

Best Practice Strategies in Avoiding SSIs: Post-Op Euglycemia



Diabetes and Hyperglycemia

- Epidemic proportions
 - 20 million people
- Prevalence of DM in hospitalized patients-
 - 12-26%
- Prevalence of inpatient hyperglycemia-
 - 38%
 - 1/3 with *newly discovered* hyperglycemia



Hyperglycemia – Scenarios

- Patient with known diabetes
 - defined as FBG > 126 mg/dl or random BG \geq 200 on 2 or more occasions.
- Patient with previously undiagnosed diabetes
- Stress hyperglycemia
 - Normal A1C
 - Hyperglycemia doesn't persist after hospital discharge

Morbidity and Mortality of Hyperglycemia

- Additional studies correlating hyperglycemia with morbidity/mortality....
 - Acute MI- Increased risk of CHF, cardiogenic shock, and mortality...
 - Cardiac Surgery- Greater mortality, increased deep-sternal wound infections, and more overall infections..
 - Acute CVA- Increased risk of mortality, poor functional recovery, and increased final infarct size...
 - Elective Surgery- Increased risk of nosocomial infection w/ early postoperative hyperglycemia



Does improving glucose control improve outcomes

- Malmberg et al. RCT study of 620 acute MI patients
 - controlling hyperglycemia with intensive insulin treatment reduces mortality by 11%
- Van den Bergh, et. al RCT study of 1548 ICU patients
 - intensive insulin therapy (maintaining glucose <110 mg/dL) reduces mortality, bloodstream infections, acute renal failure, and PRBC transfusions. Also reduced ICU stay time and mechanical ventilation time.



Does improving glucose control improve outcomes

- Furnary prospective interventional study of 3554 CABG patients
 - insulin infusion protocols improved in-hospital mortality in diabetic patients
- Krinsley comparison study of 1600 ICU patients
 - protocol involving intensive monitoring and treatment to maintain BG <140mg/dL showed a significant decrease in mortality, organ dysfunction, and ICU length of stay

Does improving glucose control improve outcomes?

- NICE-SUGAR Study (Finfer et. al)
 - very intensive/tight glucose control (81-108) actually has negative impact on patient outcomes
 - Increased mortality with lower target when compared to more traditional target (<180)
- Other studies showing little difference between intensive control and more traditional control (<180)
 - Wiener meta-analysis- ICU patients
 - No decrease in mortality, but risk of hypoglycemia
 - Van den Berghe- medical ICU RCT study
 - Reduced morbidity but not mortality



What are recommended insulin targets?

The AACE/ADA recommendations are:

- A target of 140-180 mg/dl is preferable for MOST patients.
- A target of 110-140 mg/dl may be appropriate in SELECTED patients (patients treated in sites with extensive experience and appropriate support: perhaps CABG surgical patients, sites with low rates of hypoglycemia, patients on TPN etc).
- A target > 180 mg/d/ or < 110 mg/dl is NOT recommended.



Glycemic Control-Complex

- Insulin requirements fluctuate with acute stress of illness or surgery
- Inherently unstable nutritional intake in inpatient setting
- Multiple medications and parenteral nutrition cause frequent glycemic excursions.
- Frequent monitoring and recording of data are needed
- Coordination of testing, nutrition and insulin administration can be difficult
- Transitions in care lead to multiple opportunities for breakdown in the consistency, quality and safety of care

SCOAP Elements Captured in SCOAP

- Pre-op diabetes diagnosis and method of control
- Perioperative Glucose Value
- Insulin used in OR
- Highest BG Day 1 and Day 2 post-op
- Lowest BG within first 48 hours



Elements NOT Captured in SCOAP

- Type/route of insulin ordered
- Insulin adjusted appropriately
- Are values fasting or post-prandial
- How well was blood sugar controlled pre-operatively
- Other glucose values during hospital stay



Examples of Hospital Outliers

Problem: Not checking blood glucose in diabetics perioperatively

Solutions:

- Create workgroups with Anesthesia providers
- Add to standard orders
- Utilize SCOAP surgical checklist



Examples of Hospital Outliers

Problem: Patients with >200 glucose perioperatively not getting insulin

Solutions:

- Create workgroups with Anesthesia providers
- Add to standard orders
- Utilize SCOAP surgical checklist



Examples of Hospital Outliers

Problem: Patients with >200 glucose within 48 hours post-op

Solution:

- Hospital-wide glucose management plan



Hospital-Wide Glucose Management Plan

Essential elements:

- Institutional support
- Multidisciplinary team or steering committee
- Data collection and reliable metrics
- Specific Aims or goals
- Standardized insulin order sets
- Algorithms, policies, and protocols
- Comprehensive education and certification programs

From: <http://www.hospitalmedicine.org/ResourceRoomRedesign/GlycemicControl.cfm>



Hospital-Wide Glucose Management Plan

SCOAP Hospital Stories

- University of Washington Medical Center
- Southwest Washington Medical Center
 - From January 2006 to August 2007
 - Hospital average glucose level has decreased from 165.4 mg/dL to 148.5 mg/dL
 - 162.2 mg/dL to 143.9 mg/dL on the general surgery unit and from 182.7 mg/dL to 150.7 mg/dL on the orthopedic/neurologic surgery unit
 - In the Intensive Care Unit (ICU), the percent of readings in the range of 70–150 mg/dl increased from 66% to 74.4%
- Others?

Slide 1:

- Clement S, Braithwaite SS, Magee MF, et al. Management of diabetes and hyperglycemia in hospitals. *Diabetes Care*. 2004;27(2):553-91.
- Umpierrez GE, Isaacs SD, Bazargan N, You X, Thaler LM, Kitabchi AE. Hyperglycemia: an independent marker of in-hospital mortality in patients with undiagnosed diabetes. *J Clin Endocrinol Metab*. 2002;87(3):978-82.

Slide 4:

- Capes SE, *Lancet*. 2000;355(9206):773-8.
- Capes SE, *Stroke*. 2001;32(10):2426-32.
- Parsons MW, *Ann Neurol*. 2002;52(1):20-8.
- Furnary, AP *Circulation*. 1999/100(#18)1-591.
- Pomposelli, JJ et al. *J of Parenteral and Enteral Nutrition*, 1997: 22(2) 77-81.

Slide 5:

- Malmberg K : Prospective randomised study of intensive insulin treatment on long term survival after acute myocardial infarction in patients with diabetes mellitus. *BMJ* 1997; 314: 1512– 1515
- Van den Berghe G, Wouters P, Weekers F, et al.: Intensive insulin therapy in critically ill patients. *N Engl J Med* 2001; 345: 1359– 1367

Slide 6:

- Furnary AP, Gao G, Grunkemeier GL, et al.: *Continuous insulin infusion reduces mortality in patients with diabetes undergoing coronary artery bypass grafting. J Thorac Cardiovasc Surg* 2003; 125: 1007– 1021
- Krinsley JS: *Effect of intensive glucose management protocol on the mortality of critically ill adult patients. Mayo Clin Proc* 2004; 79: 992– 1000

Slide 7:

- Finfer S, Chittock DR, Su SY, et al.: *Intensive versus conventional glucose control in critically ill patients. N Engl J Med* 2009; 360: 1283– 129
- Van den Berghe G, Wouters P, Weekers F, et al.: Intensive insulin therapy in critically ill patients. *N Engl J Med* 2001; 345: 1359– 1367
- Wiener RS, Wiener DC, Larson RJ: *Benefits and risks of tight glucose control in critically ill adults: a meta-analysis. JAMA* 2008; 300: 933– 944



www.scoap.org