

Protocol: Burn Unit Adult Hyperglycemia Protocol

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Applicable to

VUH VCH DOT VMG Off-site locations VMG VPH Other

Team Members Performing

All faculty & staff Faculty & staff providing direct patient care or contact MD House Staff APRN/PA RN LPN

Other:

Content Experts

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I. Background

The history of the literature surrounding glycemic control in critically ill patients has evolved significantly over the last 20 years. In 2001 glucose values greater than 200 mg/dL were found to be a risk factor for surgical site infections (1). This study was of cardiac surgery patients, and later studies of orthopedic trauma patients found similar results (2-3).

As the research developed intensive glucose control with targets as low as 80-110 mg/dL were recommended (4). Then the landmark NICE-SUGAR study was published and challenged these prior findings, suggesting that a more liberal goal of less than 180 mg/dL was beneficial (5). In 2012 the Society of Critical Care Medicine (SCCM) published guidelines on this topic (6). The authors suggest using an insulin protocol to target a blood glucose goal range of 100-150 mg/dL, while maintaining blood glucose values less than 180 mg/dL. These guidelines also focus on the importance of avoiding hypoglycemia, defined as a BG < 70 mg/dL (6).

II. Burn Pathophysiology and Implication on Hyperglycemia

The hypermetabolic state induced from injury predisposes the burn patient to infectious complications and impairs wound healing through glycation of immunoglobins and suppression of acute phase reactants. It decreases tensile wound strength and reduces success of graft take (7). This natural response from the body also stimulates gluconeogenesis, glycogenolysis and insulin resistance. Admission hyperglycemia has been shown to be a risk factor for poor outcomes in trauma, and a recent study shows that the same holds true for burns. This independently predicts the development of bacteremia, UTI, and pneumonia. However, a diagnosis of diabetes was not found to be a predictor of infection or mortality (8).

It is therefore imperative, due to the morbidity associated with hyperglycemia in burn patients, that each admission to the BICU be closely monitored for this treatable dyscrasia. In 2015 Stoecklin et al published in *Burns* a 15-year cohort study showing how a standardized ICU glucose control protocol can aid in improving these outcomes (9). This was performed specifically in burn patients and they concluded that moderate glycemic control by protocol was safe in this population and that a nurse driven protocol resulted in decreased rates of hypoglycemia as opposed to physician guided.

III. Protocol

1. On admission, the following patients will have an HbA1c and glucose level checked:
 - a. Adults (≥ 16 years old) admitted to BICU
 - b. Known diabetics admitted to the burn unit (ICU or stepdown)
 - c. Patients with hyperglycemia on admission or ED labs
2. Based on admission glucose level and patient's history of diabetes or not they will be classified and treated according to the following groups:
 - a. Group 1: non diabetic and euglycemic
 - b. Group 2: non diabetic and hyperglycemic
 - c. Group 3: diabetic and euglycemic
 - d. Group 4: diabetic and hyperglycemic

3. Treatment

- a. Group 1: Glucose checks every 6 hours for 48 hours
 - i. Initiate sliding scale if any value is greater than 180
 - ii. If two consecutive checks are greater than 200, then start insulin infusion using the ADULT ICU insulin order set in E-Star
 - iii. Basal Insulin: Glargine 0.1 units/kilo/day (assuming normal renal function)
- b. Group 2: Glucose checks every 4 hours
 - i. Initiate sliding scale immediately
 - ii. If two consecutive checks are greater than 200, then start insulin infusion using the ADULT ICU insulin order set in E-Star
 - iii. Basal Insulin: glargine 0.1 units/kilo/day (assuming normal renal function)
- c. Group 3: glucose checks every 4 hours
 - i. Initiate sliding scale immediately
 - ii. If two consecutive checks are greater than 200, then start insulin infusion using the ADULT ICU insulin order set in E-Star
 - iii. Basal Insulin: glargine 0.3 units/kilo/day or 75% of outpatient dose (assuming T2DM and normal renal function)
- d. Group 4: start insulin infusion using the adult ICU insulin order set in E-Start with goal of 100-150
 - i. A glucose source must accompany this. If TF have not yet reached 50% of goal then D5LR (or similar) should be ordered at 20mL/hr
 - ii. Basal Insulin: glargine 0.3 units/kilo/day (assuming T2DM and normal renal function)

4. Consult Endocrine if:

- a. Unable to adequately control blood glucose AND:
 - i. Known diabetic with A1C >7, OR
 - ii. Rate remains >4 units/hr despite adding long acting insulin
 - iii. Patient uses an insulin pump
 - iv. Patient has history of Type 1 diabetes
 - v. Insulin infusion tapering if needed
 - vi. Patient uses U-500 insulin at home
 - vii. Patient has history of pancreatic insufficiency
 - viii. Patient has newly-diagnosed diabetes

- Tips:
 - Please overlap glargine with insulin drip by 4 hours before stopping drip
 - Please try to consult endocrine early during admission if you anticipate help will be needed (not day of discharge)
 - Please consult early in the day so Endocrine can monitor response to therapy throughout the day
 - Glucose Management Service (rather than teaching service) can be requested but not guaranteed

IV. References

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