**NON-DKA/NON-HHS INSULIN INFUSION**

**Title:**

**Purpose:**

**Policy Statement:**

To provide a safe and effective procedure for dosing, administering,

and titrating of insulin infusions for uncontrolled hyperglycemia (except DKA/HHS patients)

Inclusions:

-Uncontrolled hyperglycemia

**Indications for Use:** Exclusions:

-DKA/HHS

**Insulin Infusion Guidelines**   
   
**Goal Blood Glucose**: 140-180 mg/dL

**Recommendations to initiate infusion**: Persistent blood glucose above goal. Encouraged for patients in the ICU.

**Optional Initial Bolus**

* Administer initial bolus equal to starting rate of infusion (e.g. starting rate 3 units per hour, bolus = 3 units) **REQUIRES PHYSICIAN ORDER**
* Do not administer an additional bolus if insulin infusion already started (e.g. insulin infusion started in the Emergency Department prior to admission)

**Calculation of Initial Infusion Rate**

* \*Starting rate maximum 0.1 units per kg per hour
* **If BG > 600 mg/dL – starting rate REQUIRES PHYSICIAN ORDER**
* If BG < 600 mg/dL – starting rate calculated as follows:

Starting rate calculated as follows:

Starting rate for units / hour = (Current BG – 60) x 0.02

Example: Current BG is 210 mg/dL => (210 – 60) x 0.02 = 3 units/hour (3 mL/hr)

\*Caution with elderly, CKD and low body weight individuals   
\*Caution with **BG > 600 mg/dL** (starting dose may be too high)

\*Notify provider if insulin infusion rate calculation is ever > 20 units/hour (20 mL/hr)

**Nursing Communication**

* Insulin infusion titration requires hourly blood glucose checks
* Do not start insulin until potassium is > 3.3 mEq/L; insulin may lower potassium
* Check BMP prior to initiation of insulin infusion and q 4 hours while on insulin infusion
* If blood glucose levels are in target range (140-180 mg/dL) for 4 hours, decrease frequency of blood glucose checks to every 2 hours while in the target range

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* If there is unexplained hypo- or hyperglycemia, investigation of causative factors should be performed
* If there is a significant change in glycemic source (i.e. parenteral, enteral, or oral), expect to make insulin adjustments
* If the continuous source of glucose (IV Dextrose, TPN, or Enteral Feeds) is held or discontinued, reduce the insulin infusion by 50% and check blood glucose every

1. hour

* When patient leaves unit for procedures/transport, continue to check blood glucose every 1 hour and continue to titrate insulin infusion per protocol. If blood glucose cannot be checked every 1 hour, then turn insulin infusion OFF when patient leaves and resume when patient returns to unit
* If insulin infusion is discontinued, alternative glycemic management should be ordered

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|  | **Adjustment of Existing Infusion Rate**  **INSULIN ADJUSTMENT TABLE – REQUIRES HOURLY BLOOD GLUCOSE CHECKS** | | | | | | | | |
|  | **Previous Blood Glucose Level (mg/dL)** | | | | | | | |
| <100 | 100-140 | 141-180 | 181-200 | 201-250 | 251-300 | 301-400 | >400 |
| **Current Blood Glucose Level (mg/dL)** | ≤ 70 | Hold insulin drip and initiate hypoglycemia SDO. If BG remains < 140 mg/dL after treatment, continue to hold insulin infusion and check BG hourly until BG ≥ 140 mg/dL . Once BG ≥ 140 mg/dL call physician to resume insulin infusion at 50% previous rate and return to following insulin adjustment table.  -if **Type 1 DM** hold insulin drip and initiate hypoglycemia SDO. If and BG remains < 140 mg/dL after treatment, start D5W at 50 cc/hr and monitor BG hourly. Once BG ≥ 140 mg/dL call physician to resume insulin infusion at 50% previous rate. Stop D5W one hour after insulin drip is resumed if BG ≥ 140 mg/dL. Resume following insulin adjustment table. | | | | | | | |
| 71-100 | Hold insulin drip and recheck BG at 15 minutes. If BG is 71-140 mg/dL continue to hold insulin drip and check BG q 30 minutes x 2 and then hourly. Once BG is ≥ 140 mg/dL call physician to resume insulin infusion at 50% previous rate and return to following insulin adjustment table.  -if **Type 1 DM** – hold insulin drip and recheck BG at 15 minutes. If BG is 71-140 mg/dL continue to hold insulin drip and start D5W at 50 cc/hr; check BG q 30 minutes x 2 and then hourly. Once BG is ≥ 140 mg/dL call physician to resume insulin infusion at 50% previous rate. Stop D5W one hour after the insulin drip is resumed if BG ≥ 140 mg/dL. Resume following insulin adjustment table. | | | | | | | |
| 101-140 | ↓ rate by 1 unit/hr  (check BG q 30  min until ≥ 140) | ↓ rate by 25% or 0.5 units/hr\*  (check BG q 30  min until ≥ 140) | ↓ rate by 50% or 2 units/hr\*  (check BG q 30 min until ≥ 140) | | | | ↓ rate by 75% or 2 units/hr\*  (check BG q 30 min until ≥ 140) | |
| 141-180 | No change | | | | ↓ rate by 50% or 2 units/hr\* | | | |
| 181-200 | ↑ rate by 1 unit/hr | ↑ rate by 0.5 unit/hr | | ↑ rate by 25% or 1 unit/hr\* | No change | ↓ rate by 25% or 2 units/hr\* | | |
| 201-250 | ↑ rate by 25% or 2 units/hr\* | | | ↑ rate by 25% or 1 unit/hr\* | | | ↑ rate by 1 unit/hr | No Rate  Change |
| 251-300 | ↑ rate by 25% or 2.5 units/hr\* | | ↑ rate by 25% or 1.5 unit/hr\* | ↑ rate by 25% or 1 unit/hr\* | ↑ rate by 25% or 1   unit/hr\* | ↑ rate by 25% or 1.5   unit/hr\* | ↑ rate by 25% or 2 units/hr\* | No Rate  Change |
| 301-400 | ↑ rate by 40% or 3 units/hr\* | | | | | | | |
| >400 | ↑ rate by 50% or 4 units/hr\* | | | | | | | |
|  | **\* Whichever is greater** | | | | | | | | |
| **Round to the nearest tenth** | | | | | | | | |

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**DISCONTINUING INSULIN INFUSIONS**:

Consider change to subcutaneous insulin once BG is stable between 100-180 mg/dL for 6 hours.

Initiate alternative glycemic management 1 hour (rapid acting) to 2 hours (long acting) before discontinuing insulin infusion

For patients with type 1 diabetes or those with type 2 diabetes previously controlled on insulin:

* If NPO: Initiate basal subcutaneous insulin (glargine, detemir, or NPH) at 80% of insulin administered over prior 24 hours by insulin infusion. Stop infusion 2 hours after administration of long-acting insulin
* If taking >50% of usual oral or enteral intake: Give 50% of insulin dose as basal insulin based on the previous 24 hours of insulin infused or 0.2 units/kg and initiate pre-meal bolus and correction dose to maintain BG in target range. If subcutaneous short acting insulin is given, stop the insulin infusion 1 hour after subcutaneous injection.

Another alternative is to resume the pre-hospital insulin regimen

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**References**

1. Joslin Diabetes Center and Beth Israel Deaconess Medical Center Guideline for Management of UNCONTROLLED GLUCOSE IN THE HOSPITALIZED ADULT (05/20/2013). Accessed 7/6/16. [http://www.joslin.org/docs/unc\_gluc\_in\_hosp\_guideline\_final\_5\_13.pdf](http://www.joslin.org/docs/unc_gluc_in_hosp_guideline_final_5_13.pd)
2. Joslin Diabetes Center and Joslin Clinic Guideline for Inpatient Management of Surgical and ICU Patients with Diabetes (Pre-, Per- and Postoperative Care) (12/30/2015). Accessed 7/6/16. http://www.joslin.org/docs/Inpatient-management-of-surgical-patients-with-diabetes- \_12-30-2015.pdf

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