

## INDICATIONS AND GUIDELINES FOR INSULIN INFUSION

### RATIONALE

The predictable delivery and short biological effect (about 40 minutes) of intravenous insulin allows for rapid dose titration based on individual patient requirements and more stable glucose levels. The insulin infusion is designed to:

1. Keep glucose in a target range, minimizing the risk of hypoglycemia and avoiding the undesirable effects of hyperglycemia.
2. Improve and maintain glycemic control, even when an operative procedure is delayed.

### INDICATIONS

1. Patients with diabetes *and* hyperglycemic patients who are NPO (e.g., perioperative management, prolonged nausea and vomiting)
2. For patients who are starting TPN or tube feeding, an insulin infusion may be used to establish insulin requirements; care must be taken to adjust insulin infusion when changes in rates of TPN or tube feedings are made.
3. Glycemic goal is 80 to 120 mg/dL in the ICU setting.

### IMPORTANT POINTS

1. Patients with renal failure or fluid restrictions should be given glucose as a D10 infusion at a slower rate.
2. Insulin requirements are predictably increased in certain clinical conditions: severe infections, steroid therapy (doubles insulin needs), morbid obesity, and hepatic disease.
3. If patient has continued hyperglycemia, make sure patient is hydrated and correct hypokalemia and hypomagnesemia if indicated.
4. Because insulin has a very short biological effect, it usually should be administered by infusion and not by IV push.
5. Patients in an ICU setting may have impaired peripheral perfusion or peripheral edema. Therefore, they are less likely to consistently and predictably absorb subcutaneous insulin; hence, an insulin infusion should be utilized.

# UCSF Medical Center

## INSULIN INFUSION ORDER FORM FOR ADULT CRITICAL CARE ONLY For Hyperglycemic Patients

UNIT NUMBER

PT. NAME

BIRTHDATE

LOCATION

DATE

Ht:	cm or in
Wt:	kg or lbs
Allergies:	

**Instructions:** "✓" in box to activate order

**1. Discontinue all previous orders for:**

- Insulin orders
- Oral antidiabetic medications      Name(s): \_\_\_\_\_

**2. Maintenance IV FLUIDS:** *IV dextrose infusion must be maintained while the patient is on an insulin infusion (minimum rate of 10 mL/hr)*

- D5    NS    at \_\_\_\_\_    mL/hr
- D5 1/2 NS    at \_\_\_\_\_    mL/hr
- D10    W    at \_\_\_\_\_    mL/hr (for patients with fluid restrictions or renal failure)
- Other \_\_\_\_\_ at \_\_\_\_\_    mL/hr
- Add KCl    \_\_\_\_\_    mEq/L (generally 20 mEq/L)

**3. Insulin Infusion Bags**      ICU Concentration      1 unit = 1mL\*

*\*Use 100 units of REGULAR human insulin in a 100 mL NS bag. Before connecting to the patient--Flush and discard the first 20 mL through tubing or whenever tubing is changed. Concentrated insulin infusion must be piggybacked with IV fluid chaser to ensure delivery.*

**4. Start Insulin Infusion Rate.** Blood glucose (BG) level must be  $\geq 120$  mg/dL before starting.

- If patient's normal insulin daily use is 0 - 30 units/day      **0.5**      **unit/hr**  
(or on diet, oral antidiabetic medications or no history of diabetes)
- If patient's normal insulin daily use is > 30 units/day      **1**      **unit/hr**
- Other (especially if BG > 300 mg/dL)      \_\_\_\_\_      **units/hr**

**5. Blood Glucose Goal: 80 - 120 mg/dL** (Follow monitoring parameters & dose adjustments on page 2)

**6. If the TPN or tube feeds are interrupted for longer than 30 minutes, start D<sub>10</sub>W at 50 mL/hr and notify MD about change and further action.**

**7. Converting or starting subcutaneous (SQ) insulin:** The first SQ dose should be administered 30 minutes prior to discontinuing insulin infusion (See transition plan for converting to subcutaneous insulin from insulin infusion). Use SQ Insulin Order Sheet (Form# 602-562).

<b>MD Name:</b>	<b>Provider ID #</b> _____	<b>Pager #</b> _____ - _____
<b>MD Signature:</b>	<b>Date:</b>	<b>Time:</b>
<b>RN Signature:</b>	<b>Date:</b>	<b>Time:</b>



## ICU INSULIN DOSE ADJUSTMENT TABLE

ICU Blood Glucose (BG) Goal: 80 - 120 mg/dL

<b>A.</b>	<b>If current BG is &lt; 60 then</b>
<ul style="list-style-type: none"> <li>• <b>STOP</b> insulin infusion</li> <li>• Give 50 mL D50 IV push</li> <li>• Notify MD/HO</li> <li>• Check BG every 15 minutes and repeat treatment until BG &gt; 80 mg/dL; then, check BG every 30 minutes until BG is 120 mg/dL</li> <li>• When BG ≥ 120 mg/dL, restart drip at <b>40%</b> of previous rate (0.40 x previous rate). Round up to the nearest tenth of a unit.</li> </ul>	
<b>B.</b>	<b>If current BG is 60 to 80 then</b>
<ul style="list-style-type: none"> <li>• <b>STOP</b> insulin infusion</li> <li>• Check BG every 30 minutes until BG is 120 mg/dL</li> <li>• When BG ≥ 120 mg/dL, restart drip at <b>50%</b> of previous rate (0.50 x previous rate). Round up to the nearest tenth of a unit.</li> <li>• If 2 episodes of BG below 80 mg/dL in 4 hours, call HO to reevaluate rate</li> </ul>	

<b>C.</b>	<b>If current BG is 81 to 120 and previous BG was:</b>	<b>Action Step 1</b>	<b>Action Step 2: Check BG in</b>
	81-100	↓ rate by 0.2 unit	1-2 hr
	101-120	No change	1-2 hr
	121-160	↓ rate by 0.5 unit	1 hr
	161-200	↓ rate by 1 unit	1 hr
	201-250	↓ rate by 1.5 units	1 hr
	251-400	↓ rate by 2 units	1 hr
	> 400	↓ rate by 3 units	30 mins
<b>D.</b>	<b>If current BG is 121 to 160 and previous BG was:</b>	<b>Action Step 1</b>	<b>Action Step 2: Check BG in</b>
	≤ 120	↑ rate by 0.2 units	1 hr
	121-160	↑ rate by 0.4 units	1 hr
	161-200	No change	1 hr
	201-250	↓ rate by 0.5 units	1 hr
	251-400	↓ rate by 1 unit	1 hr
	> 400	↓ rate by 2 units	30 mins
<b>E.</b>	<b>If current BG is 161 - 200 and compared to previous BG it has</b>	<b>Action Step 1</b>	<b>Action Step 2: Check BG in</b>
	Remained the same or increased	↑ rate by 0.5 unit	1 hr
	Decreased by ≥ 1 but < 10 then	↑ rate by 0.4 unit	1 hr
	Decreased by ≥ 10 but < 50 then	No change	1 hr
	Decreased by ≥ 50 but < 100 then	↓ rate by 0.5 unit	1 hr
	Decreased by ≥ 100	↓ rate by 1.5 units	30 mins
<b>F.</b>	<b>If current BG is &gt; 200 and compared to previous BG it has</b>	<b>Action Step 1</b>	<b>Action Step 2: Check BG in</b>
	Remained the same or increased	↑ rate by 1.2 unit	1 hr
	Decreased by ≥ 1 but < 30 then	↑ rate by 1 unit	1 hr
	Decreased by ≥ 30 but < 100 then	No change	1 hr
	Decreased by ≥ 100	↓ rate by 1 unit	30 mins
	NOT decreased below 200 after 3 adjustments in infusion rate	Call HO	1 hr

*Individualize algorithm for very insulin resistant subjects (insulin infusion > 20 units/hr or BG > 300 mg/dL for more than 4 hr). Endocrine service (719-9125) is available for advice.*