

Glytec®

**TIME TO
TARGET**  *The Future of
Glycemic Management*

Spotlight on Perioperative Glycemic Management A Technology-Driven Approach

Betsy Kubacka, MSN, APRN, AGPCNP-BC, RDN, CDCES

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Introduction



Betsy Kubacka

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Objectives

- Identify the challenges of perioperative glycemic control
- Define goals for perioperative glycemic management
- Review perioperative diabetes medication management plans
 - Identify when glycemic management is best served using insulin infusion
 - Identify when glycemic management is best served utilizing subcutaneous injections
- Recognize which patient populations are at high risk for hypoglycemia

CARE CHALLENGES

Inpatient Glycemic Challenges

Hyperglycemia is common

- Occurs in > 30% of hospitalized patients & up to 40% in surgical patients
 - Severe illness and surgical stress predisposes patients to insulin resistance & hyperglycemia
- Effects of hyperglycemia:
 - Immune dysfunction
 - Impaired wound healing
 - Oxidative stress

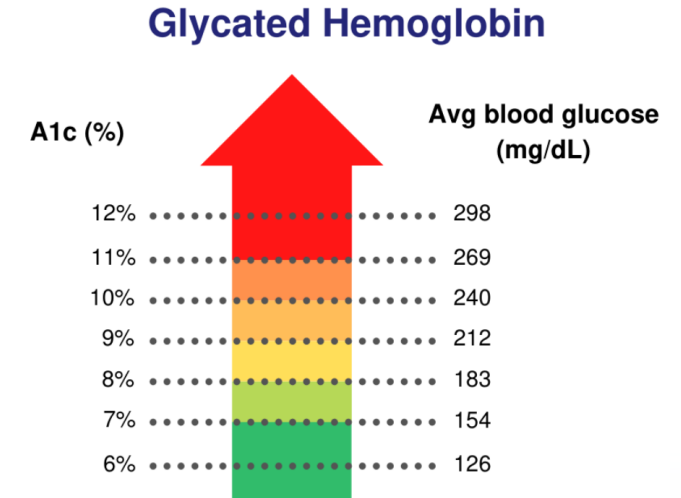
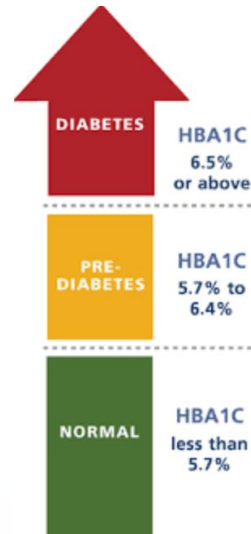
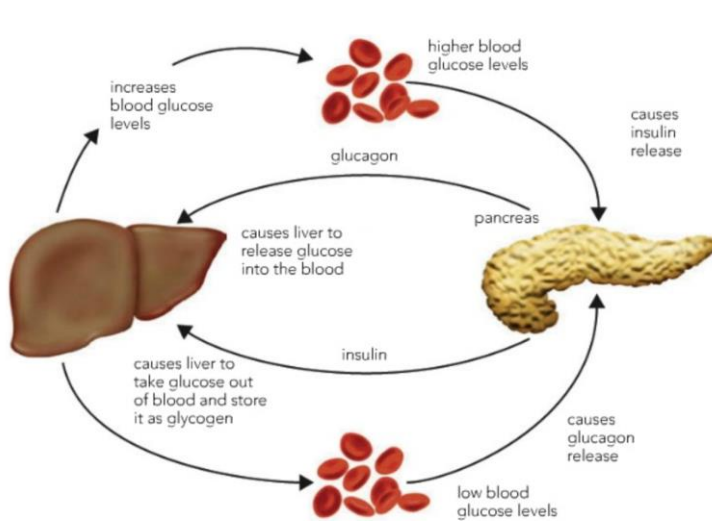
Limited Support Structures

- Lack of inpatient experts: Limited endocrine support, lack CDCES support
- Inpatient prescribers varied knowledge and comfort in prescribing insulin
 - Insulin is a high-alert, high-risk medication

Challenges

- Glycemic control has focused in the critical care areas, with less focus in the general med-surg units
- Staff fear of hypoglycemia
- Patients fear insulin
- Dosing and care challenges:
 - Coordination of glucose testing, meal delivery, & insulin administration
 - Meals on demand
 - Food from home
 - Variable intakes

Perioperative Hyperglycemia = Adverse Outcomes



Glucose Control

- Glucose control is a finely regulated balance of hepatic glucose production and glucose utilization in peripheral tissues
 - Surgery and anesthesia alter this balance
- Studies show correction of hyperglycemia decreases mortality and reduces complications
 - Tight control may lead to hypoglycemia = increased mortality

Considerations

- Screen for Diabetes
- Long-term glycemic control
- Severity of hyperglycemia on admission
- Monitoring for post-operative hyperglycemia

Occurrence

- Peri-operative Hyperglycemia:
 - General surgery = 20-40%
 - Cardiac surgery = 80%
 - 12-30% do not have h/o diabetes = Stress Hyperglycemia

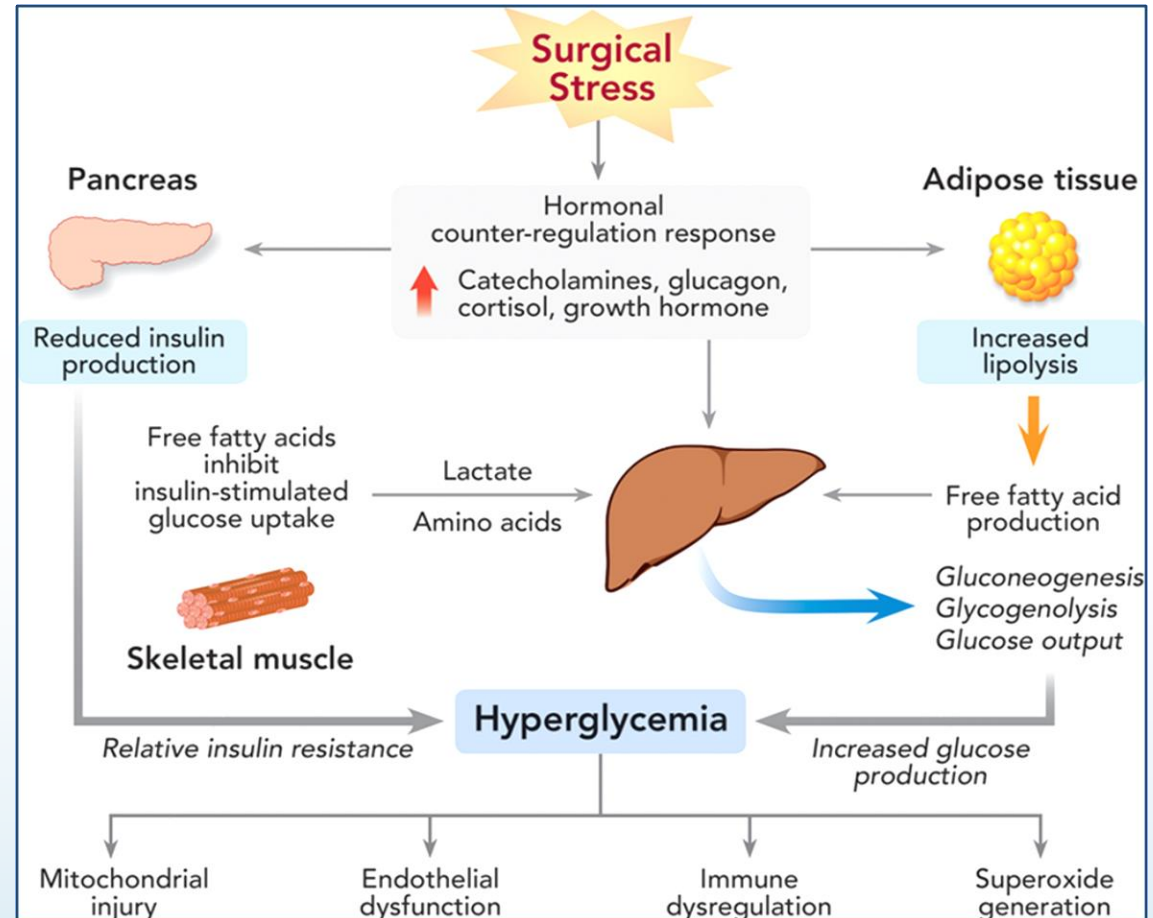
From: Perioperative Hyperglycemia Management An Update
 Anesthesiology. 2017;126(3):547-560. doi:10.1097/ALN.0000000000001515

The magnitude of stress response relates to the severity of surgery & type of anesthesia

↑ Thorax & abdomen
 General anesthesia

↓ Laproscopic

Figure Legend:
 The surgical stress response



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Enhanced Recovery After Surgery (ERAS)

- Consumption of carbohydrate-rich beverage up to 2 hours before surgery
- Preoperative carb loading
 - May counteract the state of insulin resistance (due to stress and starvation)
 - Avoids the catabolic state associated with starvation
 - Increase insulin sensitivity
 - Decreasing risk for post-op hyperglycemia
 - Associated with reduced LOS

However,
Providing pre-operative carbohydrate-containing beverages to patients with known diabetes is **not** recommended.

- <https://www.endocrine.org/clinical-practice-guidelines/inpatient-hyperglycemia-guideline-resources>
 - Online June 2022

CLINICAL STUDIES

Clinical Study Summary

- **Preoperative glucose & mortality:**

- Retrospective analysis of 61,000 patients undergoing elective noncardiac surgery and mortality
 - Preoperative BG of 60-100 mg/dL : 3 to 5% 1-year mortality²
 - Preoperative BG >216 mg/dL : 12% mortality 1-year mortality²

- **Preoperative glycemic control:**

- Preoperative A1c > 8% = wound complications (Type 2, total knee)²
- Preoperative A1c >7% increase in infectious complications in major non-cardiac surgery²
- Preoperative A1c >7% higher unadjusted 5-yr mortality in elective CABG²

- **Intraoperative glycemic control:**

- Most studies are cardiac surgery
 - For every 20 mg/dL above 100 mg/dL = 30% increase in adverse outcomes in cardiac surgery²
 - BG < 200 mg/dL = 13%, >200 mg/dL = 36%, >250 mg/dL = 63%
 - Hypoglycemia = mortality risk

Post-Operative Glycemic Management

- Inpatient hyperglycemia (> 180 mg/dL) = adverse clinical outcomes
 - Surgical site infections, delayed wound healing and increased length of stay
 - Those without prior history of diabetes (stress hyperglycemia) have been shown to have worse outcomes with elevated BG's
- Tighter control may be desired for some surgical patients but tighter control brings higher risk for hypoglycemia thus increased mortality
 - IV Glucommander very low risk for hypoglycemia

Post-Operative Glycemic Management

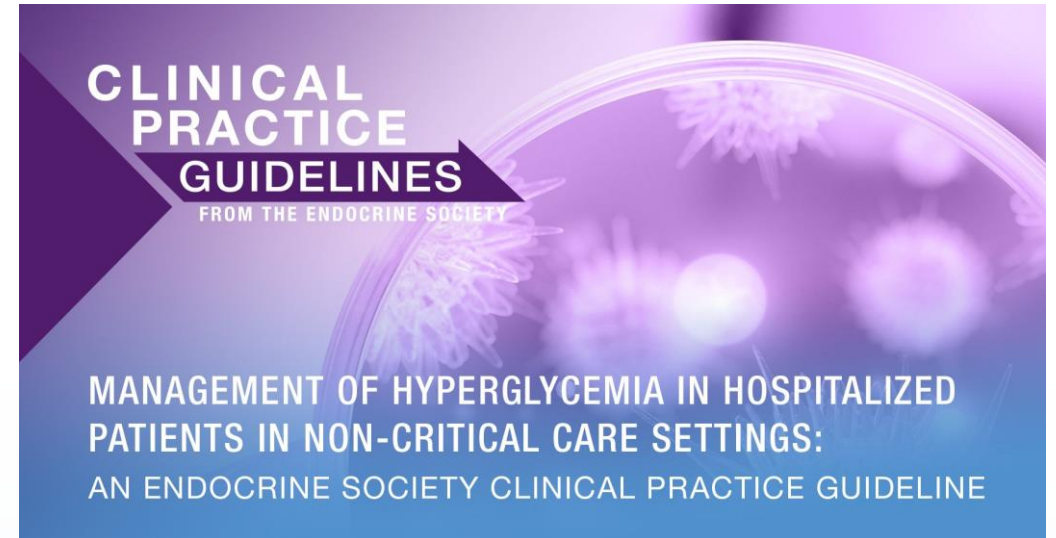
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- Tighter control may be desired for some surgical patients but tighter control brings higher risk for hypoglycemia thus increased mortality
 - IV Glucommander very low risk for hypoglycemia
 - 62.6% reduction in preventable hypoglycemia ADEs



RECOMMENDATIONS

A1c & Pre-Op BG

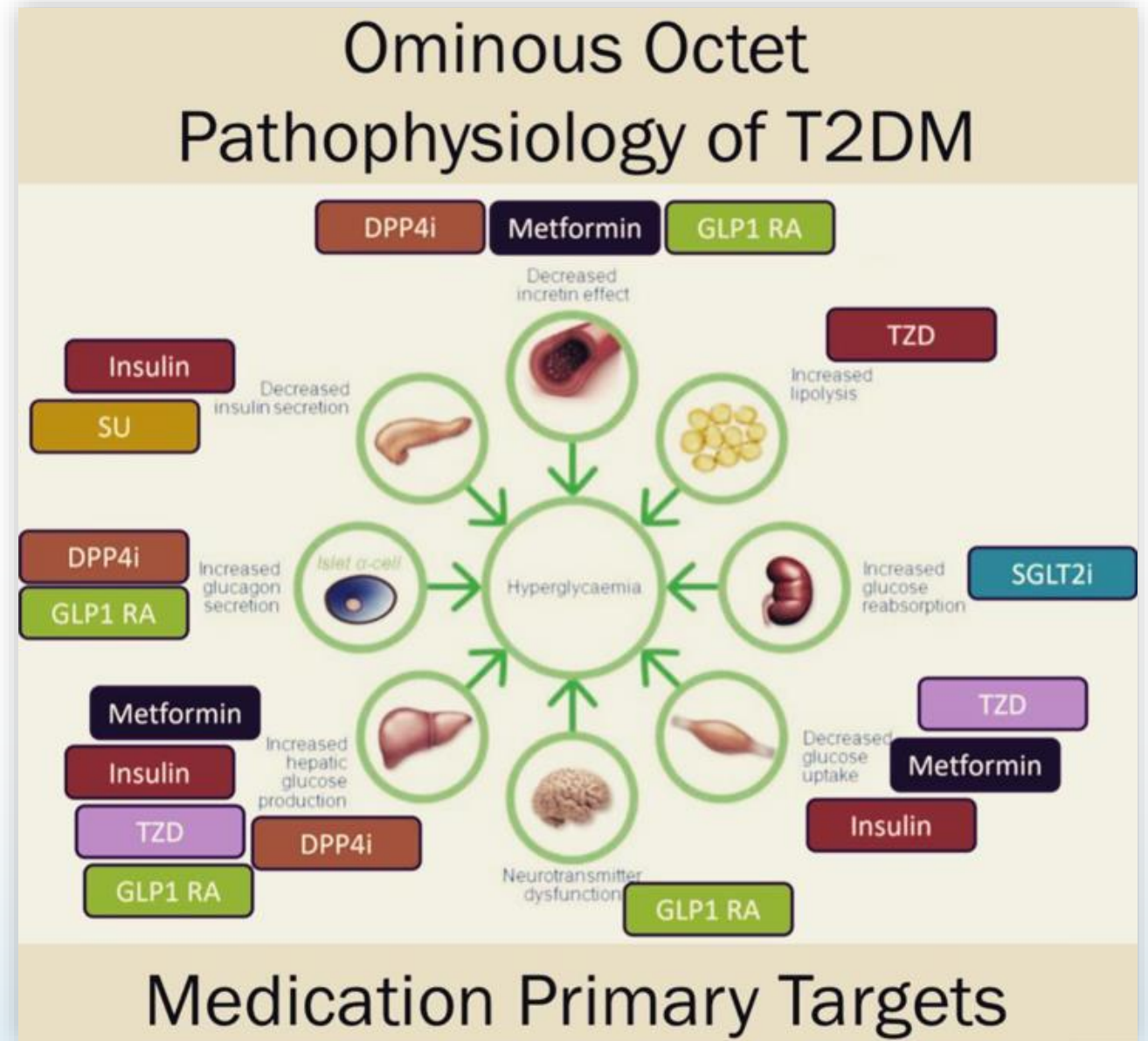
- Patients with diabetes scheduled for elective surgery may have improved postoperative outcomes when pre-operative hemoglobin A1c is $\leq 8\%$ and when blood glucose values in the immediate pre-operative period are < 180 mg/dL.



Society Guideline Recommendations for Treatment of Perioperative Hyperglycemia and Diabetes

	Ambulatory Surgery	ICU	Non-ICU
SAMBA (Society for Ambulatory Anesthesia)	SC rapid-acting insulin analogs are preferred over IV or SC regular insulin Treatment goal: intraoperative blood glucose levels < 180 mg/dl (10mM)		
ADA/AACE (American Diabetes Association/American Association of Endocrinologist)		Initiate insulin therapy for glucose >180 mg/dl (10mM) Treatment goal: For most patients, target a glucose level between 140 and 180 mg/dl (7.7-10mM). Glucose target between 110 and 140 mg/dl (6.1-7.7mM) may be appropriate for select patients if achievable without significant risk for hypoglycemia	Treatment goal: If treated with insulin, premeal glucose targets should generally be < 140 mg/dl (<7.7mM), with random glucose levels < 180 mg/dl (10mM)
ACP (American College of Physicians)		Recommends against intensive insulin therapy in patients with or without diabetes in surgical/medical ICUs Treatment goal: Target glucose is between 140 and 200 mg/dl (7.7-11.1mM) in patients with or without diabetes	
Critical Care Society		BG > 150 mg/dl (8.3 mM) should trigger insulin therapy Treatment goal: Maintain glucose <150 mg/dl (8.3mM) for most patients in ICU	
Endocrine Society			Treatment goal: Target premeal blood glucose < 140 mg/dl (7.7 mM) and random glucose <180mg/dl (10mM) Higher target glucose <200 mg/dl (11.1mM) is acceptable in patients with terminal illness and/or with limited life expectancy or at high risk for hypoglycemia
Society of Thoracic Surgeons		Continuous insulin infusion preferred over SC or intermittent IV boluses Treatment goal: Recommend glucose < 180 mg/dl (10mM) during surgery, <110 mg/dl (6.1mM) in fasting and premeal states	
Joint British Diabetes Societies			Initiate insulin therapy for glucose> 10 mM (180 mg/dl) Target blood glucose levels in most patients are between 6 and 10mM (108-180mg/dl) with an acceptable range of between 4 and 12mM (72-216 mg/dl)

- Type 1 is an insulin deficiency
- Type 2 is more complicated



Pre-Op Glycemic Management

Considerations

- Type of Diabetes
- Nature and extent of the surgical procedure
- Length of pre-and post-op fasting
- State of control preceding surgery

Type 2 Diabetes

- Oral medications, most can be taken until the day before surgery
- Reduction in basal insulin

Type 1 Diabetes

- Do not hold basal insulin, may reduce dose. Hold prandial insulin morning of if NPO
- Stress of surgery may cause severe hyperglycemia or ketoacidosis

Oral Medication Recommendations Prior to Surgery

Oral Medication for Elective Surgery	Day Before Surgery	Day of Surgery if Normal Oral Intake Anticipated Same Day and Minimally Invasive Surgery	Day of Surgery if Reduced Postoperative Oral Intake or Extensive Surgery, Anticipated HD Changes and/or Fluid Shifts
Secretagogues	Take	Hold	Hold
SGLT-2 Inhibitors	Hold	Hold	Hold
Thiazolidinediones	Take	Take	Hold
Metformin	Take*	Take*	Hold
DPP-4 Inhibitors	Take	Take	Take

*Hold if patient having a procedure with intravenous contrast dye administration, particularly in those with glomerular filtration rate < 45 ml/min.⁵⁶
DPP = dipeptidyl peptidase-4; HD = hemodynamic; SGLT = sodium glucose cotransporter-2.

Insulin Recommendations Prior to Surgery

Day Before Surgery Insulin Regimens	Glargine or Detemir		NPH or 70/30 Insulin		Lispro, Aspart, Glulisine, Regular		Noninsulin Injectables	
	AM Dose	PM Dose	AM Dose	PM Dose	AM Dose	PM Dose	AM Dose	PM Dose
Normal diet until midnight (includes those permitted clear liquids until 2 h before surgery)	Usual dose	80% of usual dose	80% of usual dose	80% of usual dose	Usual dose	Usual dose	Usual dose	Usual dose
Bowel prep (and/or clear liquids only 12–24h before surgery)	Usual dose	80% of usual dose	80% of usual dose	80% of usual dose	Usual dose	Usual dose	Hold when starting clear liquid diet/bowel prep	Hold when starting clear liquid diet/bowel prep

NPH = neutral protamine Hagedorn.

Insulin Recommendations Day of Surgery

Day of Surgery Insulin Regimens	Glargine or Detemir	NPH or 70/30 Insulin	Lispro, Aspart, Glulisine, and Regular	Noninsulin Injectables
	80% of usual dose if patient uses morning only or twice daily basal therapy	50% of usual dose if BG 120 mg/dl* Hold for BG < 120 mg/dl	Hold	Hold

*6.6 mM.
BG = blood glucose; NPH = neutral protamine Hagedorn.

Best Practice: Check BG prior to surgery

Pre-Op:

- **SubQ insulin** to correct hyperglycemia may be considered for:²
 - Patients undergoing ambulatory surgery
 - Procedures of short duration
 - (< 4 hours operating room time)
 - Patients undergoing inpatient procedures that are minimally invasive, with expected hemodynamic stability, and allow early resumption of oral intake.

Pre-Op and Intra-Op:

- **IV insulin infusion** is recommended in patients undergoing procedures that may result in the following variables that alter subcutaneous insulin absorption or distribution:²
 - Procedures with anticipated hemodynamic changes
 - Procedures with significant fluid shifts
 - Procedures with expected changes in temperature
 - (passive hypothermia or active cooling, hyperthermic intraperitoneal chemotherapy)
 - Procedures with use of inotropes
 - Lengthy operative times
 - (>4 hours)

Pearls

- Rapid-acting insulin should not be given more frequently than every two hours to minimize the risk of insulin stacking
- IV insulin infusion is recommended in patients with anticipated hemodynamic changes, significant fluid shifts, expected changes in temperature, use of inotropes, or lengthy operative times, greater than four hours
 - These variables alter subcutaneous insulin absorption and distribution
 - Can lead to persistent hyperglycemia or sudden hypoglycemia
 - IV insulin = very short half-life and allows rapid adjustment with limited lasting effects
 - IV insulin is the best modality for patients needing ICU admission
- Same day surgery patient may resume home regimen after discharge

Insulin Pumps Intra-Op

Requires preoperative planning

- Consider insulin pump insertion site in relation to the surgical field
 - May need to inform the patient of which areas to avoid
- Closed-Loop System?
- During surgery basal rate is continued and frequent monitoring of BGs is required
 - Hypoglycemia may go unrecognized under anesthesia
- Insulin infusion may be substituted for the insulin pump
- Insulin pumps are primarily utilized with type 1 diabetes, however growing use in type 2

IV Insulin

- IV Insulin infusion protocols provide guidance on insulin titration and frequency of blood glucose checks
 - Target blood glucose
 - Minimize hypoglycemia
- Nursing plays a critical role in the administration of IV insulin in ICU settings
- Anesthesia in the OR

- Initiating Glucommander™ requires an order for target range and multiplier
- The multiplier is an insulin sensitivity factor: 0.01-0.05
- Targets: 120-160 mg/dL or 140-180 mg/dL
 - 100-140 mg/dL CV surgery

Blood Glucose	Multiplier	Insulin Drop Rate
300	0.01	2.4 units/hr
300	0.02	4.8 units/hr
300	0.05	12 units/hr

Patient Management | IV Glucommander

TRANSITION, START

[Back](#)
[Transition to SubQ](#)
[Discontinue IV](#)
[Print](#)
[Lock Screen](#)

PATIENT DETAILS [Edit](#)

NAME: Transition, Start

MRN: M108257930... **DOB:** 11/03/1949

HEIGHT: 167.64 cm **WEIGHT:** 93 kg

BMI: 33 **A1C:** 10.1

FACILITY: PARKVIEW REGIONAL MEDICAL CENTER

UNIT: PRMC CV ICU

DOSING INFORMATION

CURRENT INSULIN
1.9
units/hr
[Copy](#)

LAST BG
120
mg/dl

TARGET RANGE
100-140
mg/dl

MULTIPLIER
Initial 0.02 Last 0.03125

ORDER SET [Edit](#)

8:44

[Enter BG](#)
[Start Meal](#)

[Void BG](#)

Trend ● All ○ IV Refresh

Blood Glucose Trend

Red dot ● indicates Meter limit

IV History	Glucometrix™	Notes (0)	History			
Date	BG Value	Insulin Rate	Carbs	Nurse	D50	Next BG Due
05/04/2019 15:36	120 mg/dl	1.9 units/hr	N/A	Sheryl Scott	0 ml	05/04/2019 17:36
05/04/2019 14:36	138 mg/dl	2.4 units/hr	N/A	Sheryl Scott	0 ml	05/04/2019 16:36
05/04/2019 13:35	124 mg/dl	2 units/hr	N/A	Sheryl Scott	0 ml	05/04/2019 15:35

Key takeaway:
IV insulin is responsive and can achieve and maintain BGs in target throughout the procedure

Technology-Driven Insulin Management: Glucommander

Benefits of an eGlycemic Management System® (eGMS):

- Quicker time to target range
- Maintenance of glucose in tighter target ranges
- Lower glycemic variability
- Lower risk for hypoglycemia
- Fewer calculation errors
- Built-in alert systems
- FDA cleared



Transitioning to SubQ

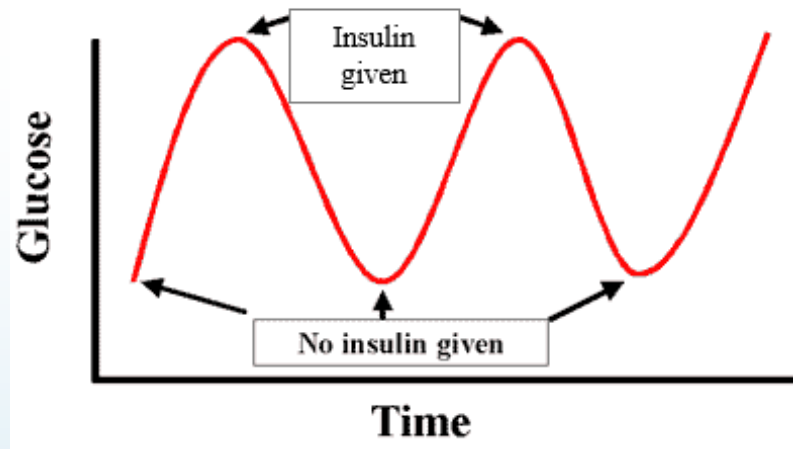
- First subcutaneous injection of insulin given before stopping the insulin infusion to allow adequate time for the subcutaneous insulin to take effect
- Imperative type 1 patients receive basal insulin before discontinuing IV insulin
- Glucommander makes the transition process efficient by recommending the optimal dose for a patient based on their BG and A1C values



Subcutaneous Insulin

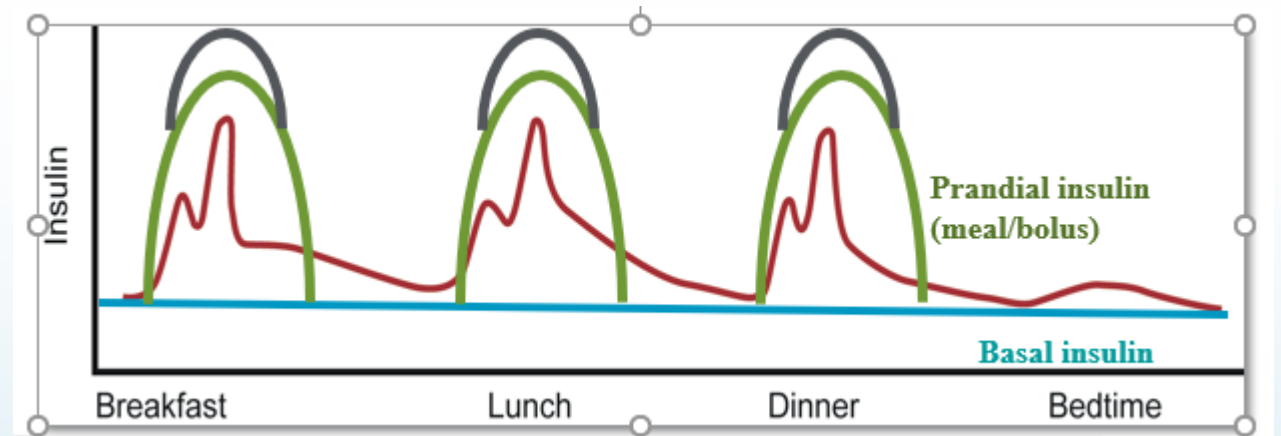
Sliding scale alone is discouraged

- **REACTIVE**—Insulin administered after hyperglycemia occurs



Basal, prandial and correction insulin for those eating

- **PROACTIVE**—Insulin administered in anticipation of blood glucose spike



Patients on Insulin Prior to Admission

- Reduce home dose by 20 to 25%, at times more, especially for those on u500 insulin
 - High A1C may be an indicator of poor compliance with the insulin regimen
 - Diet will be controlled in house
 - Variable intakes postoperatively
- If the patient is on a high basal dosing and little to no prandial dosing, redistribute the dose between basal and meal bolus with 20 to 25% reduction

Subcutaneous Insulin: Determining the Dosing

1. Calculate a total daily insulin dose. Use home insulin doses or calculate.
 - 0.3 Insulin Naive, older, renal, higher risk for hypo
 - 0.5 Most Type 2
 - 0.7 Insulin resistance, steroids
2. Split between basal and nutritional bolus
 - Basal once or twice daily
 - Meal bolus 3 times daily or with tube feeding bolus
 - Continuous feeding may give 4- or 6-hour doses
3. Correctional Insulin based on patient's insulin sensitivity
4. Adjust doses as needed based on response



Prescribing Practice

- Order sets help drive prescribing practice
 - Include Basal, Meal Bolus, and Correction orders
 - Include Hypoglycemia Protocol
 - Include nursing notifications
 - Include BG checks

▼ Basal Insulin

Insulin Glargine (LANtus) is the recommended insulin.
Insulin NPH may be used during pregnancy.

If the Insulin Glargine (LANtus) dose is > 100 units, consider splitting into twice a day (BID) doses.

insulin glargine (LANtus) 100 units/mL injection

Subcutaneous, Starting today at 1304
Basal insulin is not held for NPO status. Contact provider with any questions or concerns.

Transition from IV insulin using Glucommander Recommendations OR Provider Calculated Dosing

NPH insulin

▼ Meal Bolus Insulin

insulin lispro (HumaLOG) 100 units/mL injection

Subcutaneous, 3 times daily with meals, First dose today at 1330

MEAL BOLUS.
HOLD IF NPO

CARB BASED: insulin lispro (HumaLOG) 100 units/mL injection

Subcutaneous, 3 times daily with meals, MEAL BOLUS. HOLD IF NPO or if eats < 15 grams of carbs Give only *** units if eats 15-29 grams of carbs Give only *** units if eats 30-44 grams of carbs Give only *** units if eats 45-59 grams of carbs Give full *** units if eats at least 60 grams of carbs

▼ Correction Scale Insulin - With Meals

TDD = Total Daily Dose of scheduled insulin (basal + meal bolus)

SENSITIVE (TDD less than 30) - insulin lispro (HumaLOG) 100 units/mL injection - CORRECTION SCALE

1-5 Units, Subcutaneous, 3 times daily with meals, DO NOT HOLD IF NPO Notify provider if Blood Glucose LESS than 70 For BG 141-190 administer 1 unit For BG 191-240 administer 2 units For BG 241-290 administer 3 units For BG 291-340 administer 4 units For BG MORE than 340, administer 5 units AND notify provider

STANDARD (TDD 30-49) - insulin lispro (HumaLOG) 100 units/mL injection - CORRECTION SCALE

1-6 Units, Subcutaneous, 3 times daily with meals, DO NOT HOLD IF NPO Notify provider if Blood Glucose LESS than 70 For BG 141-180 administer 1 unit For BG 181-220 administer 2 units For BG 221-260 administer 3 units For BG 261-300 administer 4 units For BG 301-340 administer 5 units For BG MORE than 340, administer 6 units AND notify provider

MODERATE INSULIN RESISTANCE (TDD 50-70) - insulin lispro (HumaLOG) 100 units/mL - CORRECTION SCALE

1-8 Units, Subcutaneous, 3 times daily with meals, DO NOT HOLD IF NPO Notify provider if Blood Glucose LESS than 70 For BG 141-170 administer 1 unit For BG 171-200 administer 2 units For BG 201-230 administer 3 units For BG 231-260 administer 4 units For BG 261-290 administer 5 units For BG 291-320 administer 6 units For BG 321-350 administer 7 units For BG MORE than 350, administer 8 units AND notify provider

SEVERE INSULIN RESISTANCE (TDD more than 70) - insulin lispro (HumaLOG) 100 units/mL injection - CORRECTION SCALE

1-11 Units, Subcutaneous, 3 times daily with meals, DO NOT HOLD IF NPO Notify provider if Blood Glucose LESS than 70 For BG 141-160 administer 1 unit For BG 161-180 administer 2 units For BG 181-200 administer 3 units For BG 201-220 administer 4 units For BG 221-240 administer 5 units For BG 241-260 administer 6 units For BG 261-280 administer 7 units For BG 281-300 administer 8 units For BG 301-320 administer 9 units For BG 321-340 administer 10 units For BG MORE than 340, administer 11 units AND notify provider

Glucommander Initiation

Can be started as a weight-based multiplier or as a custom start

Glucommander™ powered by Glytec

Current Patients Add Patient Learning Center Reports Admin Logout

START ORDER SET

NAME: BEVERIS, LAKEIDRE ✓

ACCOUNT NUMBER: 2210061238... **DOB:** 09/28/1938

HOSPITAL: General Hospital **UNIT:** ED

GENDER: Male **A1C:**

HEIGHT: 165.1 cm **WEIGHT:** 56.7 kg

[Edit](#)

SubQ Order Set Details

Order ID: LB221006123806 [Clear Form](#)

Ordered: 10/06/2022 12:15

Order Set: **Basal/Bolus+Correction**

Intended for patients on a consistent carbohydrate diet. BG checks are associated with meal times and insulin is recommended as needed.

Target Range: **120-160 mg/dL**

Bolus Insulin: **lispro (Humalog)**

Basal Insulin: **glargine (Lantus)**

Daily Basal Distribution: **1 Dose Per Day**

Basal Time: **21:00**

Number of Carbs Per Meal: **60 grams**

Calculate Initial Dosing:

Based On: **Weight**

TDD Multiplier: **0.50**

Total Daily Dose:

Basal % of TDD: **50%**

Bolus % of TDD:

Caution: Provider order is required.

Please refer to drug "Instructions for Use" for information regarding manufacturer's indications, warnings, precautions and contraindication.

[Cancel](#) [Save](#)

START ORDER SET

NAME: CALLAHAN, DANIEL ✓

ACCOUNT NUMBER: 2210061238... **DOB:** 10/19/1990

HOSPITAL: General Hospital **UNIT:** ED

GENDER: Male **A1C:**

HEIGHT: 186 cm **WEIGHT:** 105 kg

[Edit](#)

SubQ Order Set Details

Order Set: Basal/Bolus+Correction

Intended for patients on a consistent carbohydrate diet. BG checks are associated with meal times and insulin is recommended as needed.

Target Range:

Bolus Insulin:

Basal Insulin:

Daily Basal Distribution:

Basal Time:

Number of Carbs Per Meal:

Calculate Initial Dosing:

Based On:

Total Basal Dose: Units

Breakfast Bolus Dose: Units

Lunch Bolus Dose: Units

Dinner Bolus Dose: Units

Caution: Provider order is required.

Please refer to drug "Instructions for Use" for information regarding manufacturer's indications, warnings, precautions and contraindication.

[Cancel](#) [Save](#)



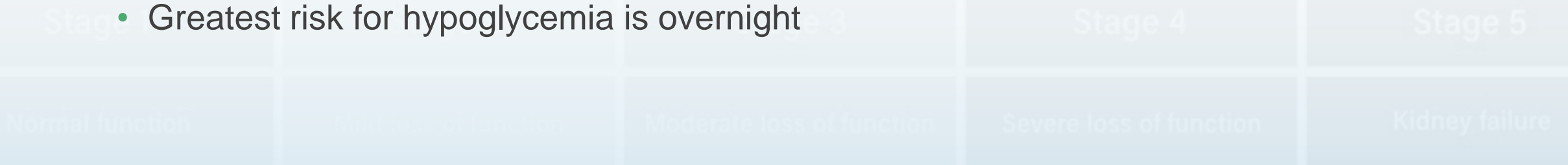
SPECIAL CONSIDERATIONS

Steroids

- Dexamethasone is often given intraoperatively to decrease risk for postoperative nausea and vomiting, decrease inflammation, and decrease postoperative pain
- Steroids are counter regulatory hormones
 - Impair insulin action
 - Increase insulin resistance
 - Diminish insulin secretion
- Many patients receiving > 40 mg of prednisone per day develop hyperglycemia
 - *Many are not monitored for hyperglycemia*
 - Once daily short-acting: effect seen 4-6 hours later, hyperglycemia seen throughout the day, BG decreases overnight = need more insulin with meals
- Long-acting: effect seen throughout the day and night = need increased basal and meal bolus
- Insulin needs decrease when steroid is tapered or stopped

Renal Insufficiency

- Loss of renal clearance of insulin = Higher risk for hypoglycemia
 - Endogenous insulin : liver is the main site of clearance
 - Exogenous insulin : kidney is the main site of clearance
 - Exogenous bypasses the liver and directly enters systemic circulation
- Reduced hepatic and renal gluconeogenesis
- A1c may be falsely low: Anemia, Erythropoietin-stimulating agents, Transfusions
- **Recommendations:**
 - 0.3 units/kg dosing and higher target range
 - Consider reduction in insulin doses on dialysis days
 - 25% reduction in basal insulin up to 24 hours after hemodialysis
 - Greatest risk for hypoglycemia is overnight





The diagram shows a horizontal progression of kidney stages from left to right. Above the table, three kidney icons are shown, each corresponding to a stage. The table has two rows: the top row labels the stages (Stage 1 to Stage 5), and the bottom row describes the level of kidney function for each stage.

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Normal function	Mild loss of function	Moderate loss of function	Severe loss of function	Kidney failure

Artificial Nutrition

- Work with the inpatient dietitians
- Tube Feeding; provide formulas low in carbohydrates when possible
 - May start with IV insulin drip to determine insulin needs
 - May use the last 4-6 drip rates to determine daily needs
 - Drip rates should be relatively stable
 - Do not use the full 24 hours rates as resistance changes and may overestimate.

PATIENT DETAILS 	DOSING INFORMATION		ORDER SET 
NAME: BRADDIX, CHAD	CURRENT INSULIN 1.3 units/hr	LAST BG 141 mg/dl	54:41 Enter BG Start Meal Void BG
MRN: M-51504845... DOB: 05/23/1962	TARGET RANGE 120-160 mg/dl	ANION GAP 17.6	
HEIGHT: 182 cm WEIGHT: 110 kg	MULTIPLIER Initial 0.01 Last 0.01563		
BMI: 33 A1C: 10.3			
FACILITY: General Hospital			
UNIT: ICU			

Summary

- Hyperglycemia is associated with adverse clinical outcomes in surgical patients
- Screen patients for diabetes and pre/post-surgical hyperglycemia
- Insulin is preferred for management of hyperglycemia
 - IV insulin is very responsive and easily titrated to meet needs
 - Transition to SubQ insulin when medically stable
- Prevent Hypoglycemia
 - Reassess and modify treatment when blood glucose is <100 mg/dL
- Special Considerations in populations
 - On enteral or parenteral nutrition
 - Receiving steroids
 - Renal insufficiency
 - Insulin pumps
- Glycemic targets should be modified according to clinical status



Thank You!

Betsy Kubacka

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Resources

- References:

1. American Diabetes Association (2022). Diabetes Care in the Hospital: Standards of Medical Care in Diabetes. Diabetes Care 45(Suppl. 1): S244–S253 | <https://doi.org/10.2337/dc22-S016>
 2. Duggan, E., Carlson, K., Umpierrez, G. (2017). Perioperative Hyperglycemia Management: An Update. Anesthesiology. 126(3): 547–560. doi:10.1097/ALN.0000000000001515.
- Best Practice Using Glucommander IV in the Periop Setting
 - Internal Talking Points: Non-Glucommander Order Sets