Evaluation of the Glycemic Control of Targeted Temperature Management Patients Before and After the Implementation of an Evidence Based Educational Module

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Background

- Critically ill patients are at risk of developing stress induced hyperglycemia (SIH)
- To sustain periods of stress and maintain energy production, epinephrine inhibits insulin secretion causing glucose levels in the blood to rise
- SIH is associated with increased mortality and adverse outcomes
- Exogenous variables that impact glycemic levels in the critically ill include the use of IV medications containing dextrose, glucocorticoids, vasopressors, persistence bedrest and the use of parental nutrition
- Organizations including *The American Diabetes Association (ADA)* and *The Society of Critical Care Medicine* recommend that glucose levels be maintained under 180 mg/dL in critically ill patients
- In order to provide evidence based care, the ADA explains that policy, protocol, and proper staff education should be implemented
- After review of the glycemic control of patients undergoing targeted temperature management (TTM) after cardiac arrest at a New Jersey hospital, data revealed that these patients remained in a hyperglycemic state (blood glucose >180 md/dL) for more than twenty four hours post initiation of TTM.

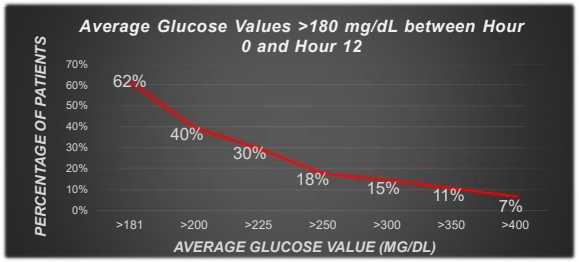
Purpose

The purpose of this quality improvement project was to improve the glycemic control of TTM patients through the use of an educational module emphasizing the importance and rationale behind glycemic management.

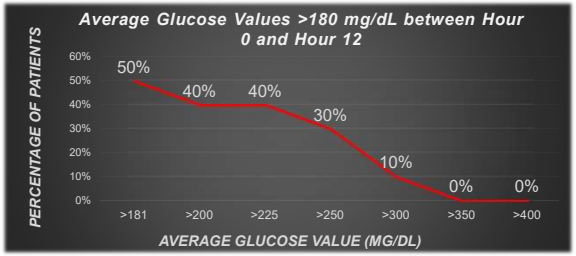
Methods

- *Setting:* Community hospital in Central New Jersey
- *Design:* Two part quality improvement project including an educational module and patient chart review
- *Intervention*: Nursing staff completed an educational module; Successful completion was determined by passing a ten question follow up quiz with a score of 10/10. Unfortunately medical staff was unable to complete educational module.
- *Sample*: Total of 85 staff members completed the educational module; Chart review of 27 TTM patients prior to education and 11 TTM patients post educational module
- *Analysis:* See results

Percentage of Pts with Average Glycemic Values >180 mg/dL at 12 Hours

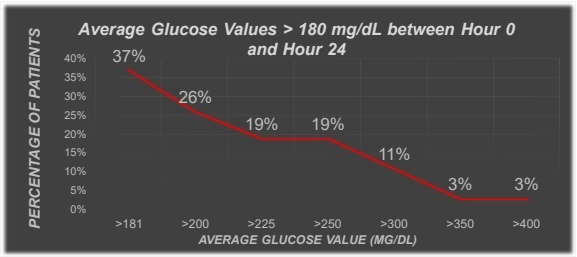


TTM Pts Prior to Education (n=27)

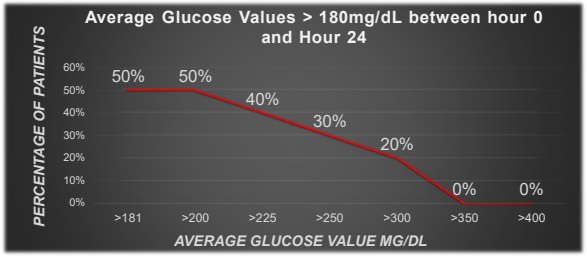


TTM Pts Post Education (n=11)

Percentage of Pts with Average Glycemic Values >180 mg/dL at 24 Hours



TTM Pts Prior to Education (n=27)



TTM Pts Post Education (n=11)

Data Collected

- Demographics: Age & Gender
- Finger stick glucose values between hours zero (Initiation of TTM) to hour 12 & zero to hour 24
- How hyperglycemia was managed i.e. subcutaneous insulin injections versus intravenous insulin infusions versus no treatment.
- Time of insulin therapy initiation and the length of time to achieve target glucose levels less than 180 mg/dL
- Confounding variables: medications mixed in dextrose, corticosteroids use, pressor use and previous diabetes diagnosis.

Results

- An unpaired t- test was run comparing the mean glycemic values at 12 hours and 24 hours.
- Using an alpha value of 0.05, no statistically significant differences were found between average glycemic values at 12 hours before education (M: 210.67 mg/dL, SD: 72) and after education (M: 202 mg/dL, SD: 72); (t= 0.263, *P*=0.79). Likewise, statistical significance was not found when comparing values at 24 hours pre (M: 191.96 mg/dL, SD: 75.19) and post education group (M: 208.5 mg/dL, SD: 70.5); (t= 0.603, *P*: 0.55). Unfortunately the mean at 24 hours increased after education.
- 4 out of the 17 hyperglycemic pts were maintained on insulin drip in the pre- education group while 1 out of the 5 hyperglycemic pts were maintained on insulin in post- education group.
- Using SPSS, a Pearson product- moment correlation was run to determine if any relationship existed between the mean glucose values of the TTM patients and confounding variables:
  - Use of Corticosteroids (*r=-.469, n= 37, p= .003*)
  - Previous Diagnosis of Diabetes (*r=-.616, n=37, p= <0.001)*

Conclusion

- No Statistical Significance between groups
- Small decrease in the percentage of patients who remained hyperglycemic in the first 12 hours, falling from 63% to 50%.
- The percentage of patients who remained hyperglycemic at the 24 hour mark increased from 37% to 50%
- Glycemic values can be difficult to control in the intensive care unit as many confounding variables and medical interventions impact glucose levels.
  - a weak negative correlation found to be statistically significant between glucose values in the first 24 hours of TTM and the use of corticosteroids (*r=-.469, n=37, P=.003)*.
  - moderate, negative correlation was found between glucose values and diagnosis of diabetes that was statistically significant (*r=-.616, n=37, p= <0.001).*

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