Perioperative Glucose Control and SSI

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• Glucose checked periop (pre-op to recovery)
• Insulin started
• POD 1
• POD 2
• Lowest blood sugar
Peri-op Blood Glucose Checked among Diabetics
Gastric Bypass Procedures

% of cases

Year 1  Year 2  Year 3  Year 4  Year 5

2006 Cohort  2007 Cohort  2008 Cohort  2009 Cohort  2010 Cohort
Peri-op Insulin Used when PBG High
Gastric Bypass Procedures

% of cases

Year 1  Year 2  Year 3  Year 4  Year 5

2006 Cohort  2007 Cohort  2008 Cohort  2009 Cohort  2010 Cohort
Peri-op Blood Glucose Checked among Diabetics
Elective Colon & Rectal Procedures

% of cases

Year 1  Year 2  Year 3  Year 4  Year 5

- 2006 Cohort
- 2007 Cohort
- 2008 Cohort
- 2009 Cohort
- 2010 Cohort
Peri-op Insulin Used when PBG High
Elective Colon & Rectal Procedures

% of cases

Year 1  Year 2  Year 3  Year 4  Year 5
2006 Cohort 2007 Cohort 2008 Cohort 2009 Cohort 2010 Cohort
Avoiding Hypoglycemia

Post-op Hypoglycemia Avoided
Elective Colon & Rectal Procedures

% of cases

<table>
<thead>
<tr>
<th>Quarter</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 10</td>
<td>(123)</td>
</tr>
<tr>
<td>Q2 10</td>
<td>(115)</td>
</tr>
<tr>
<td>Q3 10</td>
<td>(116)</td>
</tr>
<tr>
<td>Q4 10</td>
<td>(109)</td>
</tr>
</tbody>
</table>
Diabetes, Glucose Control, and SSIs After Median Sternotomy

- <200: 5
- 200-249: 10
- 250-299: 15
- >300: 20

Latham. ICHE 2001; 22: 607-12
Hyperglycemia and Risk of SSI after Cardiac Operations

Hyperglycemia - doubled risk of SSI

Hyperglycemic:
- 48% of diabetics
- 12% of nondiabetics
- 30% of all patients

47% of hyperglycemic episodes were in nondiabetics

Deep Sternal SSI and Glucose

Glucose Control after Cardiac Surgery
Sliding Scale vs Insulin Infusion

Glucose Control and Deep Sternal Wound Infections

Glucose Control and Mortality after CABG in 3554 Diabetics

Early (48h) Postoperative Glucose Levels and SSI after Vascular Surgery

<table>
<thead>
<tr>
<th>Glucose Level</th>
<th>Postoperative Infection (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;103 mg%</td>
<td>1st quartile</td>
</tr>
<tr>
<td>103-117 mg%</td>
<td>2nd quartile</td>
</tr>
<tr>
<td>117-151 mg%</td>
<td>3rd quartile</td>
</tr>
<tr>
<td>&gt;151 mg%</td>
<td>4th quartile</td>
</tr>
</tbody>
</table>

Perioperative Hyperglycemia in Noncardiac Surgical Patients: Does it Increase Postoperative Infections?

Postop inf = pneumonia, SSI, UTI, sepsis within 30 d

Variables = postop gluc, age, race, diabetes, ASA, emergent, op duration, transfusion

Significant: postop gluc > 180  O.R.=2.03
  gluc increase of 40          O.R.=1.9
  ASA & emergent

Perioperative Hyperglycemia in Noncardiac Surgical Patients

Postop Hyperglycemia and SSI in General Surgery Patients

Relative SSI Rate

Glucose Value in first 48 hr

Ata. Arch Surg 2010; 145: 858-64
“Diabetic Gap” and SSI Risk
Low Outliers Have Lower Diabetic Gap

Campbell. JACS 2009; 207: 810-820
Mastectomy, Hyperglycemia, and SSI

260 patients, 5 glucose determinations (pre-op, at anesthesia induction, intra-op, in PACU, at 24 hrs)

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Odds Ratio</th>
<th>C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt; 50</td>
<td>3.7</td>
<td>(1.5-9.2)</td>
</tr>
<tr>
<td>Pre-Op ChemoRads</td>
<td>2.8</td>
<td>(1.4-5.8)</td>
</tr>
<tr>
<td>Any gluc ≥ 150 mg%</td>
<td>2.9</td>
<td>(1.2-6.2)</td>
</tr>
</tbody>
</table>

Villar-Compte. AJIC 2008; 36:192-8
Postoperative Glucose and Mortality in Noncardiac Surgery

Hyperglycemia is More Dangerous in Non-diabetics

Frisch. Diabetes Care. 2010; 33: 1883-8
Rabbit 2 Study – Surgery Basal/Bolus vs Sliding Scale Insulin

<table>
<thead>
<tr>
<th></th>
<th>Basal Bolus</th>
<th>Sliding Scale</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>104</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>Mean Fasting</td>
<td>155</td>
<td>167</td>
<td>0.04</td>
</tr>
<tr>
<td>Mean Daily</td>
<td>157</td>
<td>176</td>
<td>.001</td>
</tr>
<tr>
<td>Readings &lt; 140</td>
<td>53%</td>
<td>31%</td>
<td>.001</td>
</tr>
<tr>
<td>Wound infections</td>
<td>3</td>
<td>11</td>
<td>.05</td>
</tr>
<tr>
<td>Any complication</td>
<td>9</td>
<td>26</td>
<td>.003</td>
</tr>
</tbody>
</table>

Umpierrez. Diabetes Care 2011; 34: 256-61
Glucose Levels & SSI

- The exact “best” level of glucose control in the perioperative period is not known.
- High glucose levels unequivocally increase the risk of SSI and other perioperative infections.
- Tight glucose control in the perioperative period is tricky.
- Hypoglycemia increases the risk of morbidity and mortality.
Slides of Published Data Available by Request

patch@uw.edu
Glucose-SSI Refs - 1


Glucose-SSI Refs - 5


Glucose-SSI Refs - 6


Glucose-SSI Refs - 8


