Medical Optimization of Patients Prior to Cardiac Surgery

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Maine Medical Center Cardiovascular Institute

No financial disclosures
Outline

- Reliability and variability
- Simple, Complicated, Complex decision-making
- Implementing process checklists
- Process mapping, fishbones and tests of change
- Wish lists
- Measuring and reporting process compliance
- Quality measurement and feedback

“Every system is perfectly designed to get the results that it gets”

Paul B. Batalden, MD
Improve outcomes by decreasing unnecessary variability and increasing reliability

Pre-operative Prediction Tools: Morbidity and Mortality after Isolated In-hospital CABG

<table>
<thead>
<tr>
<th>Patient or Disease Characteristic</th>
<th>CABG Mortality Score</th>
<th>Aortic Valve Mortality Score</th>
<th>Mitral Valve Mortality Score</th>
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<td>Total Score</td>
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Directions: Locate outcome of interest. Use the score in that column for each relevant pre-op variable then sum these scores to get the total score. Take the total score and look up the approximate preoperative risk in the table.
Address processes of care from standpoint of best evidence and most agreement among providers

Preparing a patient for surgery properly sets up a smoother perioperative course and minimizes surprises

Events leading up to surgical referral need to be carefully evaluated in the context of the patient’s life and comorbidities
The Stacey Matrix

Simple, complicated, complex

- Customize care for each patient
- Opportunities to treat infection, anemia, and glucose management are a few of the common preoperative interventions.
- Assessing patients who are frail or who may be more vulnerable to delirium can make a difference in short and long term outcomes.
Cessna Checklist

Checklists

- Includes evidence based tasks and reminders to consider certain protocols in selected patients.
- Alternative to relying on the memories of nurses, PA’s and surgeons to complete necessary preoperative tasks and consider certain protocols.
- Needs to be integrated into a comprehensive system.
Preoperative Checklist

Other Considerations

<table>
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<th>Meds to DIC:</th>
<th>Action</th>
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<tr>
<td>Pivax, Coumadin, OTC anti-plalets, ARBs, metformin</td>
<td></td>
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</tbody>
</table>

| Meds to Order: | |
| Amlo, statin, β-blockers, ASA if CABG | |

| Stroke Potential Screening: | |
| >75, PVD, asc aorta | |

| Anemia: | |
| Hgb ≤ 30? If so, consider FVU and Rx: (e.g. IV Fes Sucrose, EPO if CKD) | |

| Carotid Screening: | |
| LMH stenosis, >65, hx carotid bruit or CV disease, if at least one risk factor, order carotid duplex | |

| Beta blockade: | |
| Pre-induction heart rate ≤ 60 | |

| Hypercoagulability: | |
| Hx HIT, htx factor deficiency, antiphospholipid antibodies, hx low plates, hx DIC, unexpected art or ven thromboses, hx autoimmune dz, hx recurrent total loss. If so, hem consult, avoid Amicar, use TEG intraop | |
Meds to discontinue

- Plavix
- Coumadin
- OTC anti-platelet meds
- ACE inhibitors
- ARB’s
- Metformin
Meds to Order

- Amiodarone
- Statin
- β-blockers
- ASA if CABG

NDC 9245-0145-30
Pacerone®
(Amiodarone HCl) Tablets

400 mg
30 Tablets
Rx only

Maine Medical Center
AFib Rates and the Amiodarone Protocol
Anemia

Hct ≤ 30? If so, consider anemia work-up (including rectal exam and hematest stool) and appropriate treatment (e.g. IV Fe Sucrose, EPO if CKD)
Anesth Analg 2009;108:1741-6

Pre-op Hct (transfused and non-transfused)

Survival by preop HCT

- hct4pre = <36
- hct4pre = 36-39
- hct4pre = 40-42
- hct4pre = >=43

Survival in years

Survival in months

Adjusted by age, female sex, diabetes, CHF, vascular disease, dialysis or creatinine >=2.0, COPD, ejection fraction <40, LM >50%, IMA used, BSA <1.8

*Adjusted survival by RBC Use

Adj. HR 1.33 (95% CI 1.05, 1.67), p=0.018
Pre-op Hct (non-transfused)

Survival by preop HCT – no RBCs

- hct4pre = <36
- hct4pre = 36-39
- hct4pre = 40-42
- hct4pre = >=43

Survival in years

Intra-Op Anemia

Loor JTCVS 2012
IDENTIFICATION, EVALUATION, AND MANAGEMENT OF ANEMIA IN PREOPERATIVE CARDIAC SURGERY PATIENTS

Preop lab testing: CBC

Hemoglobin abnormal: Male Hb < 13 Female < 12

No further hematology workup

MCV > 100

MCV < 80

RBC Blood loss

Test serum B12 Hematology consult

CKD?

yes

Parenteral Fe, EPO and Nephrology consult

no

Parenteral Fe
The Sweet Spot

Intervention (RBC transfusions, Pharmaceuticals, Reoperation)

Mortality and Morbidity

Hematocrit

Safety Zone

Loor, Koch et al J Thorac Cardiovasc Surg Sept 2012 p 544

Stroke Potential Screening

- >75
- PVD
- Ascending aorta Ca++
- Hx CVA or TIA
- CKD
- DM
- EF<40%

If at least 2 risk factors, order non-contrast chest CT (Surgeon should consider epi-aortic echo)
Carotid Screening

- LMT stenosis
- >65
- History of carotid bruit
- History of cerebrovascular disease

If at least one risk factor, order carotid duplex

Pulmonary Function/ ABG’s

Consider testing if COPD or other pulmonary disease especially if:

- Home O2
- Sleep apnea
- Corticosteroids (consider stress doses)
- Bronchoreactivity
- Current smoker
Activity

Sedentary:
- Bed to chair?
- Wheelchair?
- Walker?

Glucose Management

Current policy is that blood glucose needs to be $\leq 200$ for the 24 hours preceding surgery...ideally $\leq 180$
Pre-op glucose management

Infection(s) addressed

- Teeth
- Urine
- Skin
- Other infection
- MRSA or other DRO?

Need for antibiotics other than routine?
Delirium Potential

Some Risk Factors:
- Cognitive impairment
- Advanced age
- Education
- Depression
- Etoh
- Drugs

Special Concerns
- Allergies
- HIV
- Hepatitis
- TB
- Vein status
- Radial artery
- PVD
- CHF
- Need for stress steroids
- Decubitus potential (Braden Score)
Hypercoagulability (Thrombophilia)

- Hx HIT
- Hx or FH factor mutation
- Antiphospholipid antibodies
- Hx thrombocytopenia
- Hx DIC
- Unexplained arterial or venous thromboses
- Autoimmune disease
- Hx recurrent fetal loss

Bleeding Disorders

- History most important
- Coag panel
- TEG
Beta blockade

Pre-induction heart rate $\leq 80$

Process Improvement Methodology (Multidisciplinary group)
High Level Process Map

Pre-Op

1A
1B

CTICU
R1/IMC
Discharge

Post-Acute Care

Home
SNF
Rehab

Engagement Phase
Order Set

Process: MMC CABG Overview
Authors: Cardiac Surgery Team, DSO, OH, EB
Date: March 2017
Fishbone: What is driving unwanted variability?

- **Equipment**
  - Transfer to another unit
  - Inconvenient
  - Lack of equipment

- **Patients**
  - Patient family dynamics
  - Limited resources at night

- **Variability in Orders in SCM**
  - Schedule may change
  - Waiting for consent

- **Process**
  - Intentional delay
  - Postoperative patient
  - Social and work processes

- **Staff**
  - Nurse may not know who to call

- **Other**
  - Surgeon may or may not write orders
  - Surgeon assumes PA/CT surgery will write orders
  - Whose patient is it?
PDSA Cycle: Plan, Do, Study, Act

Wish list: Pre-op

- Cath to CABG: Delays?
- Glucose Management
- Management of same day admission with high BS, HbA1c
- Readiness for Surgery Check List and Orders: Update
- Documentation of predicted risk: STS PROM
- Cost accounting
Wish list: Pre-op

- Navigator
- Transfers from OSH to cards or CT Surg? Role of Teletracking?
- Standard form for referrals
- Website needs: upgrade with security features
- Pre-op nutritional assessment
- Insurance issues

Wish list: Pre-op

- Frailty test: 5 meter gait speed (gait speed \( \geq \) associated with increased frailty)
- “Pre-hab”
- Swallowing assessment, pre and post-op (QI project)
- Establish algorithm for high risk patients: mini-mental test, S&S or 3 oz water test, 5 m walk test, incentive spirometer…and more?
Wish list: Pre-op

- Dental issues resolved pre-admission
- Second surgical opinion for turn-downs and high risk cases (threshold?)
- Advance directives
- Prior authorization (PCP?)
- Threshold for second surgical opinion for high risk cases
- Heart Team concept for revascularization

Wish list: Pre-op

- Device protocols (VADs, ECMO, impella)
- AF prophylaxis
- Anemia management
- Patient teaching: Identifying roles
- TEG
Outcomes

Feedback: The Instrument Panel
Thank you
kramer@mmc.org
Complications that may lead to death

- Any Septicemia
- Any post-op infection
- Any post-op stroke
- Any new onset hemodialysis
- Any adult respiratory distress syndrome
- Any reperfusion
- Any hemorrhage

Failure to Rescue** All Procedures^
Unadjusted mortality rates by acuity group among isolated CABG by center- last 3 years

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<tr>
<th>ACUITY GROUP</th>
<th>CENTER</th>
<th>CMMC</th>
<th>DHMC</th>
<th>UVMCC</th>
<th>MMC</th>
<th>CMC</th>
<th>EMMC</th>
<th>CH</th>
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<td>Death rate (%)</td>
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<td>0.9</td>
<td>1.3</td>
<td>1.4</td>
<td>0.0</td>
<td>0.9</td>
<td>0.8</td>
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<td>95% CI for rate</td>
<td>(1.5)</td>
<td>(1.2)</td>
<td>(1.3)</td>
<td>(1.3)</td>
<td>(1.7)</td>
<td>(1.7)</td>
<td>(1.2)</td>
<td>(1.1)</td>
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<tr>
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<td>0.9</td>
<td>1.3</td>
<td>1.5</td>
<td>1.4</td>
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* Recent MI = MI within 7 days prior to surgery

Summary

- A patient’s readiness for surgery can reduce the incidence of complications and reduce mortality.
- The cardiac surgery multidisciplinary team developed a comprehensive preoperative checklist to minimize unwanted variability and improve reliability in the preop cardiac surgery patient
- Continuous quality improvement is imbedded in the daily processes of patient care, implementing process checklists, measuring and reporting process compliance with quality measurement and feedback
Thank you

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