**GUAM MEMORIAL HOSPITAL AUTHORITY**
**ADULT INSULIN INFUSION PROTOCOL**

## ADMISSION

**DATE:** _____ **TIME:** _____

**HEIGHT:** _____ ☐ **cm** ☐ **inches** **WEIGHT (initial):** _____**kg**

**ALLERGIES:** ☐ NKDA ☐ YES _____**Specify reaction:** _____

**CONSULT:** ☐ Endocrine

## INITIAL ORDERS

**INITIAL ORDERS:**
- ☒ Admit to ICU
- ☒ Weigh patient daily
- ☒ Q1H Blood Glucose (BG) checks (or serum glucose STAT if BG > 600mg/dL)

**INITIAL LABORATORY ORDERS (STAT if not already done)**
- ☒ CBC with auto differential
- ☒ Chem7
- ☒ Calcium
- ☒ Magnesium
- ☒ Phosphorus
- ☒ Albumin
- ☒ Serum acetone
- ☒ Serum osmolality
- ☒ Urinalysis with reflex to culture
- ☒ initial VBG **or** ABG (indicated in hypoxic respiratory failure)
- ☒ EKG 12-lead
- ☒ Blood culture x2 if temperature > 100°F
- ☐ Pregnancy test
- ☐ Other: _____

**INITIAL DIET ORDERS**
- ☐ NPO for 8 hours, then advance to clear liquids
- ☐ NPO except meds
- ☐ Other: _____

**Physician initial:** _____

## INITIAL ORDERS (cont.)

**SUBSEQUENT LAB ORDERS (while on insulin infusion)**

**a) Four (4) hours after initial labs**

☒ Chem7 Q4H x 2

**b) Twelve (12) hours after initial labs**

☒ CBC with auto differential
☒ Chem7
☒ Magnesium
☒ Calcium
☒ Phosphorus
☒ Albumin

## CALCULATIONS

**Corrected Na = serum Na + [0.016 x (serum glucose mg/dL -100)]**

**Corrected Anion Gap (AG) = Na – (Cl+$CO_2$)**

**Lean Body Weight (LBW)**

- **Women = 1.07 x weight [kg] – 148 [weight (kg) / height (cm)]$^2$**
- **Men = 1.10 x weight [kg] – 128 [weight (kg) / height (cm)]$^2$**

## IV FLUID MANAGEMENT

**IV FLUIDS**

**A. INITIAL IV FLUID BOLUS**

☐ 0.9% NaCl 1000mL over 1 hour x 2 liters
☐ Lactated Ringers (LR) 1000mL over 1 hour x 2 liters
☐ Other _____at _____ml/hr x _____liters

**B. MAINTENANCE IV FLUIDS**

- **if K < 4.0mEq/L, add 40mEq KCl to IVF**
- **if K is 4 to 4.5mEq/L, add 20mEq KCl to IVF**

☐ 0.9% NaCl at _____ml/hr (recommended for corrected Na<136mmol/L)
☐ 0.45% NaCl at _____ml/hr (recommended for corrected Na≥136mmol/L)
☐ Lactated Ringers (LR) at _____ml/hr
☐ Other _____at _____ml/hr

**C. DEXTROSE-CONTAINING IV FLUIDS**

**Once BG < 250mg/dL, call MD to switch MIVF to dextrose-containing IVF**

- **DKA and hyperosmolar state – once BG < 250mg/dL**
- **Perioperative and Labor & Delivery patients – once BG < 150mg/dL**

☐ D5-1/2NS at 150 ml/hr
☐ D5-1/2NS + KCl 40mEq at 150ml/hr
☐ Other _____at _____ml/hr

**Physician initial: _____**

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## INSULIN INFUSION MANAGEMENT

**DOSING WEIGHT = _____kg**

**GOALS DURING INSULIN INFUSION**

- Aim for target BG between 140-180 mg/dL
- Target BG hourly decrease by 50-75 mg/dL
- Prior to starting insulin infusion, potassium must be > 4mEq/L.
  If initial K < 4 mEq/L, do not initiate insulin infusion. Contact ordering physician for potassium repletion.
- Hold insulin drip if K < 3.3mEq/L, call physician to replete potassium.
- Blood glucose checks every hour while on insulin infusion.

**INSULIN DRIP INITIATION**

1. Insulin drip: regular insulin 100 units in 100mL NS (final concentration 1unit/1mL).
2. Flush 20mL through the line (waste) before connecting to the patient.
3. **Initial rate of 0.1 units/kg/hr = _____units / hr**

**INSULIN DRIP ADJUSTMENT** Adjust infusion rate hourly according to the following formula:

**Infusion rate (units/hr)** = (measured BG – 60) (**X**)

**KEEP SAME INFUSION RATE FOR ANY OF THE FOLLOWING**

- Hourly decrease in BG is within 50-75 mg/dL
- Measured BG is within goal BG 140-180 mg/dL

| X value (multiplier) | X value based on insulin requirements OR actual body weight |
|---|---|
| 0.02 | < 50 units insulin/day *or* weight < 50kg |
| 0.03 | 5-100 units insulin/day *or* weight 50-100kg |
| 0.04 | > 100 units insulin/day *or* weight > 100kg |

**Physician initial: _____**

## INSULIN INFUSION DISCONTINUATION

**INSULIN INFUSION DISCONTINUATION**

Insulin infusion may be discontinued for the following indications once the criteria specified below is met. Contact physician for orders to transition to SQ insulin.

1. **DIABETIC KETOACIDOSIS (DKA) RESOLUTION (<u>all</u> of the following criteria must be met)**
   i. BG < 200 mg/dL
   ii. Serum bicarbonate ($CO_2$) ≥ 15 mmol/L
   iii. **Corrected** Anion Gap (AG) ≤ 12 mEq/L

2. **HYPEROSMOLAR HYPERGLYCEMIC STATE (HHS) RESOLUTION**
   i. Serum osmol < 320 msOsm/kg
   ii. Normal mental status

3. **UNCONTROLLED HYPERGLYCEMIA**
   i. BG < 180 mg/dL for a minimum of 4 hours
   ii. Physician must order long-acting scheduled insulin prior to discontinuing insulin infusion.

## MANAGEMENT OF HYPOGLYCEMIA

**HYPOGLYCEMIA (BG < 80mg/dL)**

- If BG < 80mg/dL, decrease insulin infusion rate to **0.5 units/hr and contact physician**.
- Consider increasing dextrose-containing IVF rate or switch to D10W if patient is NPO.

## NOTIFY PROVIDER

**NOTIFY PROVIDER (for any of the following)**

- BG < 250mg/dL for switch to dextrose-containing IVF
- Hypoglycemia defined as BG < 80 mg/dL
- If BG drop > 75mg/dL **<u>and</u>** BG < 250mg/dL
- DKA or HHS is resolved according to specified criteria
- Transition to scheduled SQ insulin

**Physician initial:** _____

## TRANSITION TO SQ INSULIN

### IV to SQ INSULIN TRANSITION

**Do NOT stop insulin infusion until at least 60 minutes after SQ basal insulin has been ordered and given.**
**Prior to transition to SQ insulin, patient must have consistent nutrition defined as either:**
**a) Enteral Nutrition: at least 75% meal tray x 2 meals**
**b) Total Parenteral Nutrition / Peripheral Parenteral Nutrition**

Evaluate patient's nutritional intake to calculate the Total Daily Dose (TDD) of insulin.
- Step 1: Average the rate of insulin infusion when BG has stabilized.
- Step 2: Multiply by 24 hours. Multiply the 24-hour insulin requirement by 75% = TDD.
- Step 3: Divide the TDD into the appropriate insulin regimen. (**See sample calculations below)**
  - 50% basal insulin + 50% prandial insulin
  - Prandial insulin dose divided TID if tolerating meals or Q6H if on continuous tube feeds.

**Example:** Average rate of insulin infusion is 2units/hr.
TDD = 2units/hr x 24hrs = 48units x 75% = 36units TDD
50% TDD = 18units given as basal insulin (NPH, Lantus, Levemir, Tujeo)
50% TDD = 18units divided TID as prandial insulin = 6units TID
*If on tube feeds = 18 units divided Q6H as prandial insulin = 5units Q6H

**Physician:** _____

**Date:** _____ **Time:** _____

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| **Initial Insulin infusion rate (units/hr) = 0.1 units/kg/hr**<br><br>**Dosing weight = _____ kg** | **Insulin infusion rate adjustment (units/hr) = (Measured BG – 60) (X)**<br><br>**X = _____** |
|---|---|

| **Date** | **Time** | **Measured BG** | **Insulin infusion rate (units/hr)** | **RN initials (2 RN verification)** | |
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