Practice Makes Improvement: Catheter-Associated Urinary Tract Infection (CAUTI) Trends in Michigan

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Disclosures

• I have nothing to disclose
Acronyms

- **MDCH** = Michigan Department of Community Health
- **SHARP** = Surveillance for Healthcare-Associated and Resistant Pathogens Unit
- **MHA** = Michigan Health and Hospital Association
- **SIR** = Standardized Infection Ratio (observed infections / expected infections)
- **DU Ratio** = Device Utilization Ratio (device days / patient days)

Background
Michigan Reporting Requirements

- Approximately 90 diseases or conditions are reportable in Michigan (required by Michigan law)
- HAI surveillance via NHSN is not mandated in Michigan
- Unusual occurrences, outbreaks, and epidemics of any disease or condition (including HAIs) are reportable

National Healthcare Safety Network

- MDCH SHARP Unit receives voluntarily-reported HAI data from 81 Michigan hospitals via NHSN
Michigan CAUTI History

- Historically, Michigan has reported low CAUTI standardized infection ratios (SIRs) and device utilization (DU) ratios
  - SHARP Surveillance Reports
    - 2011 Annual Report: SIR=0.638 (0.527, 0.766)
  - State SIR Reports provided by CDC
    - 2011: SIR=0.581 (0.490, 0.684)

Why are Michigan CAUTI SIRs and DU Ratios so low?

- Longstanding CAUTI surveillance and prevention efforts
  - Efforts of the MHA Keystone Center for Patient Safety & Quality since 2007
    - Hospital Engagement Network (HEN) since 2011
  - SHARP Unit HAI Surveillance Initiative in place since 2009
A National Comparative study by Saint, et al. found that Michigan hospitals more frequently:

- participated in collaboratives to reduce HAI and
- used bladder scanners and catheter reminders or stop orders and/or nurse-initiated discontinuation of catheters

The Problem

- Michigan CAUTI SIRs and DU ratios began to increase dramatically in 2012

Why did this happen???
Methods

• Aggregate SIRs and DU ratios using the NHSN analysis function were calculated:
  – Overall and Quarterly for 2011
  – Overall and Quarterly in 2012

• 25 hospitals shared CAUTI data with SHARP in 2011

• 73 hospitals shared CAUTI data with SHARP in 2012

Methods – Stratification Variables

• Quarterly variables examined included:
  – Overall vs. original 25 participating hospitals

  – Hospitals sharing data with MHA Keystone through the SHARP Unit vs. non-sharing hospitals

  – ICU vs. Non-ICU within each of the above categories
Results

Variables of No Difference

• ICU vs. Non-ICU comparison was not significant

• MHA Keystone-participating hospitals showed the same trend as overall Michigan hospitals
Significant Variable Comparison

• Overall (all participating hospitals) vs. original 25 participating hospitals

<table>
<thead>
<tr>
<th>Year</th>
<th>Quarter</th>
<th>Group</th>
<th>Number of Hospitals</th>
<th>SIR</th>
<th>SIR P-Value</th>
<th>SIR 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>Overall</td>
<td>Overall</td>
<td>25</td>
<td>0.739</td>
<td>0.0002</td>
<td>0.618, 0.877</td>
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<tr>
<td>2012</td>
<td>Quarter 1</td>
<td>Overall</td>
<td>69</td>
<td>1.062</td>
<td>0.1998</td>
<td>0.924, 1.214</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Original 25</td>
<td>24</td>
<td>0.743</td>
<td>0.0339</td>
<td>0.526, 1.020</td>
</tr>
<tr>
<td>2012</td>
<td>Quarter 2</td>
<td>Overall</td>
<td>70</td>
<td>1.314**</td>
<td>0.0000, 0.0230**</td>
<td>1.156, 1.487</td>
</tr>
<tr>
<td></td>
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<td>Original 25</td>
<td>24</td>
<td>0.962</td>
<td>0.4353</td>
<td>0.702, 1.287</td>
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<tr>
<td>2012</td>
<td>Quarter 3</td>
<td>Overall</td>
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<td>0.0127</td>
<td>1.019, 1.315</td>
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<tr>
<td></td>
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<td>24</td>
<td>0.613</td>
<td>0.0025</td>
<td>0.414, 0.875</td>
</tr>
<tr>
<td>2012</td>
<td>Quarter 4</td>
<td>Overall</td>
<td>73</td>
<td>1.052</td>
<td>0.2247</td>
<td>0.923, 1.195</td>
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<tr>
<td></td>
<td></td>
<td>Original 25</td>
<td>24</td>
<td>0.760</td>
<td>0.0449</td>
<td>0.540, 1.039</td>
</tr>
</tbody>
</table>

Highlight = Significantly fewer infections than expected based on p-value and confidence interval
Highlight = Significantly more infections than expected based on p-value and confidence interval
Highlight = Significantly different than expected based on p-value; not significant based on confidence interval
*=Significantly more infections than previous quarter based on p-value
**=Significantly fewer infections than previous quarter based on p-value
***=Significantly fewer infections than previous quarter based on p-value
Overall Michigan CAUTI SIR Trends

Statewide Overall CAUTI SIR

Original 25 Hospitals CAUTI SIR Trends

Original 25 Hospital CAUTI SIR

*=Significantly fewer infections than expected based on p-value and confidence interval agreement
**=Significantly more infections than expected based on p-value and confidence interval agreement
# Michigan CAUTI DU Ratios

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Hospitals</th>
<th>DU Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2011 Overall</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>25</td>
<td>0.267</td>
</tr>
<tr>
<td><strong>2012 Quarter 1</strong></td>
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<td></td>
</tr>
<tr>
<td>Overall</td>
<td>69</td>
<td>0.412**</td>
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<tr>
<td>Original 25</td>
<td>24</td>
<td>0.242</td>
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<tr>
<td><strong>2012 Quarter 2</strong></td>
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<td></td>
</tr>
<tr>
<td>Overall</td>
<td>70</td>
<td>0.407*</td>
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<tr>
<td>Original 25</td>
<td>24</td>
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<td><strong>2012 Quarter 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>73</td>
<td>0.337*</td>
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<tr>
<td>Original 25</td>
<td>24</td>
<td>0.242</td>
</tr>
<tr>
<td><strong>2012 Quarter 4</strong></td>
<td></td>
<td></td>
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<tr>
<td>Overall</td>
<td>73</td>
<td>0.326*</td>
</tr>
<tr>
<td>Original 25</td>
<td>24</td>
<td>0.242</td>
</tr>
</tbody>
</table>

*=Significantly less than previous quarter or year based on p-value  
**=Significantly greater than previous quarter or year based on p-value  
*Green box*=Original 25 is significantly lower than corresponding overall DU Ratio

# Michigan CAUTI DU Ratio Trends

![Graph showing CAUTI DU Ratio trends over quarters](image)
Why were Michigan SIRs so low to begin with?

• MHA Keystone Work to reduce CAUTIs with *On the CUSP: Stop CAUTI*
  – Implemented in 2007 for 163 units in 71 hospitals
  – Implemented two bundles addressing:
    • Timely removal of non-essential catheters
    • Insertion of catheters
Why weren’t MHA Keystone hospitals significant?

• MHA Keystone-participating hospitals were included regardless of:
  – When they began sharing data
  – When they implemented bundles
  – Which units they focused on

• MHA Keystone Hospital Engagement Network (HEN) wasn’t created until late 2011

Why weren’t ICU locations significant?

• The SIR is already risk-adjusted for location type
  – Therefore, expect no difference when comparing ICU to Non-ICU SIRs.
What was different between 2011 and 2012?

• Addition of 48 hospitals in 2012 due to CMS mandate
  – Contributed to a dramatic increase in overall state SIR and DU ratio values
  – Acute care hospitals were now mandated to report CAUTI data

Why did these hospitals make such an impact?

• We hypothesize that:
  – The 25-hospital subset included hospitals more familiar with reporting and prevention
    • Experience with CAUTI prevention led to the maintenance of low SIRs
    • Familiarity with CAUTI reporting leads to more accurate reporting techniques
Conclusions

• The 25-hospital subset continued to demonstrate low SIRs and DU ratios

• By the end of 2012, the Overall CAUTI SIRs and DU Ratios had begun to decrease slightly
  – We will continue to monitor this trend

Summary

• CAUTI prevention and surveillance initiatives can contribute to improvements in infection reduction over time

• Hospitals that sustain efforts to reduce catheter usage and prevent infections can maintain a lower-than-expected number of infections
Next Steps

• Continue to monitor CAUTI surveillance data

• Determine 25-hospital subset prevention efforts prior to the CMS mandate

• Validate HAI reporting techniques at an individual hospital level

Thank You!

Any Questions?

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