University of Toledo Insulin Infusion (STANDARD DOSE) – Adult – Practice Protocol

**Glucose Monitoring Orders:** Perform blood glucose monitoring every hour until within target range (110-150 mg/dL) for 3 hours (3 readings in a row), then decrease frequency to every 2 hours. Hourly monitoring must be resumed if blood glucose deviates from target range. Serum monitoring should be performed for patients with Hct<20%, severely compromised circulation, and other conditions in which peripheral blood glucose monitoring is known to be unreliable.

**Insulin Infusion Orders: Initiating Infusion:** (NOTE: After priming IV tubing, waste additional 20 ml of insulin infusion to saturate all plastic tubing binding sites-electrostatic interaction).

**Column 1:** INSULIN SENSITIVE. Only start here for extremely insulin sensitive patients (i.e., patients with type 1 diabetes using less than 30 units of insulin at home or s/p islet transplant).

**Column 2:** MOST. Start here for most patients (NOTE exceptions from Column 1 or 3).

**Column 3:** INSULIN RESISTANT. Only start here if: Glucose > 600 mg/dL; s/p solid organ transplant; receiving vasopressors or steroids.

**Columns 4-6:** DO NOT USE FOR START.

**Columns 7-9:** ONLY FOR USE IN ICU (HIGH DOSE).

**Rules for Column changes (1-6):**

A. Determine the amount of glucose change since previous glucose check and follow decision trees:

1. **Below Target**
   - BG < 70 mg/dL
   - TURN OFF
   - Hypoglycemia
   - Orders bellow
   - **0-49 mg/dL**
     - Stay in same column
   - **50-100 mg/dL**
     - Stay in same column
   - **Above Target**
     - Move left 1 column

2. **In Target**
   - BG 70-109 mg/dL
   - 1st time: Stay same column
   - 2nd consecutive time: Move right 1 column

3. **Above Target**
   - **Stay same column**

4. If BG is decreasing move left 1 column

5. If BG is increasing move right 1 column
**B.** Do not move more than 1 column each hour unless specifically ordered.

**C.** Consider moving right after initiation or increase of vasopressors or steroids, tube feeding or TPN if BG increases with subsequent monitoring.

**D.** Consider moving left after reduction or discontinuation of above medications or 4 hours after 1st subcutaneous dose of long-acting insulin if BG decreases with subsequent monitoring.

**E.** Nutritional Considerations: If subcutaneous rapid-acting insulin is administered with meals, stay in the same column for the next 2 hours. Two hours after, resume use of decision trees above.

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### Hypoglycemia Treatment Orders:

1. Stop infusion. *(Infusion should be off for at least 30 minutes. See step 4 below for how to re-start).*

2. Provide Treatment:
   - **If unable to eat or swallow safely or NPO:** Administer Dextrose 50% per orders
   - **If able to eat or swallow safely and BG is 40-69 mg/dL:** Give 15 grams of carbohydrates (i.e. 4 ounces of juice or 4 glucose tablets); **if BG is less than 40 mg/dL:** Give 30 grams of carbohydrates (i.e. 8 ounces of juice or 8 glucose tablets)

3. Recheck BG 5 minutes after. Repeat treatment as ordered until BG ≥ 80 mg/dL. Another BG need to be checked before re-starting infusion.

4. **Re-start infusion if insulin has been off for 30 minutes AND if current BG is 110 mg/dL or greater.** Move Left 1 column and re-start infusion rate according to current BG (if already using Column 1, follow dosing parameters as written in column 1).

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![Hypoglycemia Treatment Orders Table](image-url)
Rules for Column changes (7-9):

A. A patient must be in the ICU to use the HIGH DOSE insulin infusion Columns 7-9.

B. Notify provider when patient initially meets criteria to move to Columns 7-9.

C. A patient must be using Column 6 and meet criteria to move right 1 column in order to transition to Column 7.

D. When criteria are met to move left 1 column for a patient using column 7, patient should be moved back to Column 6 of the STANDARD DOSE Insulin Infusion Protocol.

E. Apply same rules for column changes as Rules for Column Changes (1-6)

<table>
<thead>
<tr>
<th>BG</th>
<th>Column 7</th>
<th></th>
<th>Column 8</th>
<th></th>
<th>Column 9</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>mg/dL</td>
<td>U/hr</td>
<td>mg/dL</td>
<td>U/hr</td>
<td>mg/dL</td>
<td>U/hr</td>
<td></td>
</tr>
<tr>
<td>&gt; 360</td>
<td>38</td>
<td>&gt; 360</td>
<td>46</td>
<td>&gt; 360</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>330-359</td>
<td>36</td>
<td>330-359</td>
<td>42</td>
<td>330-359</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>300-329</td>
<td>34</td>
<td>300-329</td>
<td>38</td>
<td>300-329</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>270-299</td>
<td>30</td>
<td>270-299</td>
<td>34</td>
<td>270-299</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>240-269</td>
<td>26</td>
<td>240-269</td>
<td>30</td>
<td>240-269</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>210-239</td>
<td>22</td>
<td>210-239</td>
<td>26</td>
<td>210-239</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>180-209</td>
<td>18</td>
<td>180-209</td>
<td>22</td>
<td>180-209</td>
<td>26</td>
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</tr>
<tr>
<td>151-179</td>
<td>15</td>
<td>151-179</td>
<td>18</td>
<td>151-179</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

BG < 110 mg/dL: Move left 1 column every hour until BG is back within Target Range; revert to columns 1-6 as needed

<table>
<thead>
<tr>
<th>BG</th>
<th>Target Range</th>
<th>Column 7</th>
<th></th>
<th>Column 8</th>
<th></th>
<th>Column 9</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>mg/dL</td>
<td></td>
<td>U/hr</td>
<td></td>
<td></td>
<td>U/hr</td>
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<td>U/hr</td>
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<td>140-150</td>
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<td>110-120</td>
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</table>

BG < 70 mg/dL = hypoglycemia (see hypoglycemia Treatment Orders)