Learning Outcome

The learner will be able to identify the different types of insulins available, their actions, and indications.

PROBLEM STATEMENT: Insulin is widely considered to be one of the most important and beneficial drug discoveries of the 20th century. Its therapeutic benefits are undeniable. However, preventable patient harm associated with errors involving insulin use continues to be a problem in hospitals across the country. Insulin consistently appears as a top offender, leading to the most harmful and severe adverse events on the list of high-alert drugs published by the United States Pharmacopeia (USP) and the Institute for Safe Medication Practices (ISMP) (Kelly, 2012).
Insulin is a hormone made inside the beta cells of the pancreas. With each meal, beta cells release insulin to help the body use or store the blood glucose it gets in food.

In Type 1 diabetes, the beta cells do not produce insulin.

In Type 2 diabetes, either the body does not produce insulin or the cells ignore the insulin.
Insulins available at UTMC

- Rapid-acting
  - Novolog
- Short-acting (regular)
  - Regular (U100)
  - Regular (U500)
- Intermediate-acting
  - NPH
- Long-acting
  - Levemir
  - Lantus
- Pre-mixed
  - Novolog 70/30
  - Humalog 50/50
• **Novolog** vials are stored in the Acu-Dose cabinet on each unit. Once pharmacy receives the order, the nurse can choose the Novolog option on the patient’s profile and will draw up the ordered amount for administration.

• **All other insulins** are stored in pharmacy. Once pharmacy receives an order, they will draw up the insulin and sent it to the unit.

*All insulin is checked by 2 RNs prior to administration!*
Rapid-acting Insulins

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Brand Name</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin aspart</td>
<td>Novolog</td>
<td>10-20 minutes</td>
<td>40-50 minutes</td>
<td>3-5 hours</td>
</tr>
</tbody>
</table>

These are also called prandial insulins. They are prescribed to be given at meal time, often as sliding scale coverage. They are usually injected about 10 minutes before mealtime.

Usual doses are small, as they begin working quickly and the patient receives the benefit of the full dose immediately.

These are one of the newest classes of insulins and work more quickly than the short-acting insulins.
4 Facts About Using Novolog Insulin Vials in the AcuDose at UTMC

Fact 1: Each vial is 10ml and each ml contains 100 units, so a vial is 1000 units when full. The maximum in any AcuDose is 2000 units.

Fact 2: The vials are good for 28 days at room temperature; the vials are dated when sent from the pharmacy with a tadpole label. Additional tadpole labels are sent, so you can label your syringe when you draw up the insulin.

Fact 3: The insulin is charged by the number of units dispensed. Example, covering sliding scale and need 6 units, so charge for 6 units.

Fact 4: The insulin vial goes back into the AcuDose machine, not into the patient specific bin.
### Short-acting Insulins

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Brand Name</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novolin R</td>
<td>Regular</td>
<td>30-60 minutes</td>
<td>2-4 hours</td>
<td>5-8 hours</td>
</tr>
</tbody>
</table>

These insulins are also considered prandial insulins. They work quickly in the system to correct blood sugars and may also be used at meal times or as supplemental coverage with the long-acting formulations. Regular insulin is the only type which may be administered IV push with a physician’s order in certain circumstances.

These should be taken 30-60 minutes prior to mealtime if used as sliding scale coverage.

UTMC carries 2 strengths of regular insulin – U100 and U500. The U100 insulin is most common and contains 100 units of insulin per 1ml. The U500 insulin is 5 times as strong as the U100 strength and is only ordered in rare circumstances.
# Intermediate-acting Insulins

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Brand Name</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novolin N</td>
<td>NPH</td>
<td>1-3 hours</td>
<td>8 hours</td>
<td>12-16 hours</td>
</tr>
</tbody>
</table>

These insulins cover needs for about half the day or overnight. They are usually combined with rapid- or short-acting insulins.

Usual administration time is 1 hour prior to mealtimes.
# Long-acting Insulins

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Brand Name</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin detemir</td>
<td>Levemir</td>
<td>1 hour</td>
<td>Peakless</td>
<td>20-26 hours</td>
</tr>
<tr>
<td>Insulin glargine</td>
<td>Lantus</td>
<td>1 hour</td>
<td>Peakless</td>
<td>20-26 hours</td>
</tr>
</tbody>
</table>

This type of insulin is also called a basal insulin. Basal insulin provides a steady level of insulin throughout the day and night. These insulins are usually continued even if the patient is NPO prior to a test or procedure. Dosages may be high, as they work continuously over the day and night.

These insulins are only administered once per day. They should be given at the same time each day.
## Pre-mixed Insulins

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novolog Mix 70/30</td>
<td>5-15 minutes</td>
<td>Varies</td>
<td>10-16 hours</td>
</tr>
<tr>
<td>Humalog Mix 50/50</td>
<td>10-15 minutes</td>
<td>Varies</td>
<td>10-16 hours</td>
</tr>
</tbody>
</table>

These products are generally prescribed to be taken twice a day 10-15 minutes before mealtime. They are great for patients at home who need both intermediate- and short-acting insulin coverage with fewer injections.
Signs/Symptoms of Hypoglycemia

- Confusion
- Dizziness
- Feeling shaky
- Hunger
- Headaches
- Irritability
- Pounding heart; racing pulse
- Pale skin
- Sweating
- Trembling
- Weakness
- Anxiety
Signs/Symptoms of Hyperglycemia

- Increased thirst
- Headaches
- Difficulty concentrating
- Blurred vision
- Frequent urination
- Fatigue
- Tingling in feet or leg
Safety Measures to Avoid Insulin Administration Errors

- Always have insulin double checked by 2 RNs prior to administration.

- Novolog insulin is the only insulin in this institution drawn up by nursing staff. Ensure it is only drawn up in an appropriate insulin syringe.

- Know the onset, peak, and duration of the insulin you are giving. Does the dose make sense knowing these factors?

- Administer insulin on time to ensure the patient’s blood glucose is remaining at a stable level.
References


University of Toledo Medical Center (2012). Policy 3364-100-70-13.