

Information Regarding Insulin Storage and Switching Between Products in an Emergency

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Insulin Storage and Effectiveness

Insulin for Injection

Insulin from various manufacturers is often made available to patients in an emergency and may be different from a patient's usual insulin. After a disaster, patients in the affected area may not have access to refrigeration. According to the product labels from all three U.S. insulin manufacturers, it is recommended that insulin be stored in a refrigerator at approximately 36°F to 46°F. Unopened and stored in this manner, these products maintain potency until the expiration date on the package.

Insulin products contained in vials or cartridges supplied by the manufacturers (opened or unopened) may be left unrefrigerated at a temperature between 59°F and 86°F for up to 28 days and continue to work. However, an insulin product that has been altered for the purpose of dilution or by removal from the manufacturer's original vial should be discarded within two weeks.

Note: Insulin loses some effectiveness when exposed to extreme temperatures. The longer the exposure to extreme temperatures, the less effective the insulin becomes. This can result in loss of blood glucose control over time. Under emergency conditions, you might still need to use insulin that has been stored above 86°F. You should try to keep insulin as cool as possible. If you are using ice, avoid freezing the insulin.

Do not use insulin that has been frozen. Keep insulin away from direct heat and out of direct sunlight.

When properly stored insulin becomes available again, the insulin vials that have been exposed to these extreme conditions should be discarded and replaced as soon as possible. If patients or healthcare providers have specific questions about the suitability of their insulin, they may call the respective manufacturer at the following numbers:

Lilly: 1-800-545-5979

Sanofi-Aventis: 1-800-633-1610

Novo Nordisk: 1-800-727-6500

Additional Storage Information for Insulin Pumps

Insulin contained in the infusion set of a pump device (e.g., reservoir, tubing, catheters) should be discarded after 48 hours. Insulin contained in the infusion set of a pump device and exposed to temperature exceeding 98.6°F should be discarded.

Insulin Switching

Switching insulin should always be done in consultation with a physician and requires close medical supervision, and if possible, close monitoring of blood glucose. If medical supervision is not possible under emergency conditions, the following recommendations may be considered. Make sure to closely monitor your blood glucose and seek medical attention as soon as possible.

Short-acting (regular insulin) and Rapid-acting Insulins

One brand of regular insulin (e.g., Humulin R, Novolin R) may be substituted for another brand of regular insulin and for rapid-acting insulins (e.g., Humalog, NovoLog, Apidra), and vice versa, on a unit-per-unit basis in emergency conditions.

Regular insulins are to be injected approximately 30 minutes before the start of each meal. Rapid-acting insulins begin working more rapidly than regular insulin and are to be injected no more than 15 minutes before the start of each meal to avoid dangerously low blood glucose levels.

Intermediate and Long-acting Insulins

One intermediate-acting insulin product (e.g., Humulin N, Novolin N) may be substituted for another intermediate-acting insulin product on a unit-per-unit basis in emergency conditions. Likewise, these intermediate insulins may also be substituted for long-acting insulins (e.g., Lantus, Levemir) on a total unit-per-day basis, or vice versa in emergency conditions.

- **Importantly, when switching** from a once a day long-acting insulin (e.g., Lantus, Levemir) to an intermediate-acting insulin the dose of the once a day long-acting insulin should be cut in half and given as two injections of intermediate acting insulin, one in the morning with breakfast and one in the evening with dinner to avoid dangerously low blood glucose levels.
- **When switching** from an intermediate-acting to a once a day long-acting insulin, add up the total amount of intermediate-acting insulin units for one day, and give it as a single long-acting insulin dose once a day.
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Close monitoring of blood glucose and adjustment in insulin dose may be needed in the transition period.

Insulin Mixes

Switching between types of insulin should be done in consultation with a physician and requires medical supervision, and if possible, close monitoring of blood glucose.

What is an Insulin Mix

Insulin mixes contain a ratio of intermediate- and short/rapid-acting insulin. The first number denotes the quantity of intermediate insulin and the second number denotes the quantity of short/rapid-acting insulin delivered with each dose administered. For example, each dose of a 70/30 mix contains 70% intermediate-acting insulin and 30% short/rapid-acting insulin.

Switching from Your Insulin Mix: Substitution or Replacement

Patients using pre-mixed insulin products (e.g., Humulin 70/30, Humalog Mix 75/25, Novolin 70/30, NovoLog Mix 70/30) have the following options to consider:

- In emergency conditions, one insulin mix product may be substituted for another on a unit-per-unit basis.
 - Insulin mixes containing a rapid-acting insulin analog (e.g., Humalog Mix, Novolog Mix) should be injected closer (within 15 minutes) to the start of the meal compared to mixes containing regular insulin (e.g., Humulin 70/30).
- If an insulin mix is not available, patients should follow this **two-step process**:
 - First, substitute an intermediate-acting component of the mix (e.g., for most of the examples listed above this will be approximately 70% of the total units for each dose) with an intermediate-acting or a long-acting insulin on a unit-per-unit basis.
 - Substituting with an **intermediate-acting** insulin:
 - Give 70% of total units for each dose
 - Substituting with a **long-acting** insulin:
 - Add up the total insulin units given in one day
 - Give 70% as one daily dose
 - Second, if regular or rapid-acting insulins are also available, they may be used before major meals in doses equivalent to approximately 30% of the total dose of pre-mixed insulin and in combination with the intermediate- or long-acting insulin usually taken before that meal.
 - Note: Inject longer and shorter acting insulins separately unless directed otherwise by a physician.
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Insulin Pumps

Switching between types of insulin should be done in consultation with a physician and requires medical supervision, and if possible, close monitoring of blood glucose.

Using a Different Insulin in Your Insulin Pump

- Patients administering insulin using a pump device may be able to substitute rapid-acting insulin (e.g., Humalog, Novolog, Apidra) for another on a unit-per-unit basis in emergency conditions. Patients should check the instructions for use of the pump device to see if available insulins are compatible with their devices.

Switching from an Insulin Pump to Injected Insulin

- Patients using insulin pumps who must switch to injected insulin may substitute intermediate or long-acting insulin for the total “basal” dose infused over 24-hours on a unit-per-unit basis in emergency conditions.
 - For example, an individual using a pump with a basal rate of 1 unit per hour has a total 24-hour “basal” dose of 24 units.

- For an intermediate insulin, the 24 units should generally be administered as two injections of 12 units, and for a long-acting insulin, the 24 units should generally be administered as one injection daily.
- If regular or rapid-acting insulin is also available, patients should administer these insulins with each meal. The individual should substitute their meal time “bolus” dose on a unit-per-unit basis to an injected dose.
 - For example, an individual using a “bolus” dose of 5 units on the pump to cover the breakfast meal should inject 5 units of regular or rapid-acting insulin to cover the breakfast meal.

