

SETON Network Notes

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Inpatient Diabetes Management: Time to Stop Sliding

Betsy Carlisle, PharmD, CDE

Hyperglycemia in the acute care setting is no longer considered a benign condition. Several studies have demonstrated that inpatient glycemic control reduces mortality, morbidity and healthcare economic outcomes. Hyperglycemia in the hospital may result from stress, uncontrolled type 1 or type 2 diabetes or from iatrogenic causes. While the exact targets for blood glucose levels in the ICU setting remain to be elucidated, most experts agree that fasting plasma glucoses remain between 80 and 120 mg/dL and that no glucose excursions greater than 180 mg/dL be tolerated for non-ICU patients.

Recommended strategies of attaining inpatient glycemic control are to develop order sets and pathways for diabetes management. The use of oral agents in the inpatient setting is discouraged due to limited flexibility in dosing and titration in a setting where acute changes demand such characteristics. Insulin, given either intravenously or subcutaneously, is the most effective agent for achieving glycemic control. Traditional sliding scale insulin regimens typically consist of regular insulin, without any long-acting insulin. The biggest problem with sliding scale insulin therapy is that it treats hyperglycemia after it has already occurred. Such a “reactive” approach leads to rapid changes in blood glucose levels, thus exacerbating both hyper- and hypoglycemia. When developing an subcutaneous insulin order set, experts recommend that physicians should be prompted to address all three components of insulin therapy: basal, prandial (or nutritional) and correctional doses.

- **Basal insulin**, provided by a single daily dose of long-acting insulin such as Lantus (insulin glargine), inhibits glucose production overnight and between meals.
- **Prandial or nutritional insulin** such as Novolog (insulin aspart) promotes glucose disposal into muscles from food consumption.
- **Correctional insulin** (not to be confused with “sliding scale insulin”) is administered in addition to the usual doses of meal-time Novolog insulin as a specific algorithm based on total daily dose of insulin. Novolog is preferred over Regular insulin for any correctional scale due to its faster onset of action and shorter duration of action.

Over the past several years, the Seton Family of Hospitals has been building an inpatient diabetes management program. Tools that have been developed include an ICU insulin infusion protocol, hypoglycemia SMDO, DKA order set and an insulin pump policy and order set. More recently, a **network adult subcutaneous insulin order set** was approved for use in adult patients with diabetes. This order set is intended for use by physicians for their non-ICU patients who need to be managed with subcutaneous insulin using a Lantus and Novolog regimen. Highlights of the order set include:

- The order set automatically discontinues any previous insulin orders and obtains an A1c for assessment of previous glycemic control.
- A dose calculator helps determine total daily insulin dose (TDD) and guides physicians in determining appropriate doses for Lantus and Novolog insulin.
- Additional instructions for the nursing staff include when to hold insulin doses as well as necessary adjustments in the face of hypoglycemia.
- Three correctional insulin scales are also included based on the patient’s TDD and risk factors for hypoglycemia.

This order set will replace an existing AMEP diabetes order set that is available on the intranet, but is no longer up-to-date with current guidelines. The network subcutaneous insulin order set will add a valuable tool to our existing inpatient glycemic management program to assist physicians in managing their patients with diabetes.

Adult Enoxaparin Dosing and Monitoring Guidelines

KEY POINTS YOU SHOULD KNOW

The "Guideline for Dosing and Monitoring of Enoxaparin (Lovenox®) in Adult Patients" was approved by the Pharmacy and Therapeutics Committee on Dec. 17, 2008, and published in the February 2009 issue of the Seton Medical Staff Newsletter. This document is located on the Seton Family of Hospitals Anticoagulation Management Web site (http://intranet/clinicalres/anticoagulation_management/). The guideline focuses on recommended dosing and monitoring of enoxaparin in four special adult populations:

1. Elderly (≥ 65 years old)
2. Weight < 45 kg or > 150 kg
3. Renal insufficiency (CrCl < 30 ml/min)
4. Pregnancy

KEY POINTS for the medical staff related to this new guideline and monitoring of enoxaparin are listed as follows:

- "**Enoxaparin Assay Anti-Xa**" should be ordered for monitoring enoxaparin therapy. An order for a simple "anti-Xa level" or "heparin assay" will require clarification. "Enoxaparin Assay Anti-Xa," "Heparin Assay Anti-Xa" and many other easily confused tests can be selected when ordering this in PowerChart/Compass.
- The Enoxaparin Assay Anti-Xa should be ordered **four hours after** the enoxaparin dose. Appropriate timing of the assay is critical when making dosage modifications. Seton laboratory comments have been updated to reflect the desired timing of the assay.
- The guideline recommends drawing the Enoxaparin Assay Anti-Xa **four hours after the third dose** in most circumstances. However, the assay can be ordered at any point in therapy, as long as it is ordered four hours after the subcutaneous dose, if the patient is at high risk of an embolic or bleeding event.
- The therapeutic range reported for Enoxaparin Assay Anti-Xa is now **0.6 – 1 units/mL**. This therapeutic range more accurately reflects current literature and is a change from the previous Seton laboratory comment. It is important to note that this therapeutic range does not apply to prophylactic dosing or to 1.5 mg/kg subQ Q24 hour dosing.
- The previous Seton laboratory comment listed a **therapeutic range for prophylactic dosing** of enoxaparin of 0.2 – 0.4 units/mL. Because there is little data to support a therapeutic range for prophylaxis, this range has been removed from the laboratory comments.

P&T NOTES

- ☑ **Insulin Infusion Orders for Adult ICU Patients.** There are now two site-specific ICU insulin infusion order sets in the network. The Network Insulin Infusion Order was updated to reflect a blood glucose range of 80-110 mg/dL (previously 70-110 mg/dL) and renamed the **SNW/SMCW Insulin Infusion Order**. A new order set was developed for UMCB/SMCA ICUs that targets a blood glucose range of 100-140 mg/dL. This order set is called **SMCA/UMCB Insulin Infusion Order**. Once there is consensus regarding the appropriate blood glucose range, the goal will be to create one network protocol again. Currently, it is important to note that the biggest difference between the two protocols is the blood glucose range.
- ☑ **Fentanyl PCA Order Set for Adults** was approved. The use of fentanyl PCA will be limited based on the availability of GEMSTAR pumps, a safety requirement for fentanyl PCA.
- ☑ **Regadenoson (Lexiscan®)**, a pharmacological stress agent used in myocardial perfusion, has been added to the formulary and will replace Adenoscan® (Adenosine). It is supplied as a standard, rapid-injection dose in a prefilled syringe (0.4 mg/5 mL). The risk potential of Lexiscan® may be less than that of Adenoscan® for the following reasons: 1) dose is the same for all patients regardless of weight, 2) the product is unit-dose, 3) it is better tolerated and 4) it has fewer contraindications. Adenoscan® inventory will be exhausted and replaced with Lexiscan® by July 1.