

**Transitions in diabetes:
from inpatient to
outpatient**

Chris Lewis, ARNP, BC-ADM, CDE

WADE Conference April 27, 2019

Disclosure to Participants

Notice of Requirements for Successful Completion: For successful completion, participants are required to be in attendance in the full activity and complete the program evaluation at the conclusion of the educational event.

Presenter Conflicts of Interest/Financial Relationships Disclosures:
No conflicts exist.

Disclosure of Relevant Financial Relationships and Mechanism to Identify and Resolve Conflicts of Interest:
No conflicts of interest.

Non-Endorsement of Products: Accredited status does not imply endorsement by AADE, ANCC, ACPE or CDR of any commercial products displayed in conjunction with this educational activity.

Off-label Use: Participants will be notified by speakers to any product used for a purpose other than that for which it was approved by the Food and Drug Administration.

Objectives

- ▶ Understand the importance of the diabetes discharge
- ▶ Understand, based on A1c, when to adjust medications at discharge.
- ▶ Describe the components of the effective diabetes discharge.

Definition

- ▶ **An effective diabetes discharge includes:**
 - ▶ Patient centered skills training
 - ▶ Clear and understandable post discharge plan
 - ▶ Clear documentation of education given
 - ▶ Timely discharge summary provided to PCP

Cooke et. al (2009)

Why is this important?

- ▶ Diabetes is the 4th leading co-morbid condition associated with hospitalization
- ▶ Higher rates of Diabetes; higher proportion of hospitalized patients with diabetes
- ▶ As of 2011, Diabetes affected 8% of the population, accounted for 23% of hospitalizations
- ▶ Safety issue:
 - ▶ The transition from inpatient to outpatient settings represents a potential crucial break in care
 - ▶ Nearly 1/3 of patients may experience a medical error after discharge

American Diabetes Association (2018)
Ungertner et. Al (2014)
Rubin, et. Al (2014)

Why is this important?

- ▶ In hospitalized patients with and without diabetes, both hyperglycemia and hypoglycemia are associated with adverse outcomes including death
- ▶ Poor discharge plan leads to
 - ▶ higher rates of early re-admission,
 - ▶ higher rates of post discharge adverse events
 - ▶ More ER visits
- ▶ Reducing readmission is a high priority health quality measure and target for cost reduction
- ▶ Cost of unplanned readmissions is 15-20 billion dollars annually.
- ▶ Medicare penalties for excess readmissions

Rubin et. Al (2014)
Up to Date (2019)

Preadmission Factors to Be Considered in Discharge Planning

- Physical/self-care limitations: blindness, stroke, amputation, dexterity
- Socioeconomic factors: insurance coverage, family support, transportation
- Access to follow-up care: PCP, other HCPs
- Degree of glycemic control prior to admission and severity of hyperglycemia
- Learning issues: language, cognition, competence related to diabetes self-management
- Health literacy: basic knowledge of disease process, exacerbations, medications

Adapted from American Association of Clinical Endocrinologists PowerPoint presentation Rubin et. Al (2014)

Transition From Hospital to Outpatient Care

- Preparation for transition to the outpatient setting should begin at the time of hospital admission
- Multidisciplinary team
 - Bedside nurse
 - Clinical pharmacist
 - Registered dietitian
 - Case manager/transition coordinator
- Clear communication with outpatient providers is critical for ensuring safe and successful transition to outpatient management

Adapted from American Association of Clinical Endocrinologists powerpoint presentation Umpierrez GE, et al. Clin Endocrinol Metab. 2012;97:16-38.

Recommended Educational Strategies for Inpatients Prior to and at Discharge

- Begin education on day 1 or as soon as the patient is able to participate
- Initiate inpatient diabetes educator consult as early as possible
- Nursing to reinforce the education as many times as possible utilizing every opportunity (medications, BG result, diet, etc.)
- Involve family members whenever appropriate
- Provide education materials to reinforce teachings and provide community and Web resource lists
- Continue education on an outpatient basis if needed by referring through appropriate channels

Adapted from American Association of Clinical Endocrinologists PowerPoint presentation

Survival Skills to Be Taught Before Discharge

- How and when to take medication/insulin
 - Effects of medication
- How/when to test blood glucose (SMBG)
 - Target glucose levels
- Meal planning basics
- How to treat hypoglycemia
- Sick-day management plan
- Date/time of follow-up visits
 - Including diabetes education
- When and whom to call on the healthcare team
 - Available community resources

Adapted from American Association of Clinical Endocrinologists PowerPoint presentation
Moghissi ES, et al. *Endocr Pract* 2009;15:353-369.

Predischarge Checklist

- Diet information
- Monitor/strips and prescription
- Prescription for/supplies of medications, insulin, needles
- Treatment goals
- Contact phone numbers
- Medi-alert bracelet
- Survival skills training

Adapted from American Association of Clinical Endocrinologists PowerPoint presentation

Discharge Algorithm

- ▶ A1c on Admit for all with diabetes
- ▶ Assessment of DSME on admit
- ▶ Provider inertia
- ▶ < 7%, discharge on usual therapy
- ▶ 7%-9% on OAD +/- basal insulin, discharge on 50% of hospital TDD.
- ▶ > 9% on OAD +/- insulin, discharge on 80% of hospital TDD. May also consider pre-mixed insulin.

American Diabetes Association (2014)

A1C Is Helpful in Determining Post-discharge Treatment in patients with previously diagnosed diabetes

A1C	Indication
6.5%-7.5%	Options: <ul style="list-style-type: none">• Increase dose of home noninsulin agents• Add third agent• Add basal insulin at bedtime
7.6%-9.0%	<ul style="list-style-type: none">• If already on 2 noninsulin agents, add once daily basal insulin at bedtime
≥9%	<ul style="list-style-type: none">• Discharge home on basal and bolus insulin regimen<ul style="list-style-type: none">• May use amount of basal insulin required in hospital as once daily glargine/detemir or twice daily NPH dose• Continue multiple daily doses as started in the hospital if appropriate• Twice daily premixed insulin may be considered for less complex insulin regimens, particularly in elderly patients

Handelman Y, et al. *Endocr Pract*. 2011;17(suppl 2):1-53.
Revised/adapted from American Association of Clinical Endocrinologists PowerPoint presentation
bard HW, et al. *Endocr Pract*. 2009;15(s4):559

- Discharge Summary to Primary Care Provider**
- Primary and secondary diagnoses and diagnostic findings
 - Dates of hospitalization, treatment provided, and a summary of hospital course
 - Discharge medications
 - Patient or family counseling
 - Tests pending at discharge
 - Details of follow-up arrangements
 - Name and contact information of the responsible hospital physician
- Adapted from American Association of Clinical Endocrinologists PowerPoint presentation

Specific populations

Patients Newly Diagnosed With Diabetes During Hospitalization

- Develop a diabetes education plan prior to hospital discharge that addresses the following:
 - Understanding of the diagnosis of diabetes
 - SMBG and explanation of home blood glucose goals
 - Definition, recognition, treatment, and prevention of hyperglycemia and hypoglycemia
 - Identification of healthcare provider who will provide diabetes care after discharge
 - Information on consistent eating patterns
 - When and how to take medication, including proper disposal of needles and syringes
 - Sick-day management

Adapted from ADA, Diabetes Care. 2013;36(suppl 1):S11-S66. PowerPoint presentation Handelman Y, et al. Endocr Pract. 2011;17(suppl 2):1-53.

Discharging Patients With Previously Diagnosed Diabetes

- Resume preadmission diabetes regimen at time of discharge for patients with acceptable preadmission glycemic control and no contraindication to prior therapy
- Modify preadmission therapy for patients identified as being in poor control
- Provide patient and family members/caregivers with written and oral instructions regarding glycemic management regimen at time of hospital discharge

Umpierrez GE, et al. J Clin Endocrinol Metab. 2012;97:16-38.

Patients Newly Diagnosed With Diabetes During Hospitalization

- Develop a diabetes education plan prior to hospital discharge that addresses the following:
 - Understanding of the diagnosis of diabetes
 - SMBG and explanation of home blood glucose goals
 - Definition, recognition, treatment, and prevention of hyperglycemia and hypoglycemia
 - Identification of healthcare provider who will provide diabetes care after discharge
 - Information on consistent eating patterns
 - When and how to take medication, including proper disposal of needles and syringes
 - Sick-day management

ADA, Diabetes Care. 2013;36(suppl 1):S11-S66. PowerPoint presentation Handelman Y, et al. Endocr Pract. 2011;17(suppl 2):1-53.

Acute Kidney Injury

- ▶ Patients with diabetes and decline in renal function are at high risk for hypoglycemia
 - ▶ Decreased insulin clearance
 - ▶ Impaired renal gluconeogenesis
 - ▶ Hypoglycemia agents.
- ▶ Associated with 27% increased risk in hypoglycemia
- ▶ Strong risk factor for hypoglycemia during critical illness
- ▶ Incidence rapidly increasing in US
- ▶ Study by Hung et. al. suggests risk of hypoglycemia extends beyond hospitalization
 - ▶ Across all drug regimens, highest with insulin followed by glyburide, glipizide

Gosmanov (2016)
Hung et. Al. (2018)

Steroid Therapy

- ▶ Type and duration must be considered.
- ▶ Affects post prandial more than basal.
- ▶ Insulin / medication changes
 - ▶ OADs, insulin.
 - ▶ Often need to increase basal by up to 20%, prandial / correction may need to be doubled

American Diabetes Association (2018)
Tamez-Perez (2015)

The Pathophysiology of glucocorticoids

- ▶ GCs antagonize the metabolic effects of insulin
- ▶ Induce insulin resistance
 - ▶ Interfere with GLUT-2 signaling in the pancreas
 - ▶ Interfere with GLUT-4 signaling in the muscle cells.
 - ▶ Catabolize proteins which releases amino acids which interfere with insulin signaling in the muscle cells.
 - ▶ Induce lipolysis leading to elevated FFA and Tg levels leading to insulin resistance by reducing glucose disposal into muscle cells
 - ▶ Enhance counterregulatory hormones (glucagon, cortisol, epinephrine)

Tamez-Perez (2015)

Pediatrics

- ▶ Interview with William Martin, PA-C, CDE.
- ▶ "Follow up is the key"
- ▶ Transition managers, telephone calls
- ▶ Written, simple instructions including directions to office for follow up, phone numbers

Postpartum

- ▶ Interview with Alyson Blum, PharmD, CDE
- ▶ Honeymoon period after delivery
 - ▶ Wait until Bg 160 to resume pre-pregnancy settings/regimen
 - ▶ Some need less insulin than pre-pregnancy
- ▶ GDM
 - ▶ No medications after delivery.
 - ▶ OGTT 6-8 weeks post discharge
- ▶ Breastfeeding
 - ▶ Can be challenging with T1DM. Frequent follow up is suggested.

Altered Nutrition

- ▶ Tube Feed
 - ▶ Continuous vs. bolus
 - ▶ Insulin teaching if new start
 - ▶ Management of hypoglycemia if feed is interrupted
- ▶ TPN
 - ▶ Higher dose of insulin required due to bypass of the gut and incretin secretion
 - ▶ Insulin in TPN bag: teach
 - ▶ Start 1:10
 - ▶ Regular Q 6hours

Dombrowski & Karounos (2013)

Summary

- ▶ The diabetes discharge starts at admission
 - ▶ Assessing patient's DSME, A1c, medication reconciliation, insulin pump
- ▶ Patient has received necessary training
- ▶ Patient has received written instructions
 - ▶ Medication changes
 - ▶ Survival skills
 - ▶ Follow up appointments
- ▶ Discharge summary has been sent to primary care provider or specialist

Citations

- ▶ Alpeer, E., O'Malley, T., Greenwald, J. (2019). Hospital Discharge and Readmission. Auerbach, A., Melin, J. (Eds). UpToDate. Accessed 2/12/19 from <https://www.uptodate.com/contents/hospital-discharge-and-readmission>
- ▶ American Association of Clinical Endocrinologists. Strategies for Effective Discharge Planning for Hospitalized Patients with Diabetes. [PowerPoint slides]. Retrieved from http://inpatient.aace.com/clinical_practice_guidelines
- ▶ American Diabetes Association. (2018). Diabetes Care in the Hospital: Standards of Medical Care in Diabetes. Retrieved from: <https://doi.org/10.2337/dc18-0014>.
- ▶ Cooke, C., Selfert, K., Hull, B., Hovan, M., Charles, J., Miller-Cage, V., Boyle, M., Harris, J., Magallanes, J., Littman, S. (2009). Inpatient to Outpatient Transfer of Diabetes Care: Planning for an Effective Hospital Discharge. *Endocrine Practice*, 15(3), 263-269.
- ▶ Dombrowski, N., & Karounos, D. (2013). Pathophysiology and Management Strategies for Hyperglycemia for Patients with Acute Illness During and Following a Hospital Stay. *Metabolism Clinical and Experimental*, 62, 326-336.
- ▶ Hng, A., Slew, E., Wilson, O., Perkins, A., Greevy, R., Horner, J., Khaled, A., Parr, S., Rounie, C., Griffin, M., Kizler, T., Speroff, T., Matheny, M. (2018). Risk of Hypoglycemia Following Hospital Discharge of Patients with Diabetes and Acute Kidney Injury. *Diabetes Care*. Accessed 2/12/2019 from: <http://care.diabetesjournals.org/node/54097.full.print>

Citations

- ▶ Gosmanov, A. (2016). A Practical and Evidence Based Approach to management of Inpatient Diabetes in Non-critically ill Patients and Special Clinical Populations. *Journal of Clinical & Translational Endocrinology*, 5, 1-6
- ▶ Rubin, D., Donnell-Jackson, K., Jhingan, R., Golden, S., Paranjape, A. (2014). Early Readmission Among Patients With Diabetes: A Qualitative Assessment of Contributing Factors. *Journal of Diabetes and Its Complications*, 28, 869-873
- ▶ Tamez-Perez, H.E., Quintanilla-Flores, D.L., Rodriguez-Gutierrez, R., Gonzalez-Gonzalez, J., Tamez-Pena, A.L. (2015). Steroid Hyperglycemia: Prevalence, early detection and therapeutic recommendations: A Narrative review. *World Journal of Diabetes*, 6(8), 1073-1081
- ▶ Umplierrez, G.U., Reyes, D., Smiley, D., Hermayer, K., Kahn, A., Olson, D., Pasquel, F., Jacobs, S., Newton, C., Reng, L., Fonseca, V. (2014). Hospital Discharge Algorithm Based on Admission HbA1c for the Management of Patients with Type 2 Diabetes. *Diabetes Care*. Advanced online publication. DOI: 10.2338/dc14-0479
