. Diabetes champions: culture change through education. Diabetes Spectrum. 2014;27(3):188.

65. Corl DE, Guntrum PL, Graf L, Suhr LD, Thompson RE, Wisse BE. Inpatient diabetes education performed by staff nurses decreases readmission rates. AADE in Practice. 2015;3(2):18–23.

66. Abduelkarem AR. Assessment of diabetes-related knowledge among nursing staff in a hospital setting. Journal of diabetes nursing. 2013;17(6):207–10-18.

67. Rubin DJ, Moshang J, Jabbour SA. Diabetes knowledge: are resident physicians and nurses adequately prepared to manage diabetes? Endocrine practice: official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists. 2007;13(1):17–21. doi:10.4158/ep.13.1.17.

68. Ulrich PA, Abner N. Diabetes under control: meter, meds, meals, move, and more. Am J Nurs. 2010;110(7):62–5. doi:10.1097/01.naj.0000383938.76085.00.

69. Uplinger N, Turkel MC, Adams PC, Nelson-Slemmer D, Pierce S. Development of a DiaBEATes nurse champion program. The Diabetes educator. 2009;35(5):713–26. doi:10.1177/0145721709340804.

70. Modic MB, Albert NM, Nutter B, Coughlin R, Murray T, Spence J, et al. Diabetes teaching is not for the faint of heart: are cardiac nurses up to the challenge? The Journal of cardiovascular nursing. 2009;24(6):439–46. doi:10.1097/JCN.0b013e3181b1d126.

71. Corl DE, McCliment S, Thompson RE, Suhr LD, Wisse BE. Efficacy of diabetes nurse expert team program to improve nursing confidence and expertise in caring for hospitalized patients with diabetes mellitus. Journal for nurses in professional development. 2014;30(3):134–42. doi:10.1097/nnd.0000000000000068.

72. Modic MB, Canfield C, Kaser N, Sauvey R, Kukla A. A diabetes management mentor program: outcomes of a clinical nurse specialist initiative to empower staff nurses. Clinical nurse specialist CNS. 2012;26(5):263–71. doi:10.1097/NUR.0b013e318263d73d.

73.•• Magee MF, Khan NH, Desale S, Nassar CM. Diabetes to go: knowledge- and competency-based hospital survival skills diabetes education program improves postdischarge medication adherence. The Diabetes educator. 2014;40(3):344–50. doi:10.1177/0145721714523684. **Pilot study which found increased knowledge and medication adherence after nurse delivery of standardized DVD-based diabetes education in the hospital.**

74. Wei NJ, Grant RW, Nathan DM, Wexler DJ. Effect of hospital admission on glycemic control 1 year after discharge. Endocrine practice: official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists. 2012;18(4):456–63. doi:10.4158/ep11309.or.

75. Lavernia F. Treating hyperglycemia and diabetes with insulin therapy: transition from inpatient to outpatient care. Medscape journal of medicine. 2008;10(9):216.

76.• Seggelke SA, Hawkins RM, Gibbs J, Rasouli N, Wang C, Draznin B. Transitional care clinic for uninsured and Medicaid-covered patients with diabetes mellitus discharged from the hospital: a pilot quality improvement study. Hospital Practice. 2014;42(1):46–51. doi:10.3810/hp.2014.02.1091. **Randomized controlled study which found patients seen in a transitional care clinic within 5 days of hospital discharge had fewer readmissions.**

77. Burke RE, Guo R, Prochazka AV, Misky GJ. Identifying keys to success in reducing readmissions using the ideal transitions in care framework. BMC Health Serv Res. 2014;14(1):423. doi:10.1186/1472-6963-14-423.

78. Kripalani S, Theobald CN, Anctil B, Vasilevskis EE. Reducing hospital readmission: current strategies and future directions. Annu Rev Med. 2014;65:471–85. doi:10.1146/annurev-med-022613-090415.

79. Wong FKY, Mok MPH, Chan T, Tsang MW. Nurse follow-up of patients with diabetes: randomized controlled trial. J Adv Nurs. 2005;50(4):391–402. doi:10.1111/j.1365-2648.2005.03404.x.

80.•• Brumm S, Theisen K, Falciglia M. Diabetes transition care from an inpatient to outpatient setting in a veteran population: quality improvement pilot study. The Diabetes educator. 2016;42(3):346–53. doi:10.1177/0145721716642020. **A retrospective before and after study evaluating impact of a multimodal diabetes transitional care program that included diabetes education in the hospital followed by weekly follow-up until first visit with PCP.**