Transitions in diabetes: from inpatient to outpatient
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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 21% of hospitalizations
- Safety issue:
  - The transition from inpatient to outpatient settings represents a potential crucial break in care
  - Nearly 1/2 of patients may experience a medical error after discharge

American Diabetes Association (2018)
Umpierrez 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-admissions
  - Higher rates of post discharge adverse events
  - Increased costs
- 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 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


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 where to call on the healthcare team
  - Available community resources


Adapted from American Association of Clinical Endocrinologists PowerPoint presentation.

Predischarge Checklist

- Diet information
- Medication list 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
  - 7-9.5 on G4D +/- basal insulin, discharge on 50% of hospital TDD.
  - < 8% on G4D + 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

<table>
<thead>
<tr>
<th>A1C Indication</th>
<th>Options</th>
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| 6.5% - 7.5%   | - Increase dose of home noninsulin agents  
|               | - Add third agent  
|               | - Add basal insulin at bedtime |
| 7.6% - 9.0%   | - If already on 2 noninsulin agents, add once daily basal insulin at bedtime |
|   ≥ 9%        | - Discharge home on basal and bolus insulin regimen  
|               | - 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 insulins may be considered for less complex insulin regimens, particularly in elderly patients |

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

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

Discharging Patients With Previously Diagnosed Diabetes

- Resume predmission diabetes regimen at time of discharge for patients with acceptable predmission glycemic control and no contraindication to prior therapy
- Modify predmission 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
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.

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%, postprandial / correction may need to be doubled.

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
  - Catalyze proteins which release 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)
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
- Honeyymoon period after delivery
- Wait until Bg 160 to reverse pre-pregnancy settings/regimen
- Some need less insulin than pre-pregnancy
- GDM
  - No medications after delivery.
  - OGTT 4-6 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 6 hours

Dombrowski & Karounos (2013)
Summary

- The diabetes discharge starts at admission
- Assessing patient’s DME, 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