Failure to Maintain: Missed Care and Hospital-Acquired Pneumonia

STTI INDIANAPOLIS, OCTOBER 2017
DIAN BAKER, PHD, RN  DIBAKER@CSUS.EDU
PROFESSOR, SCHOOL OF NURSING
CALIFORNIA STATE UNIVERSITY, SACRAMENTO
Next steps for a Call to Action

1. Our journey with NV-HAP, patient safety, and cost impact

2. Review of current literature and our findings from HCUP and the Medicaid databases

3. NV-HAP can be prevented through therapeutic nursing care interventions
The story of May and how we began this journey

HAPPI = Hospital-acquired pneumonia prevention initiative

May is a 57 year old grandmother who develops non-ventilator hospital acquired pneumonia (NV-HAP)

Why does this keep happening?
Incidence of NV-HAP:
Three hospital systems study (2012 used 2010 data)
similar results from Kaiser and the VA

Sutter Medical Center: 2010
- 24,482 patients; 94,247 patient days
- 1.25/1000 pt days & 0.49/100 pts
- 115 cases NV-HAP

Total estimated annual impact:
- $4.6 million (#cases at extra cost - $40,000/case)
- 23 deaths
- 1035 days

We knew VAP was a problem, but what about NV-HAP? Is it a problem too?

- How much non-ventilator pneumonia was occurring in the hospital?
- Why was no one talking about it?
- Was it happening in other hospitals?
- Can it be prevented? If so, how?
## Current Literature: NV-HAP is a National Problem

<table>
<thead>
<tr>
<th>Study</th>
<th>Incidence/ Cases</th>
<th>Mortality</th>
<th>+LOS</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Davis, J. &amp; Finley E. (2012)</td>
<td>5,600 /3 yrs</td>
<td>18.9%</td>
<td>Not queried</td>
<td>$28,000</td>
</tr>
<tr>
<td>HCUP National database (AHRQ) (to be published)</td>
<td>2/100 pts</td>
<td>14.5%</td>
<td>4 days</td>
<td>$36,400</td>
</tr>
<tr>
<td>Magill et al. Point Prevalence Study CDC (2014)</td>
<td>PNA 21.8 % of all HAIs &gt; 60% for NV-HAP</td>
<td></td>
<td></td>
<td>$40,000</td>
</tr>
<tr>
<td>Micek, Chew, Hamptom &amp; Kollef (2016)</td>
<td>174 cases NV-HAP Matched controls equally sick</td>
<td>15.5% vs. 1.6% 8.4 more likely to die 15.9 days vs. 4.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>See et al. (2016)</td>
<td>Retrospective review 8 hospitals in PA 2011-2012 VAP excluded 30% of 838 cases reviewed by CDC epidemiologists</td>
<td>30.9%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

National HAPPI-2 incidence study

2014 Data from 21 U.S. hospitals  
1300 NV-HAP Cases

- 16% mortality
- 60% occurred on Med/Surg units
- 27% acquired in ICU/ 19% transferred to ICU
- 46% of NV-HAP patients spent time in the ICU
- 33% transferred to ICU died
- **ONLY 60% admitted from home were discharged back to home**
- 19% readmitted within 30 days

Cases from these 21 hospitals = $52.5 million in extra costs from a preventable harm  ($40,000 additional costs/ case)
Literature: Pneumonia and Sepsis

50% of sepsis cases are caused by pneumonia (Finfer, 2013)

<table>
<thead>
<tr>
<th>Site of Infection</th>
<th>Frequency (%)</th>
<th>Mortality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Respiratory</td>
<td>41.8</td>
<td>35.8</td>
</tr>
<tr>
<td>Bacteremia, site unspecified</td>
<td>21.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>10.3</td>
<td>18.0</td>
</tr>
<tr>
<td>Abdominal</td>
<td>8.6</td>
<td>8.1</td>
</tr>
<tr>
<td>Device-related</td>
<td>1.2</td>
<td>1.0</td>
</tr>
<tr>
<td>Wound/soft tissue</td>
<td>9.0</td>
<td>7.5</td>
</tr>
<tr>
<td>Central nervous system</td>
<td>0.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Endocarditis</td>
<td>0.9</td>
<td>0.5</td>
</tr>
<tr>
<td>Other/unspecified</td>
<td>6.7</td>
<td>8.6</td>
</tr>
</tbody>
</table>

### What are you working on right now?
Relative Harm: Most common HAIs

<table>
<thead>
<tr>
<th>Type</th>
<th>% Prevalence</th>
<th>% Mortality</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUTI</td>
<td>13%</td>
<td>1.5%</td>
<td>$1,108</td>
</tr>
<tr>
<td>CLABSI</td>
<td>5-10%</td>
<td>12%</td>
<td>$33,618</td>
</tr>
<tr>
<td>SSI</td>
<td>&gt;10%</td>
<td>3%</td>
<td>$19,305</td>
</tr>
<tr>
<td>HAP</td>
<td>22%</td>
<td>19%</td>
<td>$40,000</td>
</tr>
</tbody>
</table>
Included for the first time in its top TEN public health concerns:

Healthcare-associated infections

#1 Hospital-acquired infection pneumonia

* >60% of HAP are from NV-HAP

CDC (2015) Prevention Status Report
How can non-ventilator hospital-acquired pneumonia be prevented?
Most Pneumonia Starts in the Mouth

Microbiome of Oral Cavity
- 200 billion oral microbes
- 700 - 1000 species

Disruption of Microbiome
- Risk with hospitalization
- Changes in saliva pH and production

- 48 hours for HAP pathogens in mouth
- **PLUS – MICROASPIRATIONS**
  - If aspirated = 100,000,000 bacteria/mL saliva into lungs

http://helios.bto.ed.ac.uk/bto/microbes/biofilm.htm / Loesche, W. 2012/
This attachment structure requires mechanical removal with a good toothbrush.
“Identify the most modifiable risk factors and develop prevention programs to address them.” (CDC, 2003)

Germs
- Reduce harmful pathogens with:
  - Comprehensive oral care
  - * applies to all patients/ most modifiable

Aspiration
- Reduce aspiration with:
  - Swallow evals
  - HOB elevated
  - Tube Care

Host
- Increase host resistance with:
  - Early mobility  Keep patients warm during surgery
  - Pulmonary toilet
  - Limit use of acid suppressive meds

Prevent HAP

Missed care associated with the development of pneumonia*

<table>
<thead>
<tr>
<th>Activity</th>
<th>Missed</th>
<th>Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEVATED HOB</td>
<td>34%</td>
<td>66%</td>
</tr>
<tr>
<td>MOBILITY</td>
<td>59%</td>
<td>41%</td>
</tr>
<tr>
<td>ORAL CARE</td>
<td>73%</td>
<td>27%</td>
</tr>
<tr>
<td>IS/C&amp;DB</td>
<td>84%</td>
<td>16%</td>
</tr>
</tbody>
</table>

*Data from Sutter HAPPI 1 study


A Pneumonia Prevention Story
How We Addressed NV-HAP & Post-Op Pneumonia at our facility

**Select Interventions based on Gap Analysis findings & best available evidence-based practices**

**GAP analysis and Gather an interdisciplinary team**

- **Include patients and families**

**Use a scientific implementation and change model**

- IHI QI process and Influencer Model™ Vital Signs

**Measure**

- Measure baseline NV-HAP/ Process rates oral care
- Control chart and OR/RR and CI chart

**Gap Analysis & Gather a Team**

- GAP analysis and Gather an interdisciplinary team

Select

- Use a scientific implementation and change model
  - IHI QI process and Influencer Model™ Vital Signs

Measure

- Measure baseline NV-HAP/ Process rates oral care
- Control chart and OR/RR and CI chart

Gap Analysis & Gather a Team

- GAP analysis and Gather an interdisciplinary team
  - Include patients and families

Select

- Select Interventions based on Gap Analysis findings & best available evidence-based practices
Focus on one intervention at a time, beginning with the most modifiable risk factors

1. **ORAL CARE**
   & Peri-Op oral care
   Add new tube care protocols
   Added monitoring of Stress Ulcer Prophylaxis

2. **Monitor process and outcome measures; C-chart and calculate return on investment (ROI)**

3. **Engage leadership**
   Provide frequent feedback to staff, patients, and leadership

4. **Celebrate and share your successes**
   Monitor process measurements & engagement

---

**Process for Change**
NV-HAP \(\downarrow\) 70% from baseline

Control chart for non-ventilator HAP
January 2010 to December 2014

- Oral care for all adult pts
- Documentation
- NGT standards revised
- Pharmacy starts SUP protocol
- Started oral care prior to surgery
- Mandatory Education for Nurse Assistants
Post operative NV-HAP (all adult inpatient surgery)  
Incidence 6 months pre oral care vs. 6 months after

![Graph showing a 75% decrease in incidence of NV-HAP between Mar-July 14 and Aug14-Jan 15]
Return on investment: What does pneumonia prevention mean?

Between May 2012 and December 2014 we avoided 164 cases of NV-HAP
- 31 lives saved
- $5.9 million not spent
- 656-1476 hospital days avoided

Based on numbers from the CDC and NVHAP incidence studies, we estimate that reducing NVHAP by even 50% in the U.S. will save 53,000 lives, 170,000 patient days, and $3.4B annually (based on HCUP total charges) (Commitment statement, WPSF Summit 2016)

JOIN US:
Email
dibaker@csus.edu
National Impact Policy

California Healthcare Quality Institute
American Dental Association
World Patient Safety Foundation
American Hospital Association
The Joint Commission
Centers for Disease Control and Prevention
HAP #1 hospital-acquired infection, costing patient lives and dollars (NV-HAP 60%)

Nursing Interventions - HAP can be prevented and harm to patients reduced

Monitoring for NV-HAP and prevention programs must rise to the same level of attention as other hospital-acquired infections
One must always be aware, to notice, even though the cost of noticing is to become responsible.

Thylias Moss

dibaker@csus.edu