Other Considerations: Decision-Making Rationales and Additional Analytic and Display Ideas for HAI Reports

Background on the Toolkit Workgroup’s Decision-Making Processes, Additional Display and Analytic Considerations, and an Overview of Maryland Focus Groups

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II. Overview of Maryland Focus Groups
I. Discussion of Additional Display/Analytic Ideas and Rationales for Toolkit Recommendations

a) Facility-level “Report Cards”

Several states have created one-page “report cards”, or summary pages, for each facility. This allows the report audience to view all of a facility’s HAI data on a single page in the state’s HAI report. The states currently using this method have received positive feedback from the facilities. The “report cards” can include various data points such as facility-specific SIRs (and SIR components) for each HAI, an indication of the facility’s performance relative to the overall state and/or national percentile distributions, or a comparison to the facility’s performance in the prior year*. Other demographic information, such as the type of facility and number of beds, may be included as well. We realize that this option would be resource-intensive and may be impractical for larger states with many facilities.

Samples of facility-specific report cards can be found here:

- **New Hampshire** (the report cards begin on page 87):

- **Tennessee** (the report cards begin on page 195):
  [http://health.state.tn.us/Ceds/PDFs/TNReportHAIO914.pdf](http://health.state.tn.us/Ceds/PDFs/TNReportHAIO914.pdf)

*Note that if you choose to present data over multiple years, the data caveats of trending should be mentioned in the report (e.g., protocol or definitional differences between the time periods). See part (d) of this document for more information about presenting trend data.

b) Considerations for Incorporating the Cumulative Attributable Difference

Targeted Assessment for Prevention (TAP) reports are an element of the TAP strategy that use a metric called the cumulative attributable difference (CAD) to quantify and rank the excess number of infections in reference to a comparison goal based on a target SIR (e.g., 1, HHS HAI Action Plan goal, state-specific goal). The CAD subtracts the number of predicted infections (given the target SIR) from the number of observed infections. Lower CADs are better. More information about the TAP strategy can be found here:

[http://www.cdc.gov/hai/prevent/tap.html](http://www.cdc.gov/hai/prevent/tap.html)

- TAP reports are one piece of a strategy to create/bolster partnerships as well as identify and prioritize facilities (or locations) for targeted infection prevention interventions.
• Findings from TAP reports are best used by internal health department, multidisciplinary Advisory Group, or other HAI stakeholders, as tools for recruitment and evaluation of infection prevention interventions. If included in an HAI public report, the use of the CAD may have several unintended consequences which may include:
  o Confusion on how to interpret the results, depending on the target SIR that is used (i.e., the CAD may not be a simple subtraction of observed minus predicted if the national HHS goals or state-specific goals are used for the target SIR).
  o Pushback from healthcare facilities if the CAD is used to rank or compare facilities; the TAP reports are not meant to be used in a way that could be viewed as punitive.

c) **Comparing a Facility to its Peers Using State or National Data**

Many stakeholders have expressed interest in comparing each facility’s SIR to the overall state or national experience to gauge the performance of a facility relative to their peers.

Performing a statistical comparison between an individual facility’s SIR and the current national or state SIR is not recommended as they may not be strictly comparable to one another. The methodology* used to compare two SIRs assumes that the distribution of risk exposure between a cohort (e.g., facility, state) and the standard population (i.e., national data) are proportional.

However, a facility’s SIR can be compared to a single nominal value, such as a “goal” or “target” SIR. This can be done using the NHSN TAP Reports, or using the SIR macro posted on the NHSN website that compares a “single SIR to 1 or other nominal value” (http://www.cdc.gov/nhsn/ps-analysis-resources/index.html). If using the macro, first adjust the number of predicted events for each hospital based on the target SIR.

• For example, facility A has an SIR of 0.98, and we would like to compare this value to the target SIR of 0.80. To compare this facility’s SIR to the target value, we must multiply the number of predicted events by the target SIR.

  • Facility A’s original SIR: 2 observed events / 2.04 predicted events = 0.98
  
  • Number of predicted events, adjusted for the target SIR: 2.04 predicted events x 0.80 = **1.63**

  • 1.63 becomes the “new” predicted number of events. We can then use the SAS macro comparing a single SIR to 1 to determine whether or not the 2 observed events is significantly different from 1.63. If the two-sided p-
value is ≤ 0.05, we can conclude that facility A’s SIR of 0.98 is significantly different from the target SIR of 0.80.


In addition to the comparison above, states also can consider presenting the facility-level percentile distributions (either national or state data) and providing information on where in that distribution a facility is located. This level of detail is more suited toward a technical audience, and would ideally not be presented in a consumer report.

- **National Percentile Distributions:**

  The national percentile distributions for each HAI type can be found in the Excel Data Tables within the HAI Progress Report (http://www.cdc.gov/hai/progress-report/index.html). See example screen shot below.

<table>
<thead>
<tr>
<th>HAI and Patient Population or or Surgical Procedure</th>
<th>Facility-specific SIRs at Key Percentiles¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>CLABSI, all¹</td>
<td>0.000</td>
</tr>
<tr>
<td>ICU²</td>
<td>0.000</td>
</tr>
<tr>
<td>Ward²</td>
<td>0.000</td>
</tr>
<tr>
<td>NICU²</td>
<td>0.000</td>
</tr>
<tr>
<td>CAUTI, all¹</td>
<td>0.000</td>
</tr>
<tr>
<td>ICU²</td>
<td>0.000</td>
</tr>
<tr>
<td>Ward²</td>
<td>0.000</td>
</tr>
<tr>
<td>Hospital-onset MRSA bacteremia, facility-wide</td>
<td>0.000</td>
</tr>
<tr>
<td>Hospital-onset <em>C. difficile</em> infections, facility-wide</td>
<td>0.000</td>
</tr>
</tbody>
</table>

- **Calculating a State’s Facility-level Percentile Distribution:**

  An agency may want to provide a percentile distribution of facility SIRs for each HAI included in the report. If this approach is used, the percentile distributions should only be calculated using the facilities that have at least 1 predicted infection (i.e., a calculated SIR). Furthermore, consider establishing a minimum number of facility SIRs needed to calculate and display the percentile distribution. In the HAI Progress Report, CDC calculates percentile distributions only when at least 20 facilities have a calculated SIR (i.e., ≥ 1 predicted infection).
d) Presenting Trend Data

States with multiple years of data may want to display trends in a table or chart to show progress in HAI measures. The workgroup has not yet developed recommendations for how best to accomplish this, but it is recommended that if trends are displayed, they be included in the technical report and not the consumer report. American Institutes for Research (2012) published findings from a study on publicly reporting trend data and concluded that “including trend data in public reports of health professional performance may lead consumers to misinterpret performance data and inappropriately influence their decision-making process.” Consumers may be confused as to whether they should compare the facility to itself across points in time, compare the facility’s history to other facilities’ histories, or compare to a specific benchmark. However, it is important to note that “trend data can play a valuable role for healthcare professionals, and can help providers (facilities or individual healthcare workers) track their progress, measure their progress with that of their peers, and share best practices to facilitate improvement.” (American Institutes for Research 2012)

e) Presenting Device Days and/or Patient Days in the Consumer Report

The workgroup recognized that device and patient days are challenging concepts to describe to a consumer audience. However, example language and concepts are provided below if your state decides to present and explain these denominators to consumers.

- **Device Days:** This is the number of device days that were reported by the facility for device-associated infections. A device day is a daily count of the number of patients with a specific device in the patient care location during a time period, collected at the same time each day. This includes central line days if displaying CLABSI data, urinary catheter days if displaying CAUTI data, or ventilator days if displaying ventilator-associated events.

- **Patient Days:** This is a daily count of the number of patients in a patient care location or facility during a time period. A patient day is a daily count of the number of patients residing in a location or facility during a given time period, collected at the same time each day. This is displayed for LabID events only (e.g., MRSA bacteremia or *Clostridium difficile*).

f) Presenting the SIR in the Consumer Report

Through focus group testing (as outlined in Section II of this document), the workgroup determined that it may not be necessary to present the actual SIR value on the consumer report. It may be easier for consumers to understand the
HAI data presented in the table if the SIR is not shown, as this ratio may create information overload. Focus group participants were able to interpret the data tables by only seeing columns for observed and predicted infections. However, example language is provided below if your state decides to present and explain this metric to consumers. If the SIR is displayed, the workgroup recommends displaying the individual components of the SIR (observed and predicted events) to the left of the SIR in the table.

- **SIR**: The Standardized Infection Ratio (SIR) is the primary metric for HAI data and compares the number of observed infections (or events) to the number of predicted infections (or events).

**g) Presenting Procedure Types**

The workgroup recommends producing a separate data table for each procedure type, in which case the full procedure name (e.g., Colon Surgery, Abdominal Hysterectomy) should be included in the title, and report authors can consider removing this column from the tables. States with a large number of hospitals should consider retaining this variable in the tables to facilitate consumer understanding. Presenting the procedure acronym is acceptable given that the full procedure name is in the title and/or legend.

**h) Colors and Symbols Used for the SIR**

To aid in the interpretation of the SIR, images or symbols should be used to help the audience quickly understand the meaning of the SIR’s value and corresponding statistical significance. To further aid in the interpretation of an image (especially for persons with visual impairment), descriptive words have been included with the shapes. While the colors and symbols are meant to allow for a fast interpretation of the data, the workgroup also recommends including a legend at the top of each “Results” page to ensure the reader is able to quickly reference the full interpretation of the symbols.

The workgroup considered several colors and symbols and has outlined some considerations for their use, based on group discussions and focus group feedback.

1. **Color Considerations**: Considerations were made on using red *(worse than the baseline)*, yellow (about the same as the baseline), and green *(better than the baseline)*. However, the workgroup felt that the yellow color conveys “caution” when in actuality, the category indicates no significant difference. The workgroup suggests using grey as the color for the “no significant difference” category, as grey is a neutral color with limited connotations. Blue *(better than the baseline)* was suggested as an alternative to green.
1a. Extended Rationale for Using the Red ‘X’:

Through initials reviews of this toolkit, the workgroup heard several concerns about associating a red ‘X’ with an individual hospital, particularly around anticipated push-back from the state HAI Advisory Group and/or the facilities themselves. While the workgroup understands and appreciate these concerns, the red “X” has been selected to clearly identify those facilities that have a statistically significantly high SIR. One purpose of surveillance and reporting is to identify those facilities that have a high burden of HAIs and prompt them to take action to reduce infections. The public has a right to know which facilities have the highest SIRs, and facilities should be prepared to address the reported data. A red “X” should cause concern, encourage the facility to investigate the problem further, and prompt prevention efforts. If at the time the report is issued, the facility has demonstrated significant improvement, the prevention efforts can be described in a progress report or note. It was also mentioned during the discussions that state health departments are held to the same standard on CDC’s HAI Progress Report, where states with a significantly high SIR are associated with the red color.

2. Symbol and Word Considerations: Several symbols were discussed. The workgroup wanted to convey the SIR interpretation in easily recognized symbols, while being sensitive to the many interpretations that may result. The workgroup also felt that it was important to recommend symbols that could be used across multiple quality indicators, regardless of which direction was “good” and which direction was “bad.” The workgroup acknowledges that the symbols used in this template may not be the best option for all populations. For states that wish to use different symbol combinations, the workgroup recommends adding concise verbiage to the symbols to help readers decipher the meaning of the symbol.

To aid in a fast and accurate interpretation of the data, a single descriptive word should be shown next to the symbol. The workgroup considered various wording schemes such as higher/lower, more infections/fewer infections, and better/worse. In many other contexts, being “high” or having “more” is a positive attribute. When viewing a sample HAI consumer report, focus group participants were not sure if “more” was good or bad, despite a description in the legend. “Better” and “worse” language was noted to be simpler, more meaningful, and preferred for ease of comprehension. While the workgroup feels that better/worse could have strong connotations, these words are most clearly understood by the average consumer and can be applied to any quality indicator.
3. **Notes on specific symbols from workgroup and focus group discussions:**

**OCTAGON/RED ‘X’:**

- There was debate among the workgroup members about the connotation of an octagon (or ‘X’) meaning “stop” and anticipation of pushback from healthcare facilities if either of these symbols were used. However, if HAI reports are for the public and the goal is to drive performance and encourage better outcomes, the workgroup agreed that these symbols are appropriate to be used. These symbols are easily recognized by a wide audience, and have a single, universal meaning to almost all populations.

**TRIANGLE:**

- To those familiar with HAI data, the use of triangles may imply that the data displayed are trend data (e.g., a hospital with an upward arrow may be interpreted to mean the hospital’s SIR is increasing over time, when in actuality this arrow only implies the hospital’s current SIR is higher than the baseline).
- Direction of triangle may be interpreted by some people as “thumbs up” (i.e., “good”) or “thumbs down” (i.e., “bad”). This may not align with the symbol’s actual meaning (e.g., downward arrow usually used to denote fewer infections, which is better).
- MONAHRQ, a quality data reporting tool from the Agency for Healthcare Research and Quality uses a downward-facing triangle for “below average” performance (a high SIR) and an upward-facing triangle for “above average” performance (a low SIR).
- Due to possible misinterpretation, the workgroup does not recommend the use of triangles.

**CIRCLE:**

- This symbol is more neutral than other options and may be better suited for the “same” category than the “worse” category, for example.

**CHECK MARK:**

- It was noted that to some populations, a check mark could indicate an incorrect item or be interpreted as a negative symbol. The workgroup felt that the green color and the word “better” next to the check mark would help to alleviate this concern.

**EMPTY SQUARE:**

- The workgroup considered this symbol for the category where data were reported, but not enough to reliably calculate an SIR. Focus
group members thought the empty box was confusing and wanted to see words or a question mark to explain the meaning of the symbol.

**i) Consumer-Friendly Language Used Around the SIR Interpretation and National Baseline**

The workgroup concluded that the phrase “national experience” is easier for consumers to understand, compared to “national baseline.” Focus group participants were shown a draft of an HAI data table with “national baseline” terminology used, and a citation of the actual year(s) of the baseline (e.g., 2009). Focus group participants were confused by this term, and thought that the data presented in the table were from 2009. Therefore, the workgroup felt that it is best to include the years of the baseline in the legend, rather than in the column title itself.

The workgroup acknowledged additional symbol options as follows:

- SIR is significantly < 1: ✔ better
- SIR is not statistically different from 1: = same
- SIR significantly > 1: ● worse
- # of predicted infections < 1: “No Conclusion” (no affiliated symbol)

**j) Granularity of Data Presented**

**Consumer Report:**

The workgroup recommends careful consideration of the trade-off between granularity and reliability in decisions about the extent to which summary data should be stratified. For example, if data are stratified too much, it may result in small denominators and many cases in which the predicted number of infections is less than 1. In this situation, the workgroup recommends the SIR not be calculated if omission of the SIR is permitted by reporting mandates. On the other hand, if data are not stratified enough, some of the information value of the data may be lost, potentially sacrificing the use of available data to identify localized problems. Further, focus group feedback was mixed on the display of unit-specific data. For some, it was too much information and having multiple units from the same facility in the same table was confusing. With these challenges in mind, the workgroup recommends displaying unit type-specific SIR data for device-associated infections (i.e., a separate SIR for ICUs, NICUs, wards, etc.) and procedure-specific SIR data for procedure-associated infections. LabID Event SIR data should be presented on a facility-wide level.
If data are aggregated to the facility level for device-associated or procedure-associated infections, the “Unit Type”/”Procedure Type” column may be removed from the data tables.

**Technical Report:**

The workgroup recommends that device-associated data be stratified by unit-type, at a minimum. The technical report audience may be especially interested in reviewing unit-specific or unit-type specific data. Procedure-associated data should be displayed for each procedure type individually, and some states may choose to additionally calculate an SSI SIR for multiple procedure types combined. LabID Event SIRs should be presented at the facility-wide level only.

**k) How to List Facilities Within a Data Table**

**Consumer Report**

After much discussion and consideration, the workgroup recommends that individual facilities be ordered alphabetically within a data table for a consumer audience to allow a consumer to easily find a facility of interest. This is preferred to “ranking” of facilities in order of increasing/decreasing SIR. The SIR measure is not intended to allow for direct comparison between facilities; rather, the SIR should be used to compare the performance of a facility (or one or more units, depending on the analyses) to the national baseline.

**Technical Report**

While the workgroup still recommends displaying facilities alphabetically at this time, several states have explored additional options for stratification of facilities including bed size categories and geographic region/county. If this option is chosen, facilities should be listed alphabetically within each stratum.

Samples of state reports that use other facility stratification techniques can be found here:

- **Missouri** (interactive reports include comparisons to hospitals of similar size) [http://health.mo.gov/data/hai/drive_noso.php](http://health.mo.gov/data/hai/drive_noso.php)

- **North Carolina** (facility-specific reports include comparisons to hospitals of similar size, see page 13 of the 2015 report as an example) [http://epi.publichealth.nc.gov/cd/hai/figures/hai_apr2015_providers.pdf](http://epi.publichealth.nc.gov/cd/hai/figures/hai_apr2015_providers.pdf)
I) **Rationale for Discussing Differences Between Data Presented by State HAI Programs and Other Sources**

Data posted on the Centers for Medicare and Medicaid Services (CMS) Hospital Compare website are updated often and do not reflect changes that are made to the data after submission deadlines. However, any changes made to the data are included in data from real-time surveillance systems like NHSN. Due to different freeze dates, populations under surveillance, and analytic methods, there is potential for conflicting information about a hospital’s HAI performance to be posted on a state public report, Hospital Compare, and other reporting sites (like Consumer Reports or the Leapfrog Group). The workgroup feels that it is important to clarify this point in a state HAI report, and provide a rationale for discrepancies the audience may see in the data posted elsewhere.
II. Overview and Demographics of Maryland Focus Groups

The Maryland Health Care Commission, a regulatory agency within the state of Maryland, held several focus groups between 2013 and 2014 in an effort to receive consumer feedback on the redesign of the Maryland Hospital Performance Guide which included HAI data displays. Questions from the HAI DAPS toolkit workgroup were incorporated into four of the focus groups. All focus groups were held in Rockville, MD in 2014 and participants received a stipend.

April 18, 2014

<table>
<thead>
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<th>Total participants</th>
<th>Morning session</th>
<th>Evening session</th>
</tr>
</thead>
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<td>9</td>
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<td>30-34 (2), 35-44 (5), 45-54 (1), 55-64 (1)</td>
</tr>
<tr>
<td>Sex</td>
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<td>5 male, 4 female</td>
</tr>
<tr>
<td>Marital status</td>
<td>4 married, 2 divorced, 1 single, 1 widowed</td>
<td>4 married, 3 divorced, 2 single</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td>3 African-American, 3 White, 2 Asian, 0 Hispanic/Latino</td>
<td>4 White, 3 African-American, 2 mixed race, 3 Hispanic/Latino</td>
</tr>
<tr>
<td>Education</td>
<td>2 post-graduate, 5 graduate, 1 some college</td>
<td>1 post-graduate, 6 graduate, 1 some college, 1 some high school</td>
</tr>
<tr>
<td>Employment</td>
<td>3 full-time, 2 retired, 2 unemployed, 1 part-time</td>
<td>5 full-time, 2 part-time, 2 unemployed</td>
</tr>
</tbody>
</table>

July 29, 2014

<table>
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<tr>
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</tr>
<tr>
<td>Sex</td>
<td>6 female, 1 male</td>
<td>6 female, 6 male</td>
</tr>
<tr>
<td>Marital status</td>
<td>3 divorced, 2 single, 1 widowed, 1 cohabitating</td>
<td>6 married, 3 single, 2 divorced, 1 widowed</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td>3 African-American, 2 White, 1 mixed race, 1 unspecified, 0 Hispanic/Latino</td>
<td>6 White, 5 African-American, 1 mixed race, 0 Hispanic/Latino</td>
</tr>
<tr>
<td>Education</td>
<td>1 graduate, 1 associate's degree, 3 some college, 2 high school graduate</td>
<td>2 graduate, 2 associate's degree, 7 some college, 1 high school graduate</td>
</tr>
<tr>
<td>Employment</td>
<td>3 unemployed, 2 retired, 2 part-time</td>
<td>6 full-time, 2 part-time, 2 retired, 2 unemployed</td>
</tr>
</tbody>
</table>