Out with the Old, In with the New: How DICON Hospitals' NHSN SIRs Changed with the New 2015 Baseline

NHSN re-calibrated their risk adjustment models based on data reported to NHSN in 2015. Please see our December 2016 DICON newsletter for additional discussion regarding the purpose of the re-baselining. We anticipated that most hospitals’ SIRs would increase with the re-baselining, since the average SIR for all hospitals reporting to NHSN would be reset to 1. What we did not know was whether all hospitals’ SIRs would change similarly with the re-baselining, or whether the new risk adjustment models would ‘favor’ some hospitals more than others (e.g., based on size). In this newsletter, we analyze the impact of the re-baselining on DICON hospitals’ CMS-reported SIRs for 2015, comparing SIRs calculated using the old and new adjustment models.

Methods

We collected NHSN SIRs for 38 DICON hospitals for the following CMS-reported metrics for calendar year 2015: CLABSI, CAUTI, MRSA BSI lab ID event, CDI lab ID event, COLO SSI, and HYST SSI. We calculated the median, 25th percentile, and 75th percentile SIR values for DICON hospitals for both the old baseline and the new 2015 baseline. In addition, we plotted SIR versus hospital bed size to assess for any SIR trends related to hospital size within the DICON network. Finally, we ranked DICON hospitals by NHSN SIR and examined the impact of re-baselining on hospital rank. Hospitals for whom an SIR could not be calculated due to expected number of infections <1 were excluded from the analysis.

Our results are shown below in the series of tables and figures that follow. We use box and whisker plots to visually depict the change in SIR median and distribution between the old and new baselines. The median is represented by the blue line, the lower and upper edges of the box represent the 25th and 75th percentiles, and the lower and upper ends of the “whiskers” represent the minimum and maximum values observed among DICON hospitals.

Results

<table>
<thead>
<tr>
<th>Infection</th>
<th># of Hospitals*</th>
<th>DICON-Wide NHSN SIR 2015 – Old Baseline</th>
<th>DICON-Wide NHSN SIR 2015 – New Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>CLABSI</td>
<td>31</td>
<td>0.394</td>
<td>0.558</td>
</tr>
<tr>
<td>CAUTI</td>
<td>36</td>
<td>0.260</td>
<td>0.441</td>
</tr>
<tr>
<td>MRSA</td>
<td>28</td>
<td>0.413</td>
<td>0.601</td>
</tr>
<tr>
<td>CDI</td>
<td>37</td>
<td>0.596</td>
<td>0.744</td>
</tr>
<tr>
<td>COLO</td>
<td>31</td>
<td>0.277</td>
<td>0.736</td>
</tr>
<tr>
<td>HYST</td>
<td>14</td>
<td>0.000</td>
<td>0.660</td>
</tr>
</tbody>
</table>

*Excludes hospitals for whom SIR could not be calculated due to expected infections <1
Summary

The 2015 NHSN re-baselining had a significant impact on SIRs. As expected, CLABSI and CAUTI SIRs increased significantly, while MRSA and CDI SIRs had a more modest increase as a result of the re-baselining. COLO SIRs declined and HYST SIRs increased modestly, but whether these changes are epidemiologically significant is unclear given the relative rarity of SSIs and the reduced number of hospitals reporting data. For some infection metrics, we noted a trend between SIR and hospital bed size among DICON hospitals. This warrants further investigation in a larger cohort of hospitals.

Many hospitals’ NHSN SIR rank within DICON changed by as many as 5 hospitals when comparing 2015 SIRs calculated under the old and new baseline.

Key Points and DICON Recommendations

- SIRs using the new 2015 baseline are based on updated baseline data and risk adjustment models, and are more accurate representations of your hospital’s performance compared to hospitals nationally.
- SIRs calculated under the old baseline will continue to be used for CMS Value Based Purchasing programs through FFY18.
- Key stakeholders at your hospital should be aware that SIRs, particularly CLABSI and CAUTI, increased significantly with the re-baselining, and this should be considered when establishing institutional SIR targets using the new baseline.
- Because of the re-baselining, it will be challenging for hospitals to assess internal performance over several years spanning the time of re-baselining. For example, it will be impossible to use SIRs to assess trends from 2014 to 2017. Hospitals may still continue to use infection rates and DICON rate benchmarks to assess their internal performance over many years.

We will be providing DICON member hospitals with reports containing hospital-specific data demonstrating the change in SIRs at your facility with the re-baselining and NHSN SIR ranking within the DICON network. Please direct any questions or concerns regarding these data to your DICON liaison Infection Preventionist. Because we think these data are valuable, we plan to include NHSN SIR ranking within DICON in our semi-annual reports.
Central Line-Associated Blood-Stream Infections (CLABSI)

The median SIR for CLABSI increased from 0.558 to 1.076 with the re-baselining, and the interquartile range increased significantly as well. This was expected given the fact that CLABSI rates across the nation have decreased significantly since the prior baseline period from 2006-2008.\(^1\)

The parallel regression lines in the above chart demonstrate that there was overall very little difference between large and small hospitals in terms of how much CLABSI SIRs increased with the new baseline. Thus, CLABSI SIRs of large and small hospitals in DICON were equally impacted by the re-baselining.
Catheter-Associated Urinary Tract Infections (CAUTI)

The median SIR for CAUTI increased from 0.441 to 0.831 with the re-baselining. This was expected due to the 2015 definition change, which dropped candiduria and urinalysis from the definition and increased the required colony count to 100,000 CFU, resulting in fewer CAUTIs in 2015 compared to the old baseline period.

The CAUTI SIR tended to be higher in larger DICON hospitals compared to smaller ones, and this trend was more pronounced with the new baseline. It’s unclear why this is the case, though one possible explanation would be the greater proportion of at-risk patients in larger hospitals, including ICU patients and others with prolonged hospital stay, not fully accounted for by the risk-adjustment model.
Methicillin-Resistant S. aureus (MRSA)

The median SIR for MRSA increased from 0.601 to 0.806 with the re-baselining, though the interquartile range remained relatively similar. This, too, was expected given the overall decline in hospital-acquired MRSA infections. Between 2011 (the old baseline) and 2014, nationwide HA-MRSA infections declined by 13%.¹

Overall, larger hospitals had slightly higher SIRs compared to smaller hospitals but there was no significant change in this relationship with re-baselining.
C. difficile Infection (CDI)

The median SIR for CDI changed very little from 0.744 to 0.790 with the re-baselining and the interquartile range remained relatively similar.

Interestingly, hospital bed capacity was not associated with SIR using the old baseline, but there does appear to be a slight negative correlation between bed capacity and SIR when using the 2015 baseline.
Colon Surgery and Hysterectomy Surgical Site Infections (COLO and HYST)

The median SIR for COLO decreased from 0.736 to 0.666, and the median SIR for HYST increased from 0.660 to 0.762. These changes are not significant.
Hospital bed capacity was not associated with SIR for COLO using the old baseline, but there does appear to be a slight positive correlation between bed capacity and SIR for COLO when using the 2015 baseline. Although there appears to be an equal positive correlation between bed capacity and SIR for HYST using both baselines, it’s difficult to interpret these data because only 14 hospitals were able to calculate and report SIRs.
Reference