Perioperative Glycemic Management of Diabetic Patients

Isabella Alcaraz, BSN, RN - Kathryn Fukumoto, BSN, RN - Shayne Santiago, BSN, RN - Dr. Rachel McClanahan, DNP, RN, NCSN - Dr. Edward Waters, DNP, CRNA

Background

- Diabetes is a chronic disease that affects 9.4% of the U.S. population
- An estimated 10-20% of patients requiring surgery are diabetic
- Perioperative glycemic management in diabetic patients remains widely variable
- Current evidence highlights the need to improve current practices to facilitate optimal outcomes for diabetic patients

Purpose

The purpose of this project is to identify potential gaps in care by reviewing perioperative records of diabetic patients undergoing elective surgery to:

(a) identify the frequency of hyperglycemia and blood glucose (BG) measurements out of target range (80-180 mg/dL)
(b) compare findings to consensus BG targets
(c) assess current perioperative glycemic management practices
(d) propose an evidence-based glycemic management protocol for diabetic patients undergoing elective surgery based on best evidence

Current Standards

Glycemic Targets
- BG 80-180 mg/dL
- BG 140-180 mg/dL on insulin therapy

Management Recommendations
- Routine perioperative point-of-care BG testing every 2-6 hours
- Preoperative diabetes home medication regimen alterations
- Perioperative subcutaneous insulin regimens with avoidance of sliding scale

Conceptual Framework

The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care

- Identify triggering issues
- State the purpose
- Form a team
- Assemble, appraise, and synthesize body of evidence
- Design the practice change

Methods

- Design: Retrospective chart review of electronic health records
- Setting: Kaiser Permanente of Southern California
- Sample: 100 Type 2 diabetic patients (n = 100) undergoing elective hip and knee surgery (>2 hours length) from January 1 through December 31, 2019
- Measures: Adherence to practice guidelines/current standards per perioperative period
  1. Number of patients with BG measurements
  2. BG values outside of glycemic target range 80-180 mg/dL
  3. Use, type, and route of insulin administration

Results

Characteristics of study subjects. Values are given as mean or # of patients.

| Characteristic | Number of Patients
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>Intraoperative</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>50</td>
</tr>
<tr>
<td>Female</td>
<td>50</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>67</td>
</tr>
<tr>
<td>Admission</td>
<td>General</td>
</tr>
</tbody>
</table>

Number of Patients with BG Measurements per Perioperative Period (n = 100)

<table>
<thead>
<tr>
<th>Time Period</th>
<th># of BG Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>70</td>
</tr>
<tr>
<td>Intraoperative</td>
<td>90</td>
</tr>
<tr>
<td>Postoperative</td>
<td>100</td>
</tr>
</tbody>
</table>

Perioperative BG Values

- Preoperative: 80%
- Intraoperative: 100%
- Postoperative: 100%

Use, Type, and Route of Insulin Administration per Perioperative Period

<table>
<thead>
<tr>
<th>Use of Insulin</th>
<th>Preoperative</th>
<th>Intraoperative</th>
<th>Postoperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>3 SQ, 1 unknown</td>
<td>NA</td>
<td>8 SQ, 4 unknown</td>
</tr>
</tbody>
</table>

Discussion

Significant Findings
- Limited number of intraoperative BG checks (3 out of 100 patients) during hip and knee surgeries > 2 hours
- Due to lack of testing, conclusions cannot be drawn regarding whether glycemic targets were met during the intraoperative period
- Postoperative period had second-lowest number of BG checks and highest incidence of hyperglycemia (20.9% of postoperative BG values > 180 mg/dL)
- Use of sliding scale insulin (12.5% of patients receiving insulin) for correction of hyperglycemia
- Significant room for improvement with BG testing (increased frequency) and management of hyperglycemia (avoiding use of sliding scale insulin) during the intraoperative and postoperative phases

Study Limitations
- Limited sample size
- Possible inaccurate documentation in electronic health record
- Variable charting practices between facilities
- Human error in data collection efforts

Recommendations

- Implementation of protocol using the Joslin Diabetes Center Guidelines for Inpatient Management of Diabetes
- Future areas of study to include strategies for dissemination and assessment of protocol compliance

References

Southern California CSU DNP Consortium ~ Fullerton • Long Beach • Los Angeles