Perioperative and Inpatient Considerations for Patients with Diabetes

0800-0900
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Presenter

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Learning Objectives

1. Outline considerations for PWD when scheduling elective surgeries.
2. Summarize changes in medication regimens for known surgical or diagnostic procedures.
3. Compare strategies for follow-up post hospitalization.

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Preparing for Elective Surgery

Perioperative treatment recommendations are generally based on the type of diabetes, nature and extent of the surgical procedure, antecedent pharmacological therapy, and state of metabolic control before surgery (110, 111). A key factor for the success of any regimen is frequent glucose monitoring to allow early detection of any alterations in metabolic control.

Management of Hyperglycemia in Hospitalized Patients in Non-Critical Care Setting:
An Endocrine Society Clinical Practice Guideline- 2012

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Preparing for Elective Surgery

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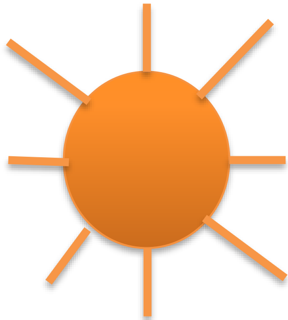
Management Approach

- Glycemic Control Plan

Night before surgery



Morning of surgery

Post-op

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Day and Evening Prior to Surgery

- Check blood glucose (BG) at bedtime; if BG>180, instruct the patient to take insulin according to their correction algorithm
- If fasting after midnight, reduce the usual dose of long-acting (glargine/Lantus, degludec/Tresiba or detemir/Levemir) insulin by 20 to 30%

Joslin Diabetes Center Guideline for Inpatient Management of Surgical and ICU Patients with Diabetes (Pre, Peri, and Postoperatve Care) 10/02/09

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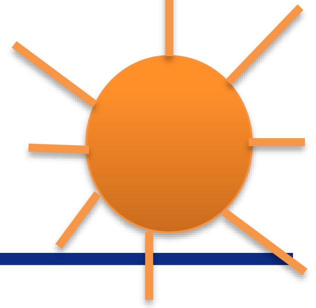
Correction Scales (Milder Than Usually Given in a Regimen)

Glucose Level	Low Dose (orals or TDD <30)	Medium Dose (TDD 30-60)	High Dose (TDD >60)
<70 mg/dl	Hypoglycemia protocol		
70-180 mg/dl	No dose		
180-220	1	2	3
220-260	2	4	6
260-300	3	6	9
300-340	4	8	12
340-380	5	10	15

SAMMC Inpatient Protocol (2018)

Morning of Surgery (Assuming NPO After Midnight)



- STOP all non-insulin medication. If not on insulin, we recommend replacing with long-acting insulin at 0.2 to 0.3 units/Kg/day
- If the patient normally takes their long-acting insulin in the morning, reduce by 20 to 30%
- Goal glucose <140 fasting, <180 random

Joslin Diabetes Center Guideline for Inpatient Management of Surgical and ICU Patients with Diabetes (Pre, Peri, and Postoperatve Care) 10/02/09

Other Medications

- Continue Beta Blockers
- Continue Statins*
- Continue ACE-I / ARB

2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery

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Diabetes is a Coronary Equivalent

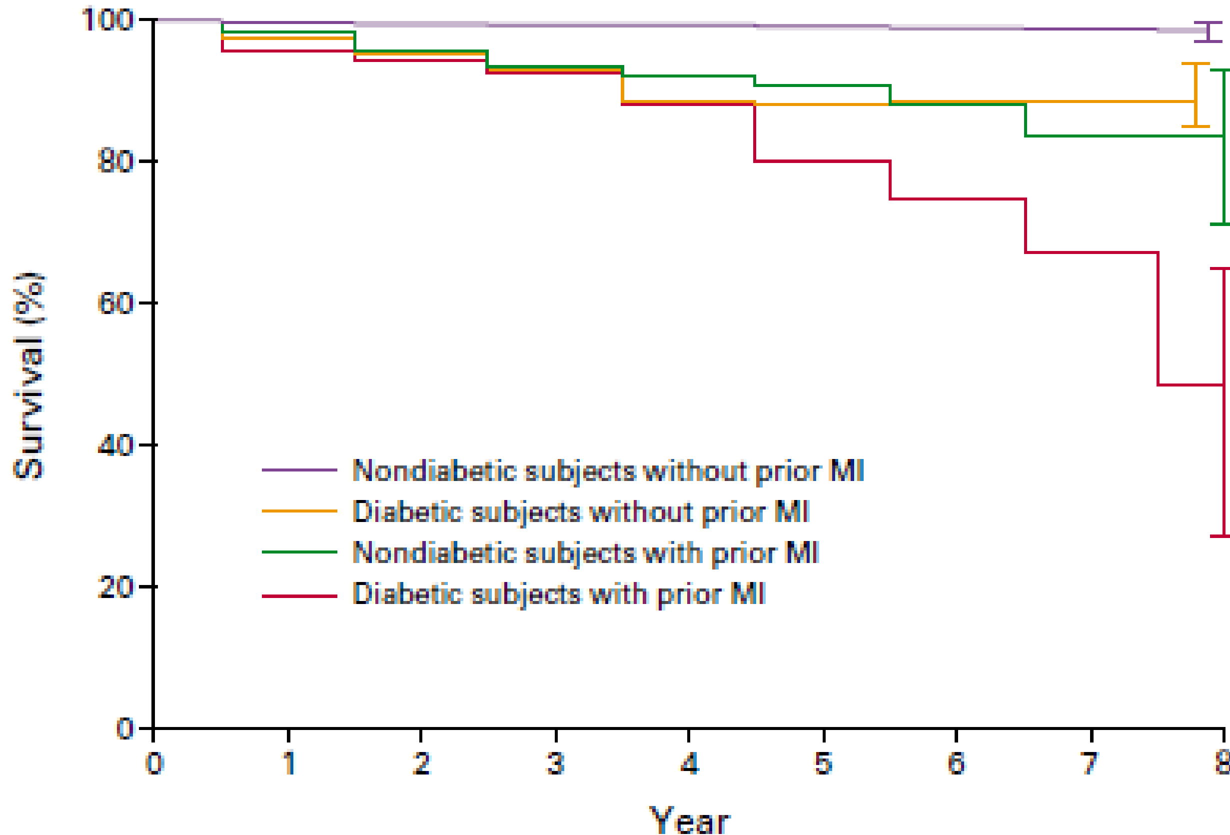

Figure 1. Kaplan–Meier Estimates of the Probability of Death from Coronary Heart Disease in 1059 Subjects with Type 2 Diabetes and 1378 Nondiabetic Subjects with and without Prior Myocardial Infarction. MI denotes myocardial infarction. I bars indicate 95 percent confidence intervals.

Haffner NEJM 1998

Case 1

52 yo male with type 2 diabetes mellitus for the last 14 years. His last microalbumin was 210, he has a remote history of laser photocoagulation for diabetic retinopathy, and on foot exam today he has multiple areas of decreased sensitivity. He has struggled with weight gain related to left shoulder pain that limits physical activity and wants to proceed to shoulder surgery.

Your patient will be admitted for a shoulder surgery, he will be NPO after midnight.

Home	***Hospital***
Glargine 36 units nightly	***?***
Aspart 12 units with meals	***?***
Metformin 1000mg twice daily	***?***
Aspirin 81mg daily	***?***

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Case 1: ANSWERS

Home	*Hospital*
Glargine 36 units nightly	*Dec by 20%, give 28 units the night before procedure*
Aspart 12 units with meals	*Hold while NPO*
Metformin 1000mg twice daily	*Stop day prior to admission*
Aspirin 81mg daily	*Hold 7 days prior*

Case 2

48 yo female non-smoker with type 2 diabetes mellitus for 6 years, BMI is 42. A1C is 7.8. Up to date on eye/foot exams. The patient has been following with bariatric clinic and is preparing for upcoming Roux-en-Y Gastric bypass.

What should we consider concerning her diabetes medications in time leading up to surgery?

Home	*Hospital*
Metformin 1000mg PO ER	*?*
Bydureon 2mg SC weekly	*?*
Lantus 30 Units qhs	*?*

Case 2 continued…

A few days later you are called. Patient has been having low fasting blood glucose on finger stick checks for past 2 days. Her surgery is scheduled in 5 days…

What do you think is happening?...

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Perioperative Management of Diabetes in Bariatric Patients

- Pre/Pre operative-Several days prior to surgery patients are typically started on a liquid diet. Small changes in insulin doses may be needed but usually can stay on same doses
- Pre Operative-night before surgery, as we previously talked usually cut long acting insulin by 30%. Note: like in our patient, if dose was already reduced leading up to surgery. Reduce it again by 30% the night before
- Short acting-same as before, hold all doses night before

Perioperative Management of Diabetes in Bariatric Patients

- What about her GLP-1?- can take doses up to day before surgery. Usually we advise to stop after surgery for a couple reasons
  - May not need it anymore
  - GLP-1 slows gastric emptying. So there is no reason to add GI discomfort to surgery GI pain
  - We often consider starting a DPP4 in its place for post prandial coverage if necessary

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Perioperative Management of Diabetes in Bariatric Patients

- Post operatively- it is impossible to predict insulin requirements post-op. The bariatric team often has a protocol in place. Our institution, typically patients are in hospital 2-3 days post op. All insulin is held post op with sliding scale only. Adjustments are made depending on need over the next few days.
- Metformin??- If metformin is continued post op (a lot of the time it is), we recommend changing from ER to IR. ER will not absorb with the new/faster tract and be less effective
- Sulfonylureas-yet another reason to stop these. Gastric bypass patients sometimes have issues with hypoglycemia, so just stop***
- Statins*

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Case 2: Review

Home	Hospital
Metformin 1000mg PO ER	Stop day prior to admission, restart after discharge and CHANGE TO IR version
Bydureon 2mg q weekly	Typically do not restart
Lantus 30 units nightly	Reduce dose night prior to surgery. Post op is variable

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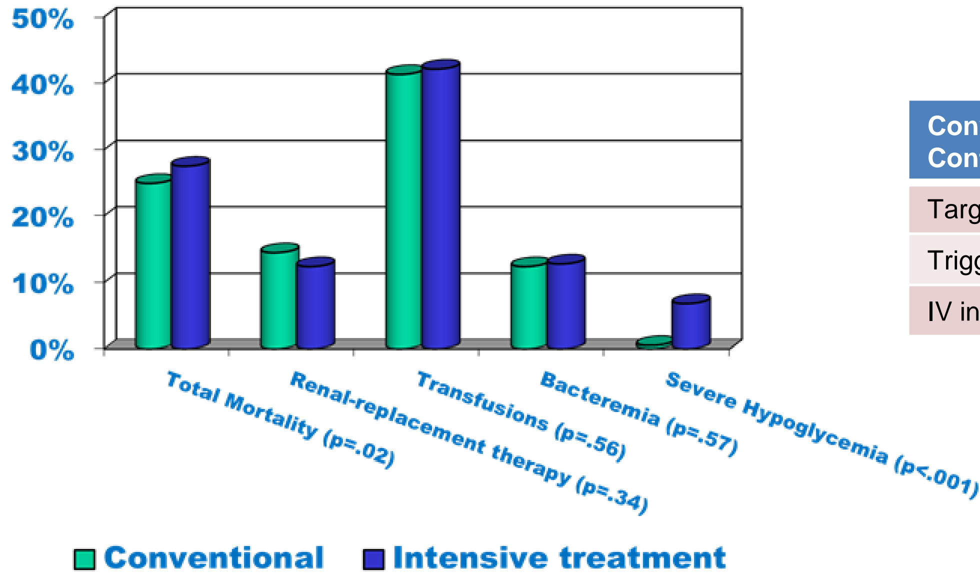
Inpatient Management of Hyperglycemia

NICE Sugar



Conventional Glucose Control	Intensive Glucose Control
Target 144 to 180 mg/dL	Target 81 to 108 mg/dl
Trigger 180 mg/dL	Trigger 140 mg/dL
IV insulin	IV insulin

Critical Care Med 2008;36:12 1-8

Not Recommended <100	Recommended Premeal <140	Recommended Random <180	Not Recommended >180

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Insulin Pumps

A standard process should be used to determine if patient is an appropriate candidate to manage via insulin pump inpatient:

The patient is knowledgeable and WILLING to manage pump during hospitalizations

Contraindications:

- **Altered LOC (look at meds)**
- **Any physical, cognitive or behavioral problem that would interfere with self-management**
- **Presence of DKA or HHS (**or just high A1c?)**
- **Critical illness (IV insulin best in these cases)**
- **Suicidal**

www.medtronicdiabetes.com%2Fres%2Fimg%2Fipt%2Fipt-img5.jpg&imgrefurl=

Insulin Pumps

- **If patient comfortable and with good control: continue their home settings (differs hospital to hospital based on local policy)**
- **Must be discontinued for surgery lasting >2 hours**
- **Nursing staff should record all bed-side glucose testing, basal rates, and boluses given**
- **If transition to scheduled SC therapy, initiate 1-2 hr before discontinuing pump**
- **Cannot go through a CT or MRI scanner**

Insulin Pumps

When to discontinue Insulin pump?

- Patient initial assessment changes
- Patient has 2 consecutive blood glucose levels greater than defined limit (250mg/dl?)
- Pump malfunction
- As diabetes champions, we need to give clear guidelines on how to transition from pump to subQ in our notes/recommendations

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U-500R Insulin

- Five times more concentrated than U100 Insulin (the product you're more familiar prescribing)
- Difficult to get as an inpatient → prone to errors in translating the dose and administration
- If your patient is on U500R 20 units with breakfast, 20 units with lunch, and 20 units with dinner:
  - TDD = 300 units U 100R
  - Decrease by 50%, prescribed as a U-100R basal bolus regimen
    - Glargine 75 units once daily
    - Novolog 25 units with meals + correction

Paulus (2016)

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U-500 Dose in the Hospital

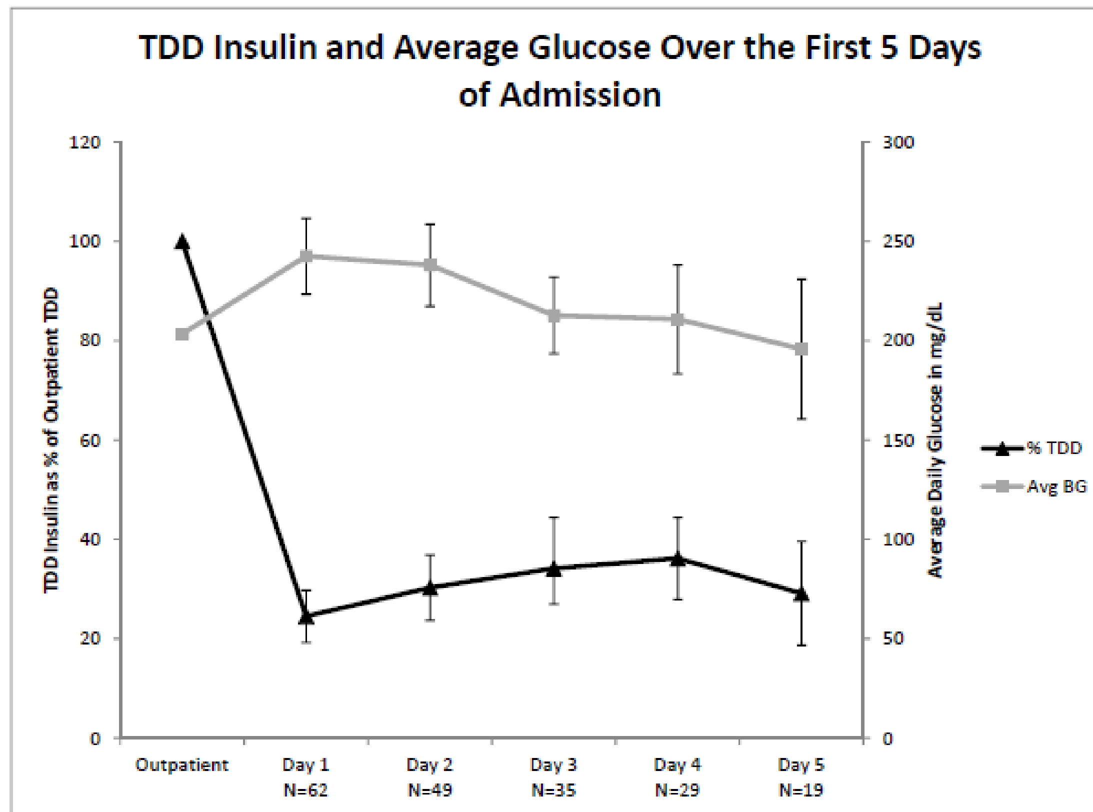

Figure 1: Outpatient total daily dose of insulin (TDD) and estimated average glucose (calculated from HgbA1c) compared to percent of outpatient TDD of insulin and inpatient average blood glucose (BG) over the first five days of hospital admission.

EVALUATION OF TOTAL DAILY DOSE AND GLYCEMIC CONTROL FOR PATIENTS TAKING U-500 REGULAR INSULIN ADMITTED TO THE HOSPITAL. Andrew O. Paulus, Jeffrey A. Colburn, Mark W. True, Darrick J. Beckman, Richard P. Davis, Jana L. Wardian, Sky D. Graybill, Irene Folaron, Jack E. Lewi Endocr Pract. 2016 Oct; 22(10): 1187–1191. Published online 2016 Jun 30. doi: 10.4158/EP161355.OR

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Transition Back to Outpatient Care

- If the patient's A1C was at goal prior to the hospitalization, consider resuming the pre-hospital diabetes medical regimen
  - May need to discontinue insulin and restart orals/non-insulin injectable medications
- If A1C was not well controlled, and glucose is now improved with the hospital regimen of medications, consider building upon this new regimen (as opposed to reverting back to what was used before)
- A hospitalization can be a "good" motivator for some to change. As champions, it is our job to try to use this to best help our patients

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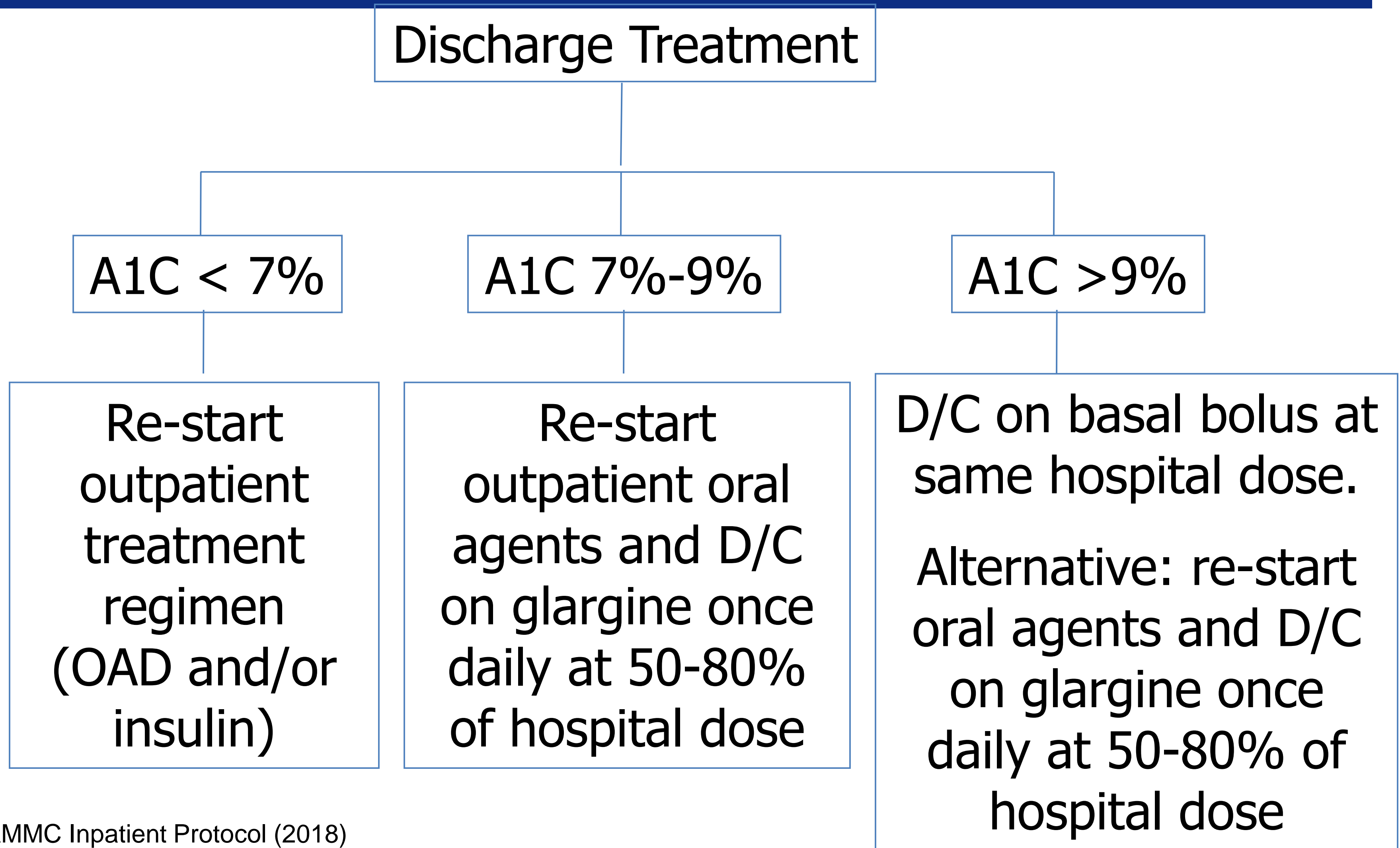
Discharge Insulin Algorithm



SAMMC Inpatient Protocol (2018)

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Summary

- Identification of glucose goals for inpatients
- Discussion on perioperative management of gastric bypass patients
- Pumps inpatient: Good idea?
- U500 inpatient: Good idea?
- Discussion of safe transfer of care after hospitalization

Key Takeaways

- Inpatient: Stop oral medications, replace with insulin
- If made NPO, decrease long-acting insulin analogs to by 20 to 30% of usual dose the night prior, stop rapid-acting insulin
- Gastric bypass patients often require dramatically less insulin (to no insulin) or other diabetes medications rapidly after bypass
- Change Metformin ER to IR in gastric bypass patients
- Goal inpatient glucose: <140 mg/dl fasting, <180 mg/dl random
- Closely evaluate the patient’s medications upon return to the clinic after a hospital discharge

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Questions