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PATIENT SAFETY INITIATIVE
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NEW JERSEY DEPARTMENT of HEALTH and SENIOR SERVICES

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Hypoglycemia Caused by Unintended Insulin in Total Parenteral Nutrition for an Infant in the Neonatal Intensive Care Unit

The New Jersey Department of Health and Senior Services' Patient Safety Initiative has received a report of a Serious Preventable Adverse Event involving a bag of total parenteral nutrition (TPN) that contained insulin instead of heparin.

A blood glucose level of 17 mg/dL was reported for a premature baby in the NICU, six hours after a TPN infusion had been started. Despite multiple bolus doses of glucose and an infusion of dextrose 20% in sodium chloride 0.45% (1/2 NS), the hypoglycemia did not completely resolve until the TPN was discontinued. The concerned neonatologist requested that the remaining TPN be sent for analysis, which revealed that the fluid contained insulin instead of heparin. The long-term impact on the neonate has yet to be determined. This hospital receives TPN from a contracted national vendor and an investigation into the event is underway.

The Institute for Safe Medication Practices (ISMP) reports that similar events –particularly mix-ups between heparin and insulin – have occurred in other states. The most common factors associated with these errors include:

- similar packaging of insulin and heparin in 10 mL vials
- placement of insulin and heparin vials, both typically used each shift/day, next to each other on a counter, drug cart, or under a pharmacy IV admixture hood
- mental slips leading to confusion between heparin and insulin, especially since both drugs are dosed in units.

If you administer TPN solutions, the Department strongly recommends that you check with your supplier, whether it is your own pharmacy or an outside vendor, to ensure that a similar heparin/insulin error could not occur. Additionally, if there are cases of unexpected and unexplained hypoglycemia, consider the possibility of a medication error as part of the differential diagnosis and take the following steps: discontinue all current infusions and hang new solutions, treat the patient as necessary and check for unintended additives by sending the bag(s) for analysis. (In addition to an error with insulin, oral hypoglycemic agents mistakenly administered to non-diabetic patients may also cause significant hypoglycemia.) Early identification of an error involving insulin (or an oral hypoglycemic) can provide a window of opportunity to mitigate harm.

ISMP recommends the following additional strategies to reduce the risk of potentially harmful mix-ups between heparin and insulin:

- **To prevent errors caused by look-alike heparin and insulin vials:**
  - Do not keep insulin and heparin vials alongside one another on top of counters or drug carts on the nursing unit or under the laminar flow IV admixture hood in the pharmacy. When insulin is needed for an IV, it should be retrieved and added separately from other ingredients and returned to the appropriate storage area immediately after use.
  - Require an independent check by a second person for all IV insulin materials and final preparations.
  - Require an independent check of all TPN solutions, including an initial independent check of the vials gathered for all additives that must be added manually before they are added, and an independent check of the finished solution comparing the label and the original order.
  - Use systems with bar code scanning for automated compounders.
  - Have the Pharmacy and Therapeutics Committee and neonatologists determine whether heparin is absolutely necessary in infant TPN solutions, or set criteria for when its use is indicated.
- **To detect errors between heparin and insulin at the point of administration before they reach the patient:**
  - Always compare the indication for heparin or insulin with the patient's diagnoses/condition to ensure they match before dispensing or administering insulin or heparin.
  - Read back verbal orders for heparin and insulin to verify understanding and accuracy.
  - Require an independent double check of all IV insulin preparations.

Many organizations do not allow insulin near any location where TPN is being prepared and administer it separately from TPN.