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Evaluation of Post-Operative Hyperglycemia in Patients Undergoing Total Hip and Total Knee Arthroplasty

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Background

- This study expands from a quality improvement (QI) project focused on glycemic monitoring and referral for patients without diabetes who had an elevated post-operative random glucose level after a total hip or total knee arthroplasty (THA/TKA) surgery at New England Baptist Hospital (NEBH).
- As part of Advanced Certification, The Joint Commission (TJC) now requires this new practice for all patients undergoing THA/TKA procedures (DSDF.02).
- Based on several unique aspects of care delivery at NEBH, particularly the elective nature, pre-operative preparation, and short length of stay for this population, a question of fit was brought up by the leadership team.

Literature Review

- Postoperative increases in blood glucose levels are an expected result of the high stress state experienced by patients undergoing surgical procedures.[1,2]
- Postoperative hyperglycemia (PHG) has been identified as an important risk factor associated with periprosthetic joint infections (PJI), venous thromboembolism, worse functional outcomes, increased length of stay and associated costs, and increased likelihood of readmission. [3-5]
- While expected in the population diagnosed with diabetes (DM), there is a strong body of evidence supporting increased PJI and PHG in patients who are not, nor ever have been, diagnosed with diabetes. [4,5]
- This phenomenon has been associated with increased morbidity and mortality in non-diabetic postoperative patients (NDM) who experience increased blood glucose levels postoperative when compared to postoperative patients with a diagnosis of diabetes (DM). [4]
- It is thought the elevated levels of glucose are related to the release of hormones such as cortisol and glucagon.[6]
- It is hypothesized that the immune response of patients with diabetes has an ability to adjust to chronic glycemic swings not seen in the NDM postoperative population.[4]

Objectives

1) Discover the incidence of postoperative hyperglycemia
2) Examine potential contributing factors
3) Monitor adverse events
4) Track interventions required based on postoperative glucose levels
5) Analyze data for correlation of glucose levels and surgical site infections (SSI)

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*References available upon request

Research Design & Analysis

Design: A retrospective chart review utilizing electronic medical record reports of patients who underwent THA/TKA between 10/1/2024 and 11/22/2024. Data collection included point of care (POC) glucose levels 30+ minutes after arrival to the Post Anesthesia Care Unit (PACU) and variables identified in literature as possible factors associated with PHG. PHG was defined as greater than or equal to 126 mg/dL per the American Diabetes Association. Inclusion criteria: adult (18-99 years of age), primary and revision THA/TKA surgery, no prior history of diabetes diagnosis. Sample size was 394 subjects, 49.6% of the THA/TKA for that period.

Analysis: Descriptive, univariate and multivariant statistics were performed using SAS.

Research Questions

1) What is the incidence rate of PHG in adult patients undergoing THA/TKA in an eight-week period of time at one orthopedic specialty teaching institution?
2) Are there identifiable variables in this cohort?

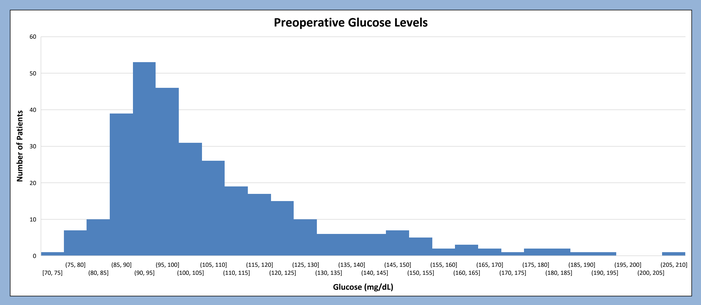
Results

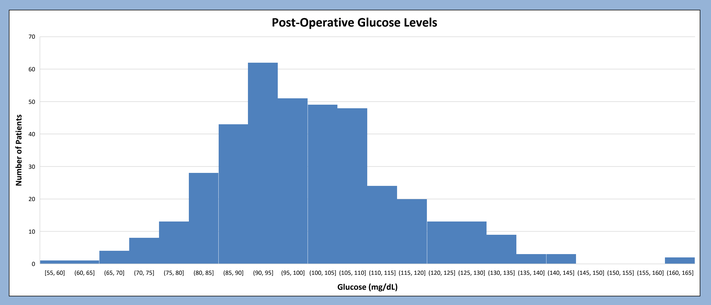
Univariate analysis statistical significance:

- body mass index (BMI) ($p = 0.030$)
- pre-operative blood glucose ($p<0.001$)
- procedure duration ($p<0.001$)
- estimated blood loss (EBL) ($p<0.001$)

N=394:

- 30 (7.6%) patients were hyperglycemic postoperatively per ADA
- 394 (100%) were asymptomatic and did not have blood glucose >163 mg/dL





Discussion

The low incidence of postoperative hyperglycemia observed in this non-diabetic THA/TKA population suggests routine postoperative glucose monitoring may have limited clinical utility in similar elective orthopedic settings such as NEBH.

Although hyperglycemia was uncommon, several perioperative factors—including body mass index, preoperative glucose levels, operative duration, and blood loss—were associated with postoperative glucose elevation. These findings may help identify patients pre-operatively who could benefit from targeted monitoring.

Usage of Decadron, ASA score, procedure type and age did not appear to contribute to PHG in this population.

Practice Implications

These findings support a targeted rather than routine approach to postoperative glucose monitoring and were used to justify a waiver of The Joint Commission postoperative glucose monitoring requirements in this population.

Future Steps

- Contributing factors need to be addressed pre-operatively when appropriate and highlighted in post-operative care.
- Prospective studies in this population are needed.