

Example 8 — Northwestern University Inpatient Intravenous Insulin Protocol

DeSantis AJ, Schmeltz LR, Schmidt K, et al. *Endocr Pract.* 2006;12:491–505.

Recently published, the Northwestern protocol uses three tables to adjust rates. Goal of 80–110 mg/dL is reached in 10.6 hours. Hypoglycemia < 60 mg/dL is reported to be 1.6%.

INTRAVENOUS INSULIN INFUSION ORDERS

1. Start the insulin infusion when blood glucose is greater than 110 mg/dL
2. If the initial blood glucose is greater than 300 mg/dL, draw a STAT Basic Chemistry Panel and notify the managing service with results.
3. Blood Glucose
 - A. Check values hourly until the value is in goal range (80-110 mg/dL) for 2 hours
 - B. If within goal range, decrease checks to every
 - 2 hours (in ICU) 4 hours (in General Care areas)
 - Other _____
 - C. If glucose meter reading is greater than 400 mg/dL, obtain a blood glucose sample for chemistry laboratory confirmation and quantification. Do not wait for laboratory results, adjust treatment.
4. Check serum potassium every _____ hours
5. When the blood glucose concentration is less than 180 mg/dL and if the patient is not on enteral or parenteral nutrition, discontinue the current IV fluids. Start IV glucose.
 - Dextrose 10% in water at _____ mL/hour
 - Dextrose 5% in water at _____ mL/hour
 - Dextrose 5%/sodium chloride 0.9% at _____ mL/hour
 - Dextrose 5%/sodium chloride 0.45% at _____ mL/hour
 - Dextrose _____ % in _____ at _____ mL/hour
6. Prime tubing with 20 mL of the insulin infusion solution. Repeat this process with any tubing changes.
7. Bolus and initiate insulin as per Table 1.

TABLE 1. INITIAL INSULIN DOSE AND INFUSION RATES

INITIAL BLOOD GLUCOSE VALUE	INITIAL BOLUS DOSE (UNITS)	INFUSION RATES (UNITS/HOUR)
110 - 180	2	2
181 - 240	3	3
241 - 300	4	4
301 - 360	5	5
361 - 420	6	6
421 - 480	7	7

8. Titrate the infusion based on current blood glucose and rate of blood glucose change according to Table 2 or Table 3 on page 3.
9. RN to document each insulin infusion rate change in the orders according to protocol

APN Signature _____
OR

INTRAVENOUS INSULIN INFUSION ORDERS

10. For blood glucose less than 60 mg/dL
 - A. Stop insulin infusion
 - B. If patient can take orally, give 15 g of fast-acting carbohydrate (4 oz. fruit juice/non-diet soda, 8 oz nonfat milk, or 3-4 glucose tablets).
 - C. If patient cannot take orally, give 50% dextrose IV
 - If patient awake and appropriately responsive: administer 25 mL
 - If patient not appropriately responsive: administer 50 mL
 - D. Recheck blood glucose every 20 minutes and repeat 25 mL of 50% dextrose IV if less than 60 mg/dL (notify service if less than 40 mg/dL after first dose of dextrose)
 - E. Restart insulin infusion at 50% of the previous setting once blood glucose is greater than 110 mg/dL on 2 consecutive checks 20 minutes apart.
11. Notify service for:
 - A. Blood glucose change (increase or decrease) of greater than 100 mg/dL in one hour.
 - B. Blood glucose greater than 400 mg/dL on two consecutive readings
 - C. Hypoglycemia requiring more than one dose of IV dextrose (per protocol in step 10)
 - D. For serum potassium less than 3.5 mEq/L or greater than 5.5 mEq/L
 - E. If blood glucose not within target range within 8 hours after starting the insulin infusion
12. Consults:
 - Diabetes Education Service (extension 6-4710)
 - Clinical Nutrition
 - Endocrine Diabetes Management Service (page 5-4385)
 - Other: _____

TABLE 2. INCREASING Blood Glucose

CURRENT BLOOD GLUCOSE	BOLUS REGULAR INSULIN	CHANGE FROM PREVIOUS BLOOD GLUCOSE	
		INCREASE	
		Less than 60 mg/dL	Greater than 60 mg/dL
80 - 110 mg/dL	No Bolus	No change	No change
111-180 mg/dL	2 units	INCREASE infusion by 0.3 units/hr	INCREASE infusion by 0.5 units/hr
181-240 mg/dL	3 units	INCREASE infusion by 0.8 units/hr	INCREASE infusion by 1 unit/hr
241-300 mg/dL	4 units	INCREASE infusion by 1 unit/hr	INCREASE infusion by 1.2 units/hr
301-360 mg/dL	5 units	INCREASE infusion by 1.5 units/hr	INCREASE infusion by 1.8 units/hr
361-420 mg/dL	6 units	INCREASE infusion by 2 units/hr	INCREASE infusion by 2.5 units/hr
421-480 mg/dL	8 units	INCREASE infusion by 3 units/hr	INCREASE infusion by 4 units/hr

TABLE 3. DECREASING Blood Glucose

CURRENT BLOOD GLUCOSE	CHANGE FROM PREVIOUS BLOOD GLUCOSE		
	DECREASE		
	<i>(follow step #10 on page 2)</i>		
Less than 60 mg/dL (Hypoglycemia)			
Less than 60 mg/dL	Bolus Regular Insulin	Greater than 60 mg/dL	
61-80 mg/dL	STOP infusion*	NO BOLUS	STOP infusion*
81-110 mg/dL	No change	NO BOLUS	DECREASE infusion by 50% of current rate
111-180 mg/dL	INCREASE infusion by 0.3 units/hr	NO BOLUS	DECREASE infusion by 30% of current rate
181-240 mg/dL	INCREASE infusion by 0.5 units/hr	2 units	NO change, NO BOLUS
241-300 mg/dL	INCREASE infusion by 1 unit/hr	3 units	NO change, NO BOLUS
301-360 mg/dL	INCREASE infusion by 1.2 units/hr	4 units	NO change, NO BOLUS
361-420 mg/dL	INCREASE infusion by 1.5 units/hr	5 units	NO change, NO BOLUS
421-480 mg/dL	INCREASE infusion by 2 units/hr	6 units	NO change, NO BOLUS

***Recheck blood glucose in one hour, restart infusion when blood glucose is greater than 110 mg/dL on 2 consecutive 20 minute checks. Restart infusion at 50% of the previous setting.**

APN Signature _____
OR