Using STS Data to Drive Quality Improvement

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October, 2019
I have no disclosures
A systematic approach of measuring and identifying gaps between actual and desired quality of care and applying tools and improvement methods (e.g., PDSA cycles) to make changes to the system that result in measurable improvements (i.e., closing the gap)

Characteristics include (things that can be):
1. Measured
2. Analyzed
3. Improved
4. Controlled
Six Sigma, Lean, MFI

Define
- Define
- Measure
- Analyze

Diagnose
- Identify
- Understand
- Value Stream

Test & Implement
- Value
- Eliminate
- Waste
- Establish Flow
- Enable Pull

Improve

Sustain
- Control
- Pursue Perfection

Model for Improvement
- What are we trying to accomplish?
- How will we know that a change is an improvement?
- What change can we make that will result in improvement?

Source: The Improvement Guide, API
CHOP IMPROVEMENT FRAMEWORK

**Define**
- What are we trying to accomplish, and by when? How will we measure success?

**Diagnose**
- What do we need to learn so that we can narrow our focus to a critical few drivers?

**Test and Implement**
- What changes should we make that will result in an improvement?

**Sustain**
- How do we ensure that the changes are sustained? And do we need to spread to any other areas?

### Activities
- **Define**
  - Validate background & problem
  - Define project success & timeframe
  - Establish project governance
- **Diagnose**
  - Create Driver Diagram
  - Create Data Collection Plan
  - Collect & validate data
  - Analyze data
  - Recommend changes to test
- **Test and Implement**
  - Create PDSA Worksheet or Change Plan
  - Test and implement changes
  - Evaluate effectiveness of changes
- **Sustain**
  - Hardcode changes into operations
  - Confirm process ownership for moving into operations
  - Identify any opportunities for spread

### Tollgate
- **Define**
  - Accept Charter
- **Diagnose**
  - Review recommended changes
- **Test and Implement**
  - Evaluate Changes
- **Sustain**
  - Project completed or re-chartered for Spread

### Documents & Tools
- **Define**
  - Charter
  - Governance Structure
  - Communication Plan
  - Project Plan
  - RACI
- **Diagnose**
  - Process Maps
  - Key Driver Bundle
  - Data Collection Plan
- **Test and Implement**
  - Data Analysis and Trending
  - Choose one:
    - PDSA Worksheet
    - Change Plan
- **Sustain**
  - Monitoring Plan
Deciding What to Work On

• Where do ideas come from?
  • Safety events/RCAs
  • Enterprise Plan
  • Observations of variability
  • Benchmarks
  • Annoyances
Standardizing Perioperative Norwood Guideline

• Develop guidelines to standardize care around the peri-operative period (Situational Awareness approach: Knowing at all times what is going on around you—having a **plan**, **anticipate** bad events, **communicate** red flags).

• Focus on easily modifiable processes in the care of these patients.

• Consistency will allow us to develop a best practice approach to optimize the care we provide to this population with the hope of improving outcomes.
Baseline Data

- Baseline data pulled from multiple sources for calendar year 2015
Driver Diagram – Periop Norwood Guidelines

Pre-op planning
- Fetal/perinatal risk factors
- Full delineation of cardiac anatomy
- Comprehensive extra cardiac work-up
- Ad hoc OR surgical conference discussion
- Identification of OR team

Intraoperative Course
- Intraoperative Course (monitoring, access, anesthesia, airway, procedure, hemostasis etc.)
- OR Team debrief

Immediate post-op management
- OR to CICU sign out
- Monitoring for red flags and action items
- Sedation and Extubation Readiness Protocols
- Early evaluation with echo/cath or re-exploration
Proposed Improvement Interventions

**Step 1: Plan** – Develop a peri-operative guideline for the care of the neonate undergoing Norwood operation.

**Step 2: Do** - Team leads monitor CICU list for neonates requiring Norwood operation, email caregivers the guideline and observe whether a pre-op discussion takes place. Surgical PA collects intra-operative data and observes OR to CICU handoff. Data entered into REDCap. Team members facilitate post-op debrief session.

**Step 3: Study** - Each patient will be a PDSA cycle, guideline edited based on feedback from the care team. Data analyzed to see if the guideline was followed (guideline adherence score) and whether there were significant complications in first 48 hours.

**Step 4: Act** – QI group meets monthly to review cases and alter the guideline as needed. Potential for expansion: 1) extend the guideline through the CICU stay to CCU readiness, 2) edit guideline to apply to all neonates undergoing bypass surgery.
Data Findings

- Data from last 5 most complicated patients were analyzed:
  - Pre-op course was not straightforward
  - High risk for Norwood operation
  - Complicated OR course
  - Cardiac Arrest &/or ECMO in early post-op period
  - Other complications followed from the complicated early post-op course (infection, NEC, thrombus, effusions, feeding intolerance)
  - Variability in care (pre-op discussion, access/lines, post-op monitoring)
1. Mortality in the first 48 hours
2. Overall mortality within 30 days of Norwood
3. Hospital LOS
4. ICU LOS
5. VIS in the first 12 hours
6. Complications in the first 48 hours
   • Cardiac Arrest
   • ECMO
   • Unplanned Reoperation
   • Catheter-based intervention
   • Pleural or pericardial effusion requiring drainage
   • Arrhythmia needing therapy
   • Catheter-associated thrombus
   • Intracranial Hemorrhage
   • Stroke
   • Seizure
   • NEC
7. Total complications during newborn hospitalization
8. Extubation day/time (POD#)
9. Reintubation within 72 hours of 1st extubation
### Peri-operative Norwood Guideline Adherence Score

**Maximum Score = 13**  
**Minimum goal score (60% of optimal adherence) = 8**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-op Discussion occurred by the day prior to surgery</td>
<td>1 (1=yes, 0=no)</td>
</tr>
<tr>
<td>IV Access per guideline</td>
<td>1</td>
</tr>
<tr>
<td>Pump prime with whole blood</td>
<td>1</td>
</tr>
<tr>
<td>Amicar administered in OR</td>
<td>1</td>
</tr>
<tr>
<td>Blood products ordered for OR (PRBC, Novo7, plts, cryo)</td>
<td>1</td>
</tr>
<tr>
<td>OR to CICU handoff with all members present</td>
<td>1</td>
</tr>
<tr>
<td>ECG within 12 hours post op</td>
<td>1</td>
</tr>
<tr>
<td>Upper and lower extremity BP within 2 hours post-op</td>
<td>1</td>
</tr>
<tr>
<td>At least 5 ABGs within first 12 hours post-op</td>
<td>1</td>
</tr>
<tr>
<td>IV Tylenol administered</td>
<td>1</td>
</tr>
<tr>
<td>Sedation/extubation plan discussed</td>
<td>1</td>
</tr>
<tr>
<td>Sedation plan appropriate for the extubation plan</td>
<td>1</td>
</tr>
<tr>
<td>Case debrief occurred</td>
<td>1</td>
</tr>
</tbody>
</table>

**Guideline Adherence Score**  

| Guideline Adherence Score | 13 |
After Guideline Implementation

Adherence Scores

Guidelines for the Peri-Operative Care of the Neonate
Undergoing the Norwood Operation and PostOp Complications

By Patient in Order of Surgery Date (Identifiers Removed)
Data Visualization
ISVMP Tracking Metrics

Program Metrics

QI Metrics

Outcome Metrics (1)
- Length of Stay
  - PreOp Risk Factors
  - Complications VS Adherence Score
  - PostOp Meds

Outcome Metrics (2)
- Intra-Op Interventions
  - Post-Op Complications <=48hours
  - Total Complications
  - Re-intubations
  - Correlation of metrics

Patient Details
- Median Age at DBD or Full Repair
- Weight Change between stages
What does spread mean in terms of improvements?

• Spread is the process of taking a successful implementation process from a pilot unit or pilot population and replicating that change in other parts of the organization.
Remember! There is not a “one size fits all” approach. However, lessons learned and guiding standards can be applied to other areas.
Thank you for your time.

If you have any questions please feel free to contact me:
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