Using Registries to Initiate and Sustain Improvement

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Ann Arbor, Michigan

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Presentation Plan

- Brief introduction to Michigan Medicine Department of Perfusion Quality and Safety program
- Discuss departmental QC process/review and improvement plan as it relates to Blood product usage
  - All QA data today
- Discuss the role of our interdisciplinary Blood management group at Michigan
Michigan Perfusion QA/QI Mission Statement:

The Perfusion department quality improvement program, within Michigan Medicine, analyzes current Perfusion practice to improve delivery of care. The following processes are utilized in this effort:

- Establishing acceptable ranges of Perfusion practices in conjunction with representatives from Anesthesia and the department of Cardiac Surgery.
- Development of reference indexes for the management of key physiological parameters during cardiopulmonary bypass.
- Regular review by clinicians of their observed practice relative to the department aggregate practice and optimal standards.
- Analysis of the association between perfusion practice and clinical outcomes.
- Selective case review of post-operative mortality and morbidity designed to improve patient outcomes.
We define roles and responsibilities for the following three levels of participation in the Perfusion CQI program:

- Clinical Perfusionist
- Perfusion CQI administrator(s)
- Perfusion CQI medical director(s).
Clinical Perfusionist

- Ownership of accurate data
- Regular review of compliance: individually and as a group
- Maintain privacy of individual and department reports
- Pursue compliance with departmental standards / protocols
- Provide input to further program development
Perfusion CQI Administrator

- Maintain privacy of individual and department reports
- Develop departmental standards in conjunction with input of all Perfusion staff and CQI medical directors
- Enforce compliance with established standards.
- Develop reports to improve perfusion practice and clinical documentation
- Regular evaluation and feedback of individual and departmental practice
Medical CQI Director

- Guide perfusion practice and development of core standards
- Maintain privacy of department reports
- Respect the anonymity of blinded individual reports, and offer feedback on methods for improvement
“You can not step into the same river twice”

- Heraclitus

- By it’s very nature a QA/QI requires constant change and ours is no exception
  - It’s a moving target

- We have evolved continuously over the years
  - Paper Chart to EMR
    - Centricity by GE for intra-op - EPIC for institutional record
  - Aggregate QA reports to blinded individual reports to un-blinded individual reports
The problem

• Institutional Mindset
  – Disseminated from Surgeon Champions
    • Blood isn’t bad and our patients do well
• Cardioplegia circuit exacerbated situation
  – Required additional liter of circulating volume (static prime) to “Batch” cardioplegia into a recirculating system
  – Again, institutional mindset- We’ve always done it this and it works!
• Pump Circuit was to large
  – Average pump prime was 2500cc
The solution

- Prescriptive Oxygenation
  - Different sized oxygenators
    - Terumo FX-15, Terumo FX-25, & Terumo FX-15 RW40
  - Different sized circuits
    - Adult 3/8 x ½ and Small Adult 3/8x3/8

- Introduce RAP and VAP

- Change Cardioplegia Circuit
  - Moved from whole blood batch system to 8:1

- Removing unit of Autologous Blood Intra-Op prior to CPB
  - Practice done in conjunction with Surgeons and Anesthesia

- Discussion of accepting lower HCT on CPB
Circuit Revision
Additional Problems

- **Staff was resistant to change**
  - “we’ve always done it this was”
  - “our outcomes are good”
  - “The supporting studies are flawed”
  - “Just use a hemoconcentrator”

- **Late Adopters**
  - Unwilling to change or be first
    - Fearful of unintended consequences
      - What if’s
Additional Solutions

• Provided feedback to individual providers with aggregate group comparison
  – Started with blinded - Quickly moved to unblinded
    • Built competition among the team

• Important QA/QI elements
  – Oxygenator and Circuit Selection
  – Blood Utilization
  – Cell Saver Usage
PCIP Measure

PCIP-1: Utilize small circuit for calculated 2.4 index < 4.1 LPM

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PCIP-1 Goal: 90%
Sustained Improved

- Over time, late adopters were converted

- Noticeable in blood transfusions over time in patients within small circuit range
  - Previously high rates of transfusion
Reducing packed Red Blood Cell (pRBC) transfusions during Cardiac Surgery – The Role of a Perfusion Care Improvement Plan (PCIP)

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University of Michigan Frankel Cardiovascular Center

Background
- Packed Red Blood Cells (pRBC) have been associated with increased risk of morbidity and mortality after cardiac surgery
- Perfusion practices (e.g., reducing circuit prime volume) have been associated with pRBC usage
- Our team has developed and implemented a novel perfusion care improvement plan (PCIP) to track and provide feedback to clinical team members around pRBC practices.

Hypothesis
- The use of consistent feedback reporting to individual practitioners regarding targeted practices may reduce pRBC transfusion rates.

Results

<table>
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<th>Year</th>
<th>% Transfused</th>
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<th>Small Circuit Utilization</th>
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<tr>
<td>2012</td>
<td>66.7%</td>
<td>64.1%</td>
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<td>2013</td>
<td>47.9%</td>
<td>80.6%</td>
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<td>2014</td>
<td>41.1%</td>
<td>90.8%</td>
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<td>2015</td>
<td>37.1%</td>
<td>93.2%</td>
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Methods

Study Design and Outcomes
- Utilization of 3/8" venous line & reduced prime oxygenator for patients with body surface areas (BSA) of < 1.71 m2
- Automated abstraction of circuit selection from institution's electronic medical record (EMR).
- Target of 90% circuit utilization.
- Performance tracked against target of 90% at clinician and program levels
- Reported monthly to Perfusion, and quarterly to broader teams

Statistical Analysis
- Small Circuit correlated with Blood Transfusion: McNemar's Test p<.0001
- Transfusion decreasing over time: Cochran-Armitage Trend Test p<.0001

Conclusions
- Consistent, monthly performance feedback and discussion was associated with reduction in overall pRBC usage (p<0.0001)
- Future area of investigation may include expanding performance measures to other areas of practice (e.g., cell saver use) and validation of our findings across other institutions.
Average Net Prime
# Blood Management Group

Interdisciplinary Team of Anesthesia, Surgeons, PA’s and Perfusion

- **Surgeon Champion**
  - Jonathon Haft, MD

| Review Quarterly blood usage | Monitor for trends | Make recommendations | Provide feedback to colleagues |
Recent uptrend in Blood Usage

Blood Conservation - (Any blood given during hospital stay)

- 2009: 69.3% (n=872)
- 2010: 61.4% (n=946)
- 2011: 54.4% (n=895)
- 2012: 53.1% (n=960)
- 2013: 43.0% (n=1,009)
- 2014: 35.6% (n=1,071)
- 2015: 35.0% (n=1,088)
- 2016: 32.3% (n=1,172)
- 2017: 36.5% (n=1,136)
Potential Explanation

- **New Staff**
  - We’re growing quickly and adding Surgical and Anesthesia Attendings, in addition, to new Perfusionist
    - Learning curve to reducing Blood usage

- **New Literature**
  - Liberal vs. Restrictive transfusion Policies
    - NEJM November 2017
      - “Restrictive or Liberal Red-Cell Transfusion for Cardiac Surgery” Mazer et al.
Modeling Red Cell Transfusion

- “Prediction of Transfusions after Isolated Coronary Artery Bypass Grafting Surgical Procedures”

  - Multicenter data aggregate to created model for predication of transfusions
  - 16 readily obtainable preoperative variables to predict transfusion

- Use this model and institutional data to create O/E for our center at the provider level
Provider Feedback

The trends of Observed and Expected for Surg Dt Day broken down by Surgeon Experience. Color shows details about Observed and Expected. The data is filtered on UMHS Proc, Surg Dt, WeightKg, Hit and CircArrestYN. The UMHS Proc filter keeps 6 of 13 members. The Surg Dt filter ranges from 2/1/2007 to 4/16/2018. The WeightKg filter ranges from 0 to 300. The Hit filter ranges from 0 to 60. The CircArrestYN filter keeps Non-Circ Arrest.
Provider Feedback

Cusum of O/E By Blinded Surgeon (Excludes Circ Arrest)

My Experience

Peers Experience

Surgery Date

Measure Names
Observed
Expected

Jan 1, 17
Mar 1, 17
May 1, 17
Jul 1, 17
Sep 1, 17
Nov 1, 17
Jan 1, 18
Mar 1, 18
Conclusion

Key Points

- Collect data from your EMR
- Look at the data you’ve collected for trends or potential areas of improvement
- Give your staff, and other departments, feedback about their practice
  - Build a team approach to data review
- Use this information to begin another QA cycle