Reducing Central Line Infections

Sinai-Grace Hospital in Detroit has achieved remarkable reductions in bloodstream infections associated with central lines. They've reduced the rate of infections significantly by implementing a simple procedure and checklist. The root cause analysis that shows how these gains were achieved is shown here.

Step 1. Define the Problem (Outline)
- Problem(s): Central line infections
- When: 2005-2006
- Differences: (pre-2006) infection rates higher than national average, (2006) infection rates lower than 50% of hospitals nationwide
- Where: Sinai-Grace Hospital, Detroit
- Impact to the Goals:
  - Patient Safety:
    - Goal Impacted: >1500 deaths (projected)
  - Compliance:
    - Goal Impacted: Non-compliance with procedures
  - Organization:
    - Goal Impacted: Patient Services Goal
  - Material, Labor:
    - Goal Impacted: Additional costs (projected) $175 million

Step 2. Perform the Analysis (Cause Map)

- Why?
  - Effect
  - Cause

  NOTE: Read the Cause Map from left to right with the phrase “Was Caused By” in place of each arrow.

- Compliance Goal Impacted
  - Non-compliance with procedures

- Organization Goal Impacted
  - Bacteria on catheter

- Patient Safety Goal Impacted
  - >1500 deaths (projected)

- Costs saved by use of checklist

- Lives saved by use of checklist

- Infection rate reduced 66% with use of checklist

- Process Map (Implement Solutions)

  1. Wash hands with soap
  2. Clean patient's skin with chlorhexidine antiseptic
  3. Cover patient's entire body with sterile drapes
  4. Don mask, hat, surgical gown, gloves
  5. Insert catheter
  6. Cover insertion site with sterile dressing

- Solutions: Add to checklist (step 1)
  - Doctors do not wash hands with soap
  - AND
  - Bloodstream infections

- Solutions: Add to checklist (step 2)
  - Chlorhexidine soap not available in most ICUs

- Solutions: Add to checklist (step 3)
  - Patients are not washed with antiseptic

- Solutions: Add to checklist (step 4)
  - Doctors do not don protective wear

- Solutions: Add to checklist (step 5)
  - Patients are not fully draped

- Solutions: Add to checklist (step 6)
  - Insertion site not protected by sterile bandage

Step 3. Select Solutions (Action Items)

<table>
<thead>
<tr>
<th>No.</th>
<th>Cause</th>
<th>Action Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Doctors do not wash hands with soap</td>
<td>Add to checklist (step 1)</td>
</tr>
<tr>
<td>2</td>
<td>Patients are not washed with antiseptic</td>
<td>Add to checklist (step 2)</td>
</tr>
<tr>
<td>3</td>
<td>Chlorhexidine soap not available in most ICUs</td>
<td>Provide soap in every ICU</td>
</tr>
<tr>
<td>4</td>
<td>Full-size barrier drapes not available in ICUs</td>
<td>Provide drapes in ICUs</td>
</tr>
<tr>
<td>5</td>
<td>Patients are not fully draped</td>
<td>Add to checklist (step 3)</td>
</tr>
<tr>
<td>6</td>
<td>Doctors do not don protective wear</td>
<td>Add to checklist (step 4)</td>
</tr>
<tr>
<td>7</td>
<td>Insertion site not protected by sterile bandage</td>
<td>Add to checklist (step 6)</td>
</tr>
</tbody>
</table>

Hospital Senior Executives, who were assigned to units to help solve problems, were instrumental in ensuring the proper equipment was found in each intensive care unit (ICU) to reduce infections. Once they understood what was necessary, they even convinced a manufacturer to put together a central line kit which contained the necessary antiseptics and drapes.