Cardiac Surgery Performance Improvement: Where Clinicians Meet Processes

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DISCLOSURE

- NO RELATIONSHIPS TO
- DISCLOSE
The Bronx
Minority, Poor, Medically Underserved

Race / Ethnicity, 2004

- Asian: 3%
- White: 10%
- AI/AN: 1%
- Black/AA: 34%
- Hisp./Lat.: 52%

Population < Poverty
Bronx vs NYC and NYS

ACS Admits/K

NYC and the Boroughs, 2000
Ambulatory Care Sensitive Admits per 1,000 Population

ACS Admits/K: 9.95, 13.98, 10.98, 8.26, 7.95, 8.60
Outline

• Describe the development of our cardiac surgery performance improvement committee

• Describe the process of performance improvement

• Discuss some of our local performance improvement projects
We’re Hearing About Performance Improvement Every Day
Site visit topics

Please be prepared to discuss, provide written responses or background material regarding the following at the time of the site visit.

- What is the Quality/Performance structure at your facility? (Please start with M&M conference/cath conference up to and including reporting to the Board of Trustees)

- How are the quality measures for Cardiac Surgery identified, implemented, monitored, reviewed and opportunities for improvement identified?

- Is there a risk assessment tool utilized for each cardiac surgical patient at your facility? If yes, who performs the risk assessment, when is it done (during hospitalization or pre-hospitalization) and how do you assure that all surgeons are utilizing it. If risk assessment algorithms are applied selectively, on what basis? Are any specific, protocol-driven actions taken based on the results?

- In the 24 hours preceding operation, who performs the final, comprehensive pre-op evaluation?

- Who is responsible for the care of the patient in the post-operative period? Are there 24/7 intensivists?

- In what forums do the nursing leadership and cardiac surgeons interact?
How is Your Program Performing?

• Do you have a mechanism at your center to ask performance related questions or express a concern?

• Is there a system at your center for measuring performance, identifying opportunities for improvement, and implementing improvement projects?
  - If yes, is it interdisciplinary and do you participate?
Performance Improvement

- Surgeon
- Anesthesiologist
- Perfusionist
- Nurses
- Critical Care Physician
- Physician Assistant
- Respiratory Therapist
- Nephrologist
- Endocrinologist
- Neurologist
- Interventional Radiologist
- Data Managers
- Oral Surgeon
Performance Improvement Committee

- Surgeons (5)
- Anesthesiologists (2)
- Perfusionists (3)
- Nurses (4)
- Critical Care Physicians (5)
- Physician Assistants (2)
- Respiratory Therapists (3)
- Nephrologist (1)
- Endocrinologists (2)
- Neurologists (2)
- Interventional Radiologist (1)
- Data Managers (2)
- Oral Surgeon (1)
Performance Improvement Committee

- Committee meets every other Friday for one to one and a half hours
- Agendas are created prior to the meeting
- Minutes are generated that highlight the discussion topics and define action items
- Minutes, data, and presentations are distributed to all committee members for discussion with their staff
- Next meeting begins with review of action items from last meeting
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The Process of Performance Improvement

Identifying Opportunities for Improvement: Context Knowledge

• Preoperative, intraoperative, and postoperative data are collected for all cardiac surgery patients

• Outcome as well as process data are collected

• Data is audited by two data auditors

• Local process and outcome data is compared to STS and NY State means

• Theoretical benchmarks are created for indicators not found in STS or NY State databases
Define Performance Expectations and Redesign the Process: Generalizable Knowledge

- Recruitment of interdisciplinary colleagues with specific expertise
- Reference current clinical practice guidelines
- Review the literature
- Experiential knowledge of team members
- Attendance at educational conferences
Implementation of Process Changes, Data Collection, and Reporting of Results

- Education of front line care providers
- Addition of data variables necessary to measure performance
- Continual reporting of performance versus expectations
- Continuous discussion to identify successes and failures
Idealized Care

Current Care
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### Class IIa

The risk for deep sternal wound infection is reduced by aggressive control of perioperative hyperglycemia by using a continuous, intravenous insulin infusion (314). *(Level of Evidence: B)*

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**Conclusion.** Perioperative blood glucose levels > 150 mg/dL are associated with increased operative morbidity and mortality.

**Ideal Clinical Practice.** Perioperative blood glucose levels are maintained in the range of 100 to 150 mg/dL. *(Class I, Level B.)*
Perioperative Glucose Management

• In 2006, we did not have a perioperative glucose management strategy

• Committee agreed to target of < 150 mg/dl

• Developed an intraoperative protocol

• Recruited endocrinologist to Committee

• Implementation of continuous insulin infusion therapy protocol for postoperative glucose management

• Developed link between our clinical database and the hospital clinical information system database

• Continuous reporting of glucose management performance
Perioperative Glucose Management

The graph shows the mean glucose levels over different quarters from 2006 to 2008. The x-axis represents the quarters of the year, and the y-axis shows the mean glucose levels. Error bars indicate the 95% confidence interval. The data suggests fluctuations in glucose levels with a general trend of decrease over the years.
Perioperative Glucose Management

CIIT Protocol not functioning

Mean

PostOpHour

Error bars: 95% CI
CIIT Protocol functioning and insulin continued into ICU
Goal-Oriented Strategy to Extubate Appropriate Patients Within 6 Hours and Minimize the Incidence of Prolonged Intubation

• 2006 data indicated our incidence of prolonged intubation for isolated CABG was above the STS mean

• Collaboration with respiratory therapists, nurses, and critical care physicians to develop goal-oriented strategy

• Educational sessions with respiratory therapists and nurses

• Data collected by respiratory therapists in our clinical database

• Continuous reporting of extubation performance
Goal-Oriented Strategy to Extubate Appropriate Patients Within 6 Hours and Minimize the Incidence of Prolonged Intubation

- 2006 data indicated our incidence of prolonged intubation for isolated CABG was above the STS mean
- Collaboration with respiratory therapists, nurses, and critical care physicians to develop goal-oriented strategy
- Educational sessions with respiratory therapists and nurses
- Data collected by respiratory therapists in our clinical database
- Continuous reporting of extubation performance

If patient not extubated within 6 hours, reason:
- Inadequate ventilation indicators (SpO2, pH, pCO2)
- Inadequate hemodynamics (MAP, CI)
- Sedation
- Chest tube output > 100mL/hr
- Temperature < 36 degrees
- >= 2 inotropes/pressors
- Patient suffered CVA
- Other
Isolated CABG Extubated Within 6 Hours
Incidence of Prolonged Intubation
Reduction of Hemodilution and Emboli

Class IIb

1. Acute normovolemic hemodilution (ANH) is not unreasonable for blood conservation but its usefulness is not well established. It could be utilized as part of a multipronged approach to blood conservation. (Level of evidence B)

Reduction of Hemodilution

Efforts should be made to reduce hemodilution, including reduction of prime volume, to avoid subsequent allogeneic blood transfusion. (Class I, Level A)

Class IIb

1. It is not unreasonable to use low prime and minimized extracorporeal bypass circuits to reduce the fall in hematocrit during CPB as part of a multimodality blood conservation program. (Level of evidence B)
Reduction of Hemodilution and Emboli

Microemboli in Brain vs. Linear (Microemboli in Brain)

Consecutively Enrolled Patients

ptrend <0.001
Reduction of Hemodilution and Emboli

27 micron 195mL + RX-25 250mL + 3/8 x 1/2 = 1315mL

27 micron 100mL + RX-15 135mL + 3/8 x 3/8 = 1000mL
CABG, Valve, and CABG/Valve Patients with BSA < 1.9m²

Circuit change
CABG, Valve, and CABG/Valve
Patients with BSA < 1.9m2

Circuit change

Mean HematostVolumeCPB

Error bars: 95% CI
CABG, Valve, and CABG/Valve
Patients with BSA < 1.9m²

Circuit change

Mean PreBypassSequestr

Error bars: 95% CI
Collaboration with Neurology

- Stroke neurologist, neuroradiologist, and interventional radiologist have become members of Committee
- Cell phone and pager access to stroke neurologist
- Early involvement postoperatively
- Emergent transfer for CT scan and possible intervention
- Grade III or higher aortas - epiaortic scan
- Consider OPCAB if possible
Conclusions

- Continuous performance monitoring and improvement is the key to ensuring high-quality care
- Government-sponsored and commercial health plans, employers, and consumers are asking for information on quality
- The environment of care is very complex and requires interdisciplinary collaboration
- Perfusionists are in an ideal position to be leaders of performance improvement