Glycemic Control in Critical Care
Achieve safe control of glucose levels in the intensive care setting.

Domain

Patient Care Processes:
Clinical processes that ensure delivery of high-quality care to individual patients

Aims

Effective:
An evidence-based practice that produces better outcomes than its alternative

Safe:
Delivery of care in a manner that minimizes any risk of harm to a patient

Process Attributes

$ Cost to Implement
The monetary resources required to implement this process

Moderate: In addition to the improvement effort, relies on additional personnel and/or technology

Time to Implement
The amount of time, from months to years, it will take on average to establish this process

Fewer than 12 months

Difficulty to Implement
The challenges of implementing this process

Most Challenging: Involves multiple units or disciplines AND requires a substantial shift in culture and/or operations

Level of Evidence
The degree to which the actions in this process are supported by research and experience; based on the Cochrane scale

Some Evidence: Level III — Studies published with some control included
Develop and implement a method of measuring and tracking glucose levels and displaying them for front-line staff.
  - Determine which glucose values to use: bedside glucometer values, laboratory values, or both.
  - Establish a process for entering glucose values into the appropriate database.
  - Establish a process for analyzing and displaying this data (e.g., mean, medians, standard deviations, range, percent in control range, hypoglycemia definition and rate, etc.).
  - Determine how this data will be communicated and to whom.

Control glucose using protocols:
  - Establish a continuous insulin drip protocol.
  - Establish a subcutaneous insulin delivery protocol.
  - Establish a continuous to subcutaneous transition protocol.

Establish a protocol glucose target level (for example, less than 180) to ensure that this goal will be achieved, while also maintaining an acceptable and low hypoglycemia rate.

Outcomes
  - Mortality (HSMR): Decreased mortality (hospital standardized mortality ratio, or HSMR)
  - Harm: Decreased harm to patient (e.g., Harms per 100 patient days, as measured by the IHI Global Trigger Tool)

Service Lines and Critical Functions
  - Intensive Care

Key Measures
  - Hypoglycemia Rate (below 40 mg/dl)
    - Numerator: All glucose values that are below 40 mg/dl
    - Denominator: All glucose values drawn
    - The rate should be less than 1%.
  - Percent of glucose control values between 60-180 mg/dl
    - Numerator: All glucose values that are between 60-180 mg/dl
    - Denominator: All glucose values drawn

Reasons and Implications
Importance for Patients and Families
Although it is difficult to control blood sugar levels in very sick patients, it is an important step for reducing patient harm and death.

Requirement, Standards, Policies, and Guidelines
  - American Diabetes Association
  - National Priorities Partnership (NPP)
  - National Quality Forum (NOF)
    Safe Practice for Better Healthcare—2009 Update
    Safe Practice 11: Intensive Care Unit Care
    Safe Practice 32: Glycemic Control

Financial Implications
  - Expense reduction due to potential infection reduction. • Expense increase can occur due to equipment and staff time.

Prerequisites
Recommend high-functioning multidisciplinary rounds to facilitate team communication about glucose control issues.
Resources

Additional Resources

- **New England Journal of Medicine (NEJM)**
  Intensive insulin therapy in the critically ill patients

- **The Joint Commission (TJC)**
  Journal on Quality and Patient Safety
  Intensive Glycemic Management in Critically Ill Patients

- **The Commonwealth Fund**
  Why Not the Best?
  Comparative performance data on surgical care, including postoperative blood glucose control

- **New England Journal of Medicine (NEJM)**
  Intensive versus Conventional Glucose Control in Critically Ill Patients

- **The Journal of the American Medical Association (JAMA)**
  Benefits and risks of tight glucose control in critically ill adults: a meta-analysis

- **New England Journal of Medicine (NEJM)**
  Intensive Insulin Therapy in the Medical ICU

- **Infection Control and Hospital Epidemiology**
  The association of diabetes and glucose control with surgical-site infections among cardiothoracic surgery patients

- **Endocrine Practice**
  American Association of Clinical Endocrinologists and American Diabetes Association Consensus Statement on Inpatient Glycemic Control

Information Compiled By

- Terry Clemmer, MD, Intermountain Healthcare and IHI Faculty
- Bruno DiGiovine, MD, Wayne State University and IHI Faculty