Postoperative Glucose Control and SCIP Measures

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Chief, Adult Cardiac Surgery
University of Virginia
April 25, 2015
Diabetes in CABG

• Incidence of Diabetes in cardiac surgery increased 85% over last 25 years

• 37% of Isolated CABG have Diabetes

• 50% of patients develop perioperative hyperglycemia
Hyperglycemia and Mortality

• Non-diabetics with hyperglycemia have higher mortality than those with controlled Diabetes

• Well known perioperative hyperglycemia increases mortality
  – Perioperative glycemic control improves mortality and morbidity
Outline

1. History of SCIP measures
2. Studies from our Center
3. Current Practice
SCIP Measures History

- Designed to decrease Infection/Improve outcomes
- Developed metrics that hospitals must achieve

1. 2006: Post Cardiac Surgery POD 1 or 2 (0600) glucose < 180
2. 2013: Maintain glucose <180 in first day following surgery including 0600
3. 2014: SCIP measures for glucose suspended
What is optimal glucose control?
Landmark Hyperglycemia Trial

Intensive insulin therapy (Glucose $\leq$ 110 mg/dl) reduced mortality compared to Conventional (Glucose < 215) in SICU

Intensive glucose control (Glucose 81-108 mg/dl) had higher mortality versus Conventional (Glucose ≤180 mg/dl)

Study 1

Is Tight Control Better than Moderate Control in Cardiac Surgery?
University of Virginia
Isolated CABG
(1995-2008)
N=8,662

Known Diabetes Mellitus (Type II)
OR
Developed perioperative hyperglycemia
• First postoperative glucose >126 mg/dl
• Postoperative (3 day mean) glucose >126 mg/dl
N=4,658

GROUP I
Tight
≤126mg/dl
N=134

GROUP II
Moderate
126-179mg/dl
N=2,785

GROUP III
Liberal
≥180mg/dl
N=1,739
Mortality

*P<0.001

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>Tight</th>
<th>Moderate*</th>
<th>Liberal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>2.9</td>
<td>2.0</td>
<td>3.4</td>
</tr>
</tbody>
</table>
Major Complications

- Tight: 19.4%
- Moderate*: 11.1%
- Liberal: 14.2%

*P=0.02
Hypoglycemia (1st Postop Glucose \(\leq 60 \text{ mg/dl}\))

![Bar chart showing % Hypoglycemia Events for different glucose control levels: Tight (1.5%), Moderate (0.4%), Liberal (0.1%). *P=0.02]
Summary

• Moderate glucose control:
  – Less hypoglycemia
  – Less prolonged ventilation
  – 2 day shorter length of stay
  – 30% lower major complication rate
  – 40% lower odds of death
Study 2

Are SCIP measures really useful measure of outcomes?
Study 2

Surgical Care Improvement Project (SCIP) Measure for Postoperative Glucose Control Should Not Be Used as a Measure of Quality Following Cardiac Surgery

Damien J. LaPar MD, MSc, James M. Isbell MD, MSCI, John A. Kern MD, Gorav Ailawadi MD, Irving L. Kron MD

Virginia Interdisciplinary Cardiothoracic Outcomes Research (VICTOR) Center

39th Annual Meeting
Western Thoracic Surgical Association
Coeur d’Alene, ID
UVA: 2010-2012
(n=1,703)

SCIP (BG≤200)
(n=1,527)

1:1 Propensity Matching
(Nearest Neighbor Methodology)

Non-SCIP (BG>200)
(n=176)

SCIP (BG≤200)
(n=176)

Non-SCIP (BG>200)
(n=176)
Median Glucose Level

POD 1

- Non-SCIP: 135 [119, 154]
- SCIP: 223 [207, 243]

POD 2

- Non-SCIP: 131 [117, 150]
- SCIP: 224 [210, 259]
## Propensity Matched Cohort: NO DIFFERENCES

<table>
<thead>
<tr>
<th>Variable</th>
<th>SCIP (n=176)</th>
<th>Non-SCIP (n=176)</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perioperative Myocardial Infarction</td>
<td>0.0</td>
<td>0.6</td>
<td>&gt;0.99</td>
</tr>
<tr>
<td>Stroke</td>
<td>2.3</td>
<td>4.0</td>
<td>0.54</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>4.5</td>
<td>5.7</td>
<td>0.81</td>
</tr>
<tr>
<td>Prolonged Ventilation</td>
<td>15.9</td>
<td>21.6</td>
<td>0.22</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>9.7</td>
<td>11.4</td>
<td>0.73</td>
</tr>
<tr>
<td>Deep Sternal Wound Infection/Mediastinitis</td>
<td>0.0</td>
<td>0.6</td>
<td>&gt;0.99</td>
</tr>
<tr>
<td>Major Sternal Complication</td>
<td>0.0</td>
<td>0.6</td>
<td>&gt;0.99</td>
</tr>
<tr>
<td>Composite Major Morbidity</td>
<td>17.6</td>
<td>21</td>
<td>0.5</td>
</tr>
<tr>
<td>Operative Mortality</td>
<td>6.2</td>
<td>9.1</td>
<td>0.42</td>
</tr>
<tr>
<td>Median Total ICU Length of Stay (Hours)</td>
<td>52 [21,98]</td>
<td>64 [23,116]</td>
<td>0.61</td>
</tr>
<tr>
<td>Median Postoperative Length of Stay (Days)</td>
<td>6[4,9]</td>
<td>6 [5,9]</td>
<td>0.08</td>
</tr>
</tbody>
</table>
## No Association SCIP Status ~ Adjusted Outcomes (CABG Only Patients)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Odds Ratio or Regression Coefficient</th>
<th>95% C.I. or SE</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>1.79</td>
<td>0.44, 7.32</td>
<td>0.42</td>
</tr>
<tr>
<td>Major Morbidity</td>
<td>1.08</td>
<td>0.41, 2.83</td>
<td>0.88</td>
</tr>
<tr>
<td>Major Sternal Complications</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total ICU Duration (Hours)</td>
<td>-14.8</td>
<td>16.7</td>
<td>0.38</td>
</tr>
<tr>
<td>Postoperative Length of Stay (Days)</td>
<td>-0.1</td>
<td>0.68</td>
<td>0.99</td>
</tr>
</tbody>
</table>
Summary

• Achieving the SCIP measure for controlled POD 1 and 2 blood glucose is not associated with improved outcomes.
Compliance with the new Surgical Care Improvement Project (SCIP) measure for glycemic control after cardiac surgery is not associated with improved postoperative outcomes

James M. Isbell, MD, MSCI, Damien J. LaPar, MD, MSc, Robert H. Thiele, MD, John A. Kern, MD, Gorav Ailawadi, MD, Irving L. Kron, MD, Anthony L. McCall, MD, PhD, Jennifer L. Kirby, MD, PhD

Western Thoracic Surgical Association
Whistler, British Columbia
June 24, 2015

To Be Presented at WTSA 2015!!!
Current Practice

• 2014: we instituted an inpatient CV diabetes consult service with a dedicated NP, aided by an attending endocrinologist

• Also initiated Glucommander- FDA approved device to aid in optimal BG control
Multidisciplinary Team

Jay Isbell, MD
ICU Intensivist

Jennifer Kriby, MD
Endocrinologist

Cherie Chaney, NP
CV Diabetes Consult
Cut Hyperglycemia by >50%

<table>
<thead>
<tr>
<th>ICU</th>
<th>PRE</th>
<th>POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>% BG &lt;70</td>
<td>0.69</td>
<td>0.72</td>
</tr>
<tr>
<td>% BG &gt;180</td>
<td>16.8</td>
<td>9.3</td>
</tr>
<tr>
<td>% BG &gt;299</td>
<td>0.98</td>
<td>0.57</td>
</tr>
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<table>
<thead>
<tr>
<th>FLOOR</th>
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<th>POST</th>
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<tr>
<td>% BG &lt;70</td>
<td>0.71</td>
<td>0.54</td>
</tr>
<tr>
<td>% BG &gt;180</td>
<td>32.9</td>
<td>16.3</td>
</tr>
<tr>
<td>% BG &gt;299</td>
<td>4.4</td>
<td>1.3</td>
</tr>
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</table>
Mean Glucose Level

**DWMBG**

<table>
<thead>
<tr>
<th></th>
<th>4N</th>
<th>4W</th>
</tr>
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<tbody>
<tr>
<td>PRE</td>
<td>145.4</td>
<td>164.4</td>
</tr>
<tr>
<td>POST</td>
<td>137.3</td>
<td>141.2</td>
</tr>
</tbody>
</table>

**% DWMBG >180**

<table>
<thead>
<tr>
<th></th>
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<th>4W</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>10</td>
<td>29.4</td>
</tr>
<tr>
<td>POST</td>
<td>5.8</td>
<td>10.9</td>
</tr>
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**% BG <70**

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**DWMBG = day-weight mean BG average BG for a patient over a day**
Day-weighted mean

Blood glucose (mg/dL)

% Day-weighted mean >180

% BG <70

FLOOR

FY2013

CY2014
Conclusion

• SCIP measures currently suspended but likely to come back once validated
• Multidisciplinary approach yields optimal outcomes
• Midlevel provider on endocrinology/diabetes service essential for education and excellent outcomes
Questions?

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- gorav@Virginia.edu