Hyperglycemia, as part of the stress response, is a commonly seen in the ICU. However, hyperglycemia, has been associated with ICU complications. In 2001, maintaining tight glucose control (BG 80-110 mg/dL) was shown to decrease mortality and many intensive care complications, however these results could not be duplicated. The incidence of hypoglycemia also was higher. Recently, conventional glucose control (BG < 180 mg/dL) was shown to have a significantly lower mortality and hypoglycemic rate compared to tight glucose control. The target BG value of 180 mg/dl was selected based upon common practices.

In critically ill trauma patients, admission blood glucose (BG) values > 200 mg/dL have been shown to be independent predictors of increased infections and mortality. BG values > 200 mg/dL during the initial week of ICU stay also have been shown to be independent predictors of infections, increased ventilator and ICU LOS and mortality. In patients with traumatic brain injuries, BG > 200 mg/dL, acidosis and hypercapnia are associated with a prolonged ICU stay, whereas BG > 200 mg/dL, hypothermia and hypotension are associated with increased mortality.

High glucose variability has been associated with increased infections, prolonged ventilator and ICU LOS and increased mortality. Glucose variability in 4th quartile has been associated with significantly increased mortality whereas the 1st quartile had a significantly lower mortality.

Using the NICE-SUGAR data, moderate (BG 41-70 mg/dL) and severe (BG ≤ 40 mg/dL) had significantly higher mortalities compared to patients without hypoglycemia. Also, the more times a patient experienced hypoglycemia increased the mortality risk.

Basal insulin use has been shown to improve glucose control better than sliding scales alone in the non-critically ill diabetic patients. The use of basal insulin in the critically ill patient is common in order to wean insulin drips and/or decrease the use of sliding scales.
Management

Sliding Scale Monitoring
1. Check FSBS Q4H.
2. If FSBS < 60 mg/dL and patient has received any insulin in the past 24 hours, check FSBS Q2H until FSBS ≥ 80 mg/dL, then resume Q4H FSBS.
3. If FSBS > 60 and ≤ 140 mg/dL and NO insulin has been administered x 48 hours, change FSBS to Q8H.
4. If the patient requires insulin administration for 2 consecutive checks during the Q8H FSBS, change FSBS Q4H.
5. Check FSBS q 30 minutes after administering D50W until FSBG >80 x 2 consecutive checks

Sliding Scale
FSBS 0-39 mg/dL = 1 amp D50W (50 ml) & call MD
FSBS 40-60 mg/dL = 0.5 amp D50W (25 ml) & call MD
61-149 mg/dL = 0 units Regular Insulin SQ
150-174 mg/dL = 5 units Regular Insulin SQ
175-199 mg/dL = 8 units Regular Insulin SQ
≥ 200 mg/dL = 12 units Regular Insulin SQ*
*If 3 consecutive FSBS ≥ 200 mg/dL, call MD & start insulin drip.

Insulin Drip
1. Begin at 4 units/hr and titrate to maintain FSBS 150-199 mg/dL.
2. Check FSBS Q1H.
3. Discontinue drip if FSBS ≤ 140 mg/dL.
4. Once drip rate is stable x 4 hrs, begin Q2H FSBS.

Basal Insulin
Patients requiring basal insulin, either to wean from insulin infusion or to decrease sliding scale requirements, NPH (Levemir®) every 8 hours is be preferred.
References


