

Implementing Hospital Policies & Protocols

Jane Jeffrie Seley

DNP MPH GNP BC-ADM CDE CDTC FAADE FAAN

*Division of Endocrinology, Diabetes
& Metabolism*

NewYork-Presbyterian Hospital

Weill Cornell Medicine

janeseley@nyp.org

 **NewYork-Presbyterian**
 The University Hospital of Columbia and Cornell

Disclosures

Jane Jeffrie Seley

Advisory Panel:

Boehringer-Ingelheim/Lilly Alliance

Sanofi Diabetes

Novonordis

Abbott Nutrition

Consultant:

Johnson & Johnson Diabetes Institute

Bayer Diabetes

Outline

- DKA
- Insulin Pumps
- Hypoglycemia
- Coordination of BG, Insulin & Meals
- Perioperative Care
- Nurses' Role in Safe Insulin Administration

Adult DKA Guidelines at NYPH

Insulin

- FS BG q 1 hour until BG < 250 mg/dl, stable & no change > 10 % for 3 hours, then FS BG q 2 hour
- Serum Chemistry every 4 hours
- **Regular Insulin:** 0.15 Units/Kg as IV Bolus; Then IV infusion @ 0.1 Units/Kg/hr (100 Units/100 mL NS)
- If Serum Glucose does not fall by 50 -70 mg/dL in the next hour: double Insulin Infusion every hour until Glucose Falls by 50-70 mg/dL

Adult DKA Guidelines at NYPH

When Serum Glucose Reaches 250 mg/dL :

- Add Dextrose (D51/2NS or D5NS*) to IVF @ 150 – 250 mL/h to maintain serum glucose 150 – 200 mg/dL and continue insulin at same rate
- Titrate insulin to a minimum 0.1 Units/kg/hr and glucose goal between 150 – 200 mg/dL until ketosis and anion gap resolves.
- If patient can tolerate PO, encourage consistent carbohydrate diet
- * Use D5NS if corrected $[Na^+]$ 140 or remains volume depleted

Insulin Pumps

Animas Ping/Vibe



Insulet Omni Pod



Medtronic 670G SAP



Roche Accu-Chek Spirit Combo



Tandem t:slim, t:slim G4, t:flex



Valeritas V-Go

NYPH PATIENT'S OWN INSULIN PUMP POLICY- ADULT

Sample Nursing Documentation:

Nursing Notes - Document the following:

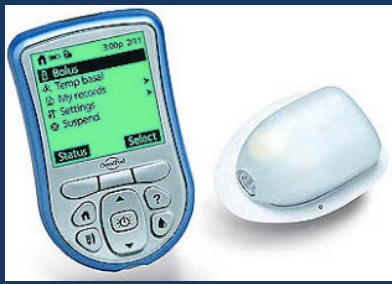
(1) Patient was admitted wearing insulin pump.

(2) Assessment of insulin pump insertion site upon admission and every shift.

(3) Site locations

(4) When witnessing change in reservoir, infusion set, site and hospital insulin supplied

(5) Episodes of hyper/hypoglycemia, pump and site problems and any interruptions in insulin delivery.



Insulin Pumps



- To stay on pump, patient must:
 - Cognitively intact with fully functional pump and adequate supplies
 - Able to demonstrate operational features pump
- Clinician who is knowledgeable about insulin pumps should follow patients on own pump and make dose adjustments

Insulin Pumps (Cont.)

- Order set for “patient’s own pump” should include:
 - Order “patient may use own insulin pump”
 - Order for insulin vial for pump
 - Patient’s signed consent ???
 - Flow sheet for patient to document all basal settings, boluses, site changes

Patient's Own Insulin Pump: Competency Must Be Evaluated



Vs.



NewYork-Presbyterian
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CLINICAL SUPPORT TELEPHONE NUMBERS

Medtronic: 1-800-646-4633
Omnipod: 1-800-591-3455
Animas: 1-877-937-7867

PATIENT'S OWN CONTINUOUS SUBCUTANEOUS INSULIN PUMP FLOWSHEET

IF NO PLATE, PRINT NAME, SEX AND MEDICAL RECORD NO.

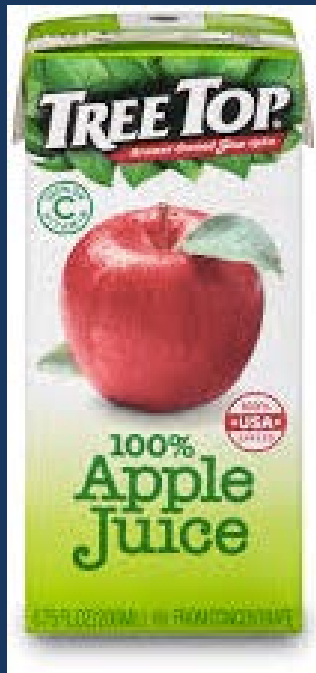
Date:	Correction Factor: _____ Correct to: _____ mg/dl											Insulin: Carb Ratios Breakfast _____ Lunch _____ Supper _____												
Time:	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Basal Insulin Rates																								
Blood Glucose																								
# Grams of Carbohydrates																								
Meal Insulin																								
Correction Insulin																								
Comments																								
Comments																								
Comments																								
Set Changes: Note Time	Set Change Due _____											<input type="checkbox"/> Set Change Done by _____											If not due, reason for change _____	

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Safety Issues

**Patient's Own Glucose Meter? Patient's Own Insulin?
Drip vs. Pump in ICU? Nursing Documentation**

Hypoglycemia Treatments



Delineate Treatment Options

- If patient is eating and able to swallow:
one tube glucose gel OR 4 oz fruit juice
(apple preferred)
- If patient cannot swallow or is NPO,
Unconscious or NOT alert:
 - If IV access Give D50W 50 mL IV Push
 - If no IV access Give Glucagon injection IM
 - May repeat glucagon x 1 only in 15 mins
- Glucose gel & D50W in Automated
Dispensing Cabinet (ADC) as over-ride ,
glucagon in crash cart

Coordination of BG, Insulin & Meals



Controlled Carbohydrate Meal Plan

- Controlled CHO meal plan recommended for patients with diabetes and/or hyperglycemia
- CHO are counted but # may vary from tray to tray
- Offers more flexibility & choices
- *Should not restrict calories* in acutely ill patients

Snacks:

- *Not necessary* with basal insulin & appropriate insulin dosing

Coordinating Meals, BGM & Insulin

- **Timing is Everything: What Goes Wrong**
 - Meal tray delivery times vary from the kitchen
 - BGM done too soon before mealtime
 - Poor communication between person checking BG and RN administering insulin
 - Tray delivered to room without BG or insulin
 - BG checked after patient started meal
 - **Room service** delivers meals directly to pt without notification or coordination with nursing



Meal Comparison at 3 Sites

	UCSD San Diego	VMMC Seattle	NYPH New York
Carb controlled diet	All carb limited trays limited to 60g per tray, including room service	All carbs labelled on the menu, no restrictions, room service	45 g/tray 60 g/tray- default 75 g/tray
Alert Trays Arriving	Phone call from kitchen 30 min prior to tray arrival on floor	Kitchen staff notifies RN by Vocera	Tray assistant notifies RN upon tray arrival on unit
BG Check	Done by RN 30 min prior to scheduled meal-time with call from kitchen as reminder	Patient presses call light when they order and then patient care technician comes to check BG	Done by RN within 60 minutes of arrival of tray on unit
Trays delivered by	Food Service staff leaves all carb limited trays in cart to be delivered by RN (with insulin). Room service has cut-offs when patient allowed to order/receive carb limited tray	Delivered by patient care technician or RN	Food Service staff delivers carb controlled trays first directly to patient
Nutritional Insulin administration	Administered with first bite of food or up to 30 min after if patient has nausea or poor appetite	With first bite of food	+/- 15 min of first bite of food

PERIOPERATIVE Glycemic Control



Perioperative Glycemic Control

Perioperative hyperglycemia matters:

- Malglycemia causes oxidative stress
- Increased risk of inflammation & infection
- Increased risk of thrombosis

Post-op period matters:

- > infections, arrhythmias, renal impairment
- Studies show improving glycemic control reduces risk of complications

Standards of Care

- Obtain A1c pre-op for pts with diabetes or DM risk factors, make regimen adjustments prior to surgery
- Use intravenous insulin drip in pts who take insulin PTA & are undergoing major surgical procedures, with known target e.g. BG 120 -180 mg/dL
- Use subcutaneous (subQ) correction dose or insulin drip during minor or short surgical procedures, with target BG 140 -180 mg/dL, and monitor BG q1–2 hours, depending on insulin used and type of surgery.

Standards of Care (Cont.)

- Anesthesia and OR team should make sure:
 - BG levels are monitored at least every hour for patients on insulin drip
 - If using insulin during surgery, potassium levels are measured every 4 to 6 hours in OR
 - BG is monitored in the recovery room immediately after surgery *and ongoing if needed*

Peri-Op Patient Education

- Medications to take the day before surgery
- Medications to take the morning of surgery
- Medications to take post op in hospital or at home
- How will patient get this information?



DIABETES MEDICATION ADJUSTMENTS *PRIOR TO PROCEDURE AND SURGERY*



Medications	Day Before Procedure or Surgery	Day of Procedure or Surgery
Oral sulfonylureas: Glyburide (Micronase [®]), glipizide (Glucotrol [®]), glimepiride (Amaryl [®])	Take only morning and/or lunch doses	None
Sodium-Glucose Co-Transporter 2 Inhibitor (SGLT-2): canagliflozin (Invokana [®]), dapagliflozin (Farxiga [®]), empagliflozin (Jardiance [®])	Stop taking any medications including combinations containing SGLT-2s 3-5 days before surgery or procedure	None
All other oral agents	Take usual dose(s)	None
Non-insulin injectables: GLP-1 RAs, pramlintide (Symlin [®])	Daily: Take usual dose Weekly: Hold if dose within 3 days	None
Rapid/Short acting insulins: Regular (Humulin [®] R, Novolin [®] R), Lispro (Humalog [®]), Aspart (Novolog [®]), Glulisine (Apidra [®])	Before meals: Take usual dose No bedtime dose	None
Insulin NPH Humulin [®] N, Novolin [®] N	Morning dose: Take usual dose Dinner/bedtime dose: T1DM: Reduce dose by 20% T2DM: Reduce dose by 30%	T1DM: Reduce dose by 30% T2DM: Reduce dose by 50%

Medications	Day Before Procedure or Surgery	Day of Procedure or Surgery
<p>Long-acting basal insulin U100 glargine (Lantus®), U100 detemir (Levemir®), Longer-acting basal insulin U300 glargine (Toujeo®), U100 & U200 degludec (Tresiba®)</p>	<p>Long-acting basal: Morning dose: Take 100% Dinner/bedtime dose: reduce by 20% Longer-acting basal: Reduce AM and/or PM dose by 20%</p>	<p>T1DM: Reduce dose by 20% T2DM: Reduce dose by 50%</p>
<p>Pre-Mixed Insulin Humulin® 70/30, Novolin® 70/30, Novolog® Mix 70/30, Humalog® Mix 75/25</p>	<p>Morning Dose: Take 100% T1DM: Reduce dinner dose by 20% T2DM: Reduce dinner dose by 30%</p>	<p>T1DM: Reduce dose by 50% T2DM: Do not take</p>
<p>Insulin Pumps</p>	<p>Ask patient to contact PCP/endocrinologist for orders, or reduce all basal rates by 20% for outpatients. Endocrine/Maternal Fetal Medicine consult mandatory for all inpatients</p>	

The Role of the RN in Safe & Effective Insulin Administration



Role of the RN

in Safe & Effective Insulin Administration

- RN should report BG <100 or >180 mg/dL to primary team for insulin adjustment
- Primary team should reduce insulin dose when BG is <100 or >180 mg/dL
- RN should never hold or change insulin dose without consulting primary team, that is prescribing & out of scope of practice of RN in NYS
- NO ONE should hold basal insulin in a patient with type I diabetes, including when pt is NPO

Key Glycemic Control References

- American Diabetes Association: Standards of medical care in diabetes—2017. Diabetes care in the hospital. *Diabetes Care*. 2017;40(Suppl. 1):104–S109.
- Draznin, B. et al. Pathways to quality inpatient management of hyperglycemia and diabetes: A call to action. *Diabetes Care*. 2013;36:1807-14.
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- Rushakoff, R.J., et al. Using a mentoring approach to implement an inpatient glycemic control program in United States hospitals. *Healthcare*. 2014;2;205-210.
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