QI Tools: Fishbone, Pareto, Root Cause and FMEA

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DISCLOSURE

- No presenter has a conflict to disclose
Cause and Effect (Fishbone) Diagram

- Why use this tool?
  - Great visual knowledge sharing tool about the complexities of a problem
  - Provides various vantage points from different contributors
  - Verifies that there are multiple causes contributing to a problem (staff, policies, equipment etc.)
  - Often generates ideas to quickly address a problem

- When to use?
  - To more deeply understand a process or problem and prioritize what to work on improving
  - Valuable for planning cycles for learning and improvement
  - Can be good to discuss most likely causes and then use (or collect) data to put into a Pareto Chart

Developing a Cause and Effect (Fishbone) Diagram

- Define the problem you are going to study
  - For example: delayed discharge, family dissatisfaction, medication errors
  - NOTE: You can also use this method to determine how you will get a positive outcome such as on-time discharges

- Gather a group of stakeholders together to share and organize their insights and theories about the causes of a problem

- Brainstorm: What are the major causes of this problem?

- Determine the categories for the causes
  - People often use: a) People, Policies, Procedures and Equipment or b) Methods, Materials, Machinery and Staffing, but it can be categories such as c) Parents, Education, Staff Actions, and Supplies. Use what works for your team.

- Complete the categories
  - This can be done on flip chart pages and then put into a nice diagram after the session
Delayed Discharge Policies

- Discharge Orders
  - Not well communicated
  - Not enough notice
- Miscommunications
- Checklist for Going Home
  - Not completed
  - Incorrect
- Discharge Summary
  - Documentation incomplete
  - Missing
- Medications not ready
  - Order not written
  - Order delayed
- Social Worker not available
- Education not complete
- CPR not taught
  - Med admin not taught
- Checklist incomplete
- No follow-up planned
- No pediatrician selected
- Parents unavailable
- Parents out of town
- No car seat available
- No follow-up appt scheduled

Delayed Discharge Procedures (Staff)

- Education not complete
- CPR Medication Administration
- Parents unavailable
- Home nursery not set up with proper equipment

Delayed Discharge Equipment and supplies

- Equipment
  - Not ordered
  - Not delivered
  - Not correct

Delayed Discharge People (Parents)

- No follow-up appt scheduled
- No pediatrician selected
- Parents unavailable
- Parents out of town
- No car seat available
- Home nursery not set up with proper equipment
Pareto Chart

- Why use this tool?
  - To prioritize the part(s) of a process to work on first
  - Provides good visual display of which problems to address in which order
  - Data is needed to populate the chart so good to use when you have data (survey data, complaints, observational data)
  - Once you find the biggest problem, data can be further stratified
    - For example, biggest problem in discharge process is parent education. You can break that down into CPR, car seat, medication administration etc.
  - Based on the 80/20 rule so work on what is most important first (the vital few)

Constructing a Pareto Chart

- Brainstorm: What are our major problems with this process?
  - (NOTE: If you have already constructed a cause and effect diagram, use this information instead of brainstorming)
- Use existing data to identify how often the problem occurred
  - If you don’t already have the data, decide how to collect data and over what period of time
- List the categories from left to right on the horizontal axis in order of decreasing frequency. The last category can be “other.”
- Above each category, draw a rectangle whose height is equal to the frequency of that item
- Once you identify the 2-3 top categories (Vital Few), a Pareto Chart can be developed for each of these categories to provide even more detail
Pareto Chart: Delays in Timely Discharge

- Family Education not completed
- Home and community resources not lined up
- Delays in getting meds
- Delays in getting equipment
- Discharge Summary not complete
- Other

Delays in Timely Discharge – February 2016

Pareto Chart: “Family Education Not Completed”

- Family not familiar with medications
- CPR teaching not done
- Breast feeding pump missing
- Car seat challenge not done
- Other

Family Education Not Completed - February 2016

For illustration purposes only
Pareto Chart: Family Not “Extremely Satisfied” with “Involvement with their Baby in NICU”

- Families on Rounds
- Family Holds Baby within 48 hours
- Family Touch in the Delivery Room
- Family attends to baby’s needs (such as diapering)
- Easy access to baby for extended family members
- Other

March 2016

VITAL FEW

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For illustration purposes only
ROOT CAUSE ANALYSIS

RCA SHOULD IDEALLY BE PERFORMED AS SOON AFTER THE EVENT AS POSSIBLE, AND ARE TRADITIONALLY PERFORMED THROUGH FACE-TO-FACE MEETINGS WITH THE INVOLVED CLINICAL STAFF.

THIS RELIES ON CLINICAL STAFF REMEMBERING TO REPORT EVENTS TO LEADERSHIP. IT IS LABOR INTENSIVE FOR ALL, AND EVEN ON THE DAY OF AN EVENT, IT IS UNLIKELY THAT ALL OF THE TARGETED STAFF WILL BE AVAILABLE.

MANY DEPARTMENTS UTILIZE MORBIDITY & MORTALITY (M&M) CONFERENCES FOR IN-DEPTH REVIEW. THESE OFTEN OCCUR WEEKS AFTER EVENT, AND CAN BE DIFFICULT FOR STAFF TO ATTEND.
RCA EXAMPLE FOR SURGICAL SITE INFECTION

RCA Reviews whether SSI Bundle Elements are followed:

✓ Nutrition Assessment
✓ Nutrition consult if labs indicate
✓ CHG Night Before Surgery
✓ CHG in pre-anesthesia area
✓ Patient temp >36 in pre anesthesia area
✓ Antibiotic administration in recommended timeframe
✓ Antibiotic dosing appropriate
✓ Intraoperative temp >36

RCA IS....

Retrospective and reactive
FAILURE MODES AND EFFECTS ANALYSIS (FMEA) IS A STEP-BY-STEP APPROACH FOR IDENTIFYING ALL POSSIBLE FAILURES IN A DESIGN, A PROCESS, OR A PRODUCT OR SERVICE.

“FAILURE MODES” MEANS THE WAYS, OR MODES, IN WHICH SOMETHING MIGHT FAIL.

FMEA IS....

PROSPECTIVE AND PROACTIVE
### Step 4: Brainstorm Potential Failure Modes, Causes, and Effects

<table>
<thead>
<tr>
<th>Step</th>
<th>Failure Mode</th>
<th>Cause of Failure</th>
<th>Effect of Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/A</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>2</td>
<td>Child not banded</td>
<td>Not in Policies &amp; Procedures, Not in Standard of Care, Not Emphasized, Not Understood</td>
<td>No HUGS Protection</td>
</tr>
<tr>
<td>3</td>
<td>Insufficient IS info provided to mom</td>
<td>Forgetfulness, Training Issues, Not Assuming Responsibility</td>
<td>Mom Doesn’t know Infant Security Precautions</td>
</tr>
<tr>
<td>3</td>
<td>Mom not paying attention</td>
<td>Not the Best Time for Mom</td>
<td>Mom Doesn’t know Infant Security Precautions</td>
</tr>
<tr>
<td>3</td>
<td>Info not understood</td>
<td>Cultural/Language Barriers</td>
<td>Mom Doesn’t know Infant Security Precautions</td>
</tr>
<tr>
<td>4</td>
<td>Baby may not be HUGS banded prior to washing</td>
<td>Caregiver Knowledge Deficit about New System</td>
<td>Baby may be Moved w/o HUGS Protection</td>
</tr>
</tbody>
</table>

### Step 5: Evaluate the Risk of Failure, or Hazard Score

<table>
<thead>
<tr>
<th>Step</th>
<th>Failure Mode</th>
<th>Frequency of Failure</th>
<th>Degree of Severity</th>
<th>Chance of Detection</th>
<th>Risk Priority #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/A</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>2</td>
<td>Child not banded</td>
<td>7</td>
<td>10</td>
<td>5</td>
<td>350</td>
</tr>
<tr>
<td>3</td>
<td>Insufficient IS info provided to mom</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>160</td>
</tr>
<tr>
<td>3</td>
<td>Mom not paying attention</td>
<td>8</td>
<td>5</td>
<td>8</td>
<td>320</td>
</tr>
<tr>
<td>3</td>
<td>Info not understood</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td>80</td>
</tr>
<tr>
<td>4</td>
<td>Baby may not be HUGS banded prior to washing</td>
<td>5</td>
<td>10</td>
<td>3</td>
<td>270</td>
</tr>
</tbody>
</table>
Prioritized Failure Mode RPN Scores

<table>
<thead>
<tr>
<th>Step</th>
<th>Failure Mode</th>
<th>Risk Priority # (Before)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bands loosening</td>
<td>432</td>
</tr>
<tr>
<td>5</td>
<td>Info not entered into computer system, including name/room#</td>
<td>400</td>
</tr>
<tr>
<td>9</td>
<td>Not checked against census</td>
<td>382</td>
</tr>
<tr>
<td>2</td>
<td>Child not banded</td>
<td>380</td>
</tr>
<tr>
<td>9</td>
<td>Transferred rooms, not updated</td>
<td>343</td>
</tr>
<tr>
<td>3</td>
<td>Morn not paying attention</td>
<td>320</td>
</tr>
<tr>
<td>14</td>
<td>Leaving SCN other than for discharge w/ HUGS band (may include family room visiting)</td>
<td>310</td>
</tr>
<tr>
<td>4</td>
<td>Baby may not be HUGS banded prior to washing</td>
<td>270</td>
</tr>
<tr>
<td>6</td>
<td>Baby in entering room w/ HUGS band</td>
<td>200</td>
</tr>
<tr>
<td>5</td>
<td>Alarm ringing - doors not locking</td>
<td>200</td>
</tr>
<tr>
<td>8</td>
<td>Bands not checked and/or tightened properly</td>
<td>192</td>
</tr>
<tr>
<td>3</td>
<td>Insufficient S# info provided to mom</td>
<td>160</td>
</tr>
<tr>
<td>10</td>
<td>HUGS band may not be checked when moving to nursery, other, for blood draws, circ., etc.</td>
<td>105</td>
</tr>
<tr>
<td>6</td>
<td>HUGS band not applied until reaching post partum (sometimes)</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Info not understood</td>
<td>60</td>
</tr>
<tr>
<td>misc.</td>
<td>Side door not reactivating properly</td>
<td></td>
</tr>
<tr>
<td>misc.</td>
<td>Other entrance issues related to cameras and other security features</td>
<td></td>
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Step 8 Determine FMEA Project Success

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<th>Frequency of Detection</th>
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<td>2</td>
<td>Child not banded</td>
<td>1</td>
<td>10</td>
<td>5</td>
<td>150</td>
</tr>
<tr>
<td>3</td>
<td>Insufficient S# info provided to mom</td>
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<td>5</td>
<td>8</td>
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