New Insulin Subcutaneous Orders 1
Insulin Subcutaneous Orders PPO #717 3

In This Issue...

NEW INSULIN SUBCUTANEOUS PRE-PRINTED ORDERS (PPOs)

Two new insulin subcutaneous pre-printed orders: PPO #717 (for patients who are eating meals or are NPO) and PPO #718 (for patients on continuous enteral feeds or TPN) were implemented hospital-wide in June 2016 to replace the previous insulin sliding scale orders. These orders have been recently revised and simplified for ease of use.

A. Insulin Subcutaneous Orders for Patients Who are Eating Meals or are NPO (PPO # 717, pages 3-4)

Target Blood Glucose:
• To maintain fasting capillary blood glucose (CBG) between 5 and 8 mmol/L.

New Terminology for Insulin Use:
• Basal Insulin [NPH, glargine (Lantus®)]
  Longer-acting insulin that controls hyperglycemia caused by liver glucose production when not eating
  ⇒ Insulin-dependent patients should receive their usual basal insulin dose, even if NPO.
  ⇒ If patient is NPO or has poor oral intake, the dose may be reduced by 25%.
  ⇒ See Table 1 (page 2) for Non-Formulary Insulin Conversion Chart (ie. detemir (Levemir®)).

• Nutritional Insulin [insulin Regular, lispro (Humalog®)]
  Shorter-acting insulin required for meal-related hyperglycemia
  ⇒ Insulin Regular is given 30 minutes before meals and insulin lispro is administered right at mealtime.
  ⇒ See Table 1 (page 2) for Non-Formulary Insulin Conversion Chart: (ie. aspart (Novorapid®), glulisine (Apidra®)).

• Correction Insulin [insulin Regular, lispro (Humalog®)]
  ⇒ Shorter-acting insulin that is used:
    a) in addition to regularly scheduled insulin when CBG is above 8 mmol/L;
    b) on its own for 24-48 hours as a dose finding strategy in insulin naïve patients; or
    c) as short-term management of hyperglycemia
  ⇒ There are 3 “Correction (sliding) scales” to choose from: Low, Medium, or High depending upon the pre-admission 24-hour insulin usage. There is also a “Custom scale” that can be selected.
  ⇒ Correction insulin is used to “fine tune” the regularly scheduled insulin doses.
    ◊ The goal is to use as little Correction insulin as possible and provide blood glucose control primarily through the scheduled Basal and Nutritional insulin.
  ⇒ A separate Correction scale is used for HS dosing since insulin requirements at bedtime are lower than during the day.

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Any comments, questions, or concerns with the content of the newsletter should be directed to the editors. Write to CSU Pharmaceutical Sciences Vancouver General Hospital, 855 W12th Ave, Vancouver BC V5Z 1M9, send a FAX to 604-875-5267 or email karen.shalansky@vch.ca
Discharge Insulin:
- If an insulin naïve patient requires more than 10 units of insulin daily in hospital, they may require insulin after discharge.

B. Insulin Subcutaneous Orders for Patients Who are Receiving TPN or Continuous 24 Hours Enteral Feeds (PPO # 718)

Target Blood Glucose:
- To maintain CBG between 5 and 8 mmol/L.

New Terminology for Insulin Use:
- Basal Insulin
  ⇒ Basal insulin is recommended for patients receiving TPN or continuous enteral feeds who were receiving insulin prior to admission.
  ◊ Basal insulin should be continued at pre-admission levels, especially for type 1 diabetics.
  ⇒ For patients receiving TPN or enteral feeds who were not using insulin prior to admission, basal insulin is not recommended initially because of the difficulty in determining basal insulin dose.
  ◊ Initially, these patients should receive only Nutritional and Correction insulins.
  ◊ Once insulin requirements have been stabilized, Basal insulin can be added to make up approximately 50% of the total daily insulin dose.

- Nutritional Insulin
  ⇒ Insulin in TPN bag: The preferred and safest way of administering insulin for patients who are on TPN is to add it to the TPN bag, because when the TPN stops, the insulin also stops.
  ◊ If known diabetes, start with 1 unit insulin Regular for each 10 g dextrose in the TPN bag.
  ◊ If stress hyperglycemia occurs without known diabetes, start with 1 unit insulin Regular for each 20-30 g dextrose in the TPN bag.
  ⇒ Continuous Enteral Feeds: Use insulin Regular Q6H. Adjust dose by 10-20% every 1 to 2 days as needed to achieve Q6H glucose targets.

- Correction Insulin
  ⇒ Shorter-acting insulin that is used:
    a) in addition to regularly scheduled insulin when CBG is above 8 mmol/L;
    b) on its own for 24-48 hours as a dose finding strategy; or
    c) as short-term management of hyperglycemia

Comparison to Traditional Insulin Sliding Scales:
When compared with the traditional insulin sliding scales, basal-nutritional-correction insulin orders have been shown to improve blood glucose control with no increase in hypoglycemia.1

Please contact Anar Dossa at anar.dossa@vch.ca for any questions.

Reference:

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**Table 1. Insulin Conversion Chart for Non-Formulary Insulins**

<table>
<thead>
<tr>
<th>Pre-Admission Insulin</th>
<th>Conversion (Original to Formulary)</th>
<th>Formulary Insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>detemir (Levemir®)</td>
<td>detemir → NPH or glargine = 1:1</td>
<td>NPH 10 units BID OR glargine 20 units daily</td>
</tr>
<tr>
<td>20 units daily</td>
<td>(1 unit detemir = 1 unit NPH = 1 unit glargine)</td>
<td></td>
</tr>
<tr>
<td>aspart (Novorapid®)</td>
<td>aspart = lispro = regular = 1:1:1</td>
<td>regular 5 units TID OR lispro 5 units TID</td>
</tr>
<tr>
<td>5 units TID</td>
<td></td>
<td>regular 5 units TID OR lispro 5 units TID</td>
</tr>
<tr>
<td>glulisine (Apidra®)</td>
<td>glulisine = lispro = regular = 1:1:1</td>
<td></td>
</tr>
<tr>
<td>5 units TID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humalog® MIX 25</td>
<td>Humalog® MIX 25 → lispro 25% and NPH 75%</td>
<td>lispro 5 units BID AND NPH 15 units BID (breakfast and dinner)</td>
</tr>
<tr>
<td>(lispro 25%/lispro protamine 75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novomix® 30</td>
<td>Novomix® 30 → lispro 30% and NPH 70%</td>
<td>lispro 6 units BID AND NPH 14 units BID (breakfast and dinner)</td>
</tr>
<tr>
<td>20 units BID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(aspart 30%/aspart protamine 70%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novolin® GE 50/50</td>
<td>Novolin® GE 50/50 → regular 50% and NPH 50%</td>
<td>regular 10 units BID AND NPH 10 units BID (breakfast and dinner)</td>
</tr>
<tr>
<td>20 units BID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(regular 50%/NPH 50%)</td>
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</tr>
</tbody>
</table>
Insulin Subcutaneous Orders PPO # 717

IF YOU RECEIVED THIS FACSIMILE IN ERROR, PLEASE CALL 604-875-4077 IMMEDIATELY

Vancouver Coastal Health
VA: VGH / UBC / GFS
VC: BP / Purdy / GPC

ORDERS

COMPLETE OR REVIEW ALLERGY STATUS PRIOR TO WRITING ORDERS

INSULIN SUBCUTANEOUS ORDERS
For patients who are eating meals or are NPO
(items with check boxes must be selected to be ordered)

Date: ____________ Time: ____________

MONITORING: Capillary blood glucose (CBG) TID before meals and 1 hour after meals. If HS correction insulin administered, repeat CBG at 03:00; do NOT give any insulin at 03:00, call physician if CBG is above 18 mmol/L

MEDICATIONS: Discontinue all previous insulin orders

BASAL Insulin (Longer acting): Can be given even if NPO; prescriber may reduce dose by 25% if NPO or poor intake

insulin NPH ________ units subcutaneous at breakfast (08:00 if NPO)
__________ units subcutaneous at 00:00
__________ units subcutaneous QHS
“OR” ________ units subcutaneous at dinner (17:00 if NPO)

“OR” insulin GLARGINE (LANTUS) ________ units subcutaneous at breakfast (08:00 if NPO)
__________ units subcutaneous QHS

NUTRITIONAL Insulin (Shorter acting): HOLD IF NPO or unable to eat

☐ insulin REGULAR subcutaneous (30 min before meal) ________ units Breakfast ________ units Lunch ________ units Dinner

“OR” ☐ insulin LISPRO subcutaneous (give at mealtime) ________ units Breakfast ________ units Lunch ________ units Dinner

CORRECTION / SLIDING SCALE (Shorter acting): Can be ordered and given even if NPO or unable to eat

Choose same insulin type as Nutritional insulin. If not on Nutritional and nothing selected, insulin REGULAR is default

☐ insulin REGULAR TID subcutaneous before meals and HS

“OR” ☐ insulin LISPRO TID subcutaneous with meals and HS

CBG (mmol/L) | TID Dosing | HS Dosing
--- | --- | ---
Below 4 | Follow hypoglycemia protocol and call MD | Follow hypoglycemia protocol and call MD
4 to 8 | No correction; give only nutritional insulin as ordered | 0 units
8.1 to 10 | 1 unit | 0 units
10.1 to 12 | 2 units | 0 units
12.1 to 14 | 3 units | 0 units
14.1 to 16 | 4 units | 0 units
16.1 to 18 | 5 units | 0 units
Above 18 | 6 units; call MD | 10 units; call MD

**Total daily insulin requirement from all sources. See guidance on reverse for selection of low, medium or high dosing

Signature ____________________________ Printed Name VCH.VA.PPO.717  I Rev.AUG.2016 College ID
Guidelines for the Use of Basal, Nutritional and Correction Insulin
For patients who are eating meals or are NPO

GOAL OF THERAPY
- The goal of therapy is to use as little correction insulin as possible and to provide most of the insulin as regularly scheduled basal and nutritional insulin to maintain fasting CBG between 5 mmol/L and 8 mmol/L

Basal insulin (longer acting insulin that targets hyperglycemia caused by liver glucose production when not eating)
- Formulary Basal insulins: glargine (LANTUS) and NPH
- Patients previously on insulin should receive scheduled basal insulin at all times regardless of nutritional status
- Patients with type 1 diabetes should have basal insulin ordered at all times to avoid developing ketosis
- Patients with Type 2 diabetes not previously on insulin can also be started on basal insulin if they have either:
  - poorly controlled glucose on admission (i.e. A1C above 8.5%) *OR*
  - two or more high doses of oral agents which are being held while in hospital
- For patients using insulin NPH prior to admission: order insulin NPH BID (the second NPH dose may be given at bedtime instead of dinner to avoid nocturnal hypoglycemia)
- Well controlled Type 2 diabetes eating meals: consider 20% dose reduction if glucose is well controlled and dietary intake reduced.

Nutritional insulin (shorter acting insulin that targets hyperglycemia caused by meals)
- Formulary Nutritional insulins: regular and lispro (humalog)
- Regular insulin should be administered 30 minutes before a meal and lispro insulin should be administered at mealtimes

Correction Scale – selection of low, medium or high insulin dose
- Formulary Correction insulins: regular and lispro (humalog)
- If blood glucose is above 8 mmol/L, correction insulin is given in addition to the scheduled nutritional insulin dose.
- Add up all insulin over 24 hours from all components of pre-admission regimen and choose the appropriate dose scale according to the 24-hour insulin use. Consider starting at low dose for patients at high risk of hypoglycemia such as patients with type 1 diabetes, renal dysfunction, hypoglycemia unawareness, insulin naive patients and the elderly.

Insulin Conversion Chart for Non-Formulary Insulins:

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<tr>
<td>aspart (NOVORAPID) 5 units TID</td>
<td>aspart → lispro or regular = 1:1</td>
<td>regular 5 units TID OR lispro 5 units TID</td>
</tr>
<tr>
<td>glulisine (APIDRA) 5 units TID</td>
<td>glulisine → lispro or regular = 1:1</td>
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<td>NOVOMIX 30 (aspart 30%/aspart protamine 70%) 20 units BID</td>
<td>NOVOMIX 30 → lispro 30% and NPH 70%</td>
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<td>NOVOLIN GE 50/50 (regular 50%/NPH 50%) 20 units BID</td>
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<td>regular 10 units BID AND NPH 10 units BID (breakfast and dinner)</td>
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*Intermittent enteral feeds:
- This PPO may be used for intermittent enteral feeds (consider rapid-acting insulin); consult endocrinology for difficult to manage cases

Daily review of blood glucose results
- Basal insulin: assess basal insulin daily and adjust as needed every 1 to 3 days by targeting the morning (pre-breakfast) glucose.
- Nutritional insulin: assess nutritional insulin doses daily and adjust as needed every 1 to 3 days by targeting glucose level at next CBG.
- Correction insulin: If correction insulin is being administered frequently, the basal and nutritional insulin doses should be reassessed.

Ensure appropriate discharge insulin and diabetic medications
- If an insulin naive patient requires more than 10 units of insulin daily in hospital, they may require insulin after discharge.
- If the fasting glucose is elevated, consider starting with insulin NPH 10 units HS and ensure early follow-up with the family doctor.