Are accreditation scores linked to hospital infection rates?

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Objectives

IDENTIFYING AND MEASURING ACCREDITATION OUTCOMES

- Measuring the impact of hospital accreditation is complicated by the lack of defined outcomes.
- Hospital acquired infection is a major cause of morbidity and increased length of stay, and is a key metric for patient safety and quality.
- Hospital acquired Staphylococcus aureus bacteraemia (SAB) rates are widely used as a hospital outcome indicator.
- We used this indicator to test our hypothesis that hospitals with higher accreditation scores, specifically in infection control, would be associated with lower SAB rates.

Methods

DESIGN, SETTING AND PARTICIPANTS

- We conducted a retrospective cohort study from 2009 to 2013.
- Participant inclusion criteria comprised acute public hospitals in NSW (population 7.25 million), Australia, with:
  1. Reported SAB rates;
  2. Results from two accreditation surveys conducted by the Australian Council for Healthcare Standards (ACHS); and
  3. Results from at least four hand hygiene audits.
- Private hospitals were excluded as these hospitals could self-select to submit infection control data.

Methods

DATA LINKAGE AND REGRESSION MODEL

- We linked these separate data sets:
  1. Monthly SAB incidence rates per 10,000 bed days from 2009-2012, provided by the NSW Clinical Excellence Commission (CEC);
  2. Results from accreditation surveys conducted by ACHS during 2009-2012; and
  3. Self-reported hand hygiene audit data from eight separate audits carried out between 2010 and 2013, provided by CEC.
- SAB rates were regressed against accreditation scores, hand hygiene audit rates, and hospital demographics.
- We used a generalised linear regression model to account for the non-linear nature of our outcome variable.

Description of Variables Used

INFECTION CONTROL RELATED VARIABLES

SAB Rates
The outcome of interest comprised annual SAB rates from January 2009 to December 2012.

Hand hygiene audit rates
We used the data reported to the NSW CEC comprising self-reported audits of the number of times healthcare workers performed hand hygiene against the “five moments” of hand hygiene. The national target was 70%.

ACCREDITATION RELATED VARIABLES

Accreditation scores
ACHS scored each of the 14 mandatory standards on a five point scale, coded from 1 for Little Achievement to 5 for Outstanding Achievement. We included the 14 standards that were common to during the study period and summed the results from an average score for each standard. To achieve accreditation, hospitals needed a “Meets Accreditation” score of 3 for each standard, implying a minimum average score of 3.00 over the 14 common standards. We excluded infection control scores, which we assessed as a separate variable.

Infection control scores
Scores from the infection control standards were marked using the same scale as the other mandatory standards.
Description of Variables Used

DEMOGRAPHIC VARIABLES

| Vulnerable patient marker | Binary variable with 1 denoting hospitals treating a higher percentage of vulnerable patients or providing higher risk treatments as identified by the Australian National Health Performance Authority. |
| Year                     | Year of SAB incidence rate data collection. |
| Hospital peer group      | Hospitals were grouped in terms of size and activity according to peer groups defined by the AIHW, the Australian federal health data agency. Group A hospitals (principal referral hospitals and specialist teaching hospitals) were coded as 1, group B (large hospitals) were coded as 2, and group D (small hospitals) were coded as 3. |

Results

Significant (p<0.05) findings included:

1. SAB incidence rates across all hospitals fell from 1.34 per 10,000 bed days in 2009 to 0.77 per 10,000 bed days in 2012.
2. Higher SAB rates were significantly associated with lower hand hygiene audit rates without accreditation scores being included in the model.
3. Over the study period, mean SAB rates in small hospitals (0.62/10,000 bed-days) were lower than those for principal referral hospitals (1.52/10,000 bed-days).
4. Overall, higher accreditation scores were associated with higher SAB rates.

Correlation Matrix

SUGGESTS A DISCONNECT RELATED TO HOSPITAL SIZE

<table>
<thead>
<tr>
<th>Correlation Matrix for all hospitals (n=77)</th>
<th>Mean SAB Rates (%)</th>
<th>Accreditation scores (%)</th>
<th>Infection control scores (%)</th>
<th>Average hand hygiene audit rates (%)</th>
<th>Vulnerable patient marker (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accreditation scores</td>
<td>28.0</td>
<td>54.7</td>
<td>13.1</td>
<td>10.1</td>
<td>5.9</td>
</tr>
<tr>
<td>Infection control rates</td>
<td>54.7</td>
<td>10.1</td>
<td>5.9</td>
<td>28.0</td>
<td>28.0</td>
</tr>
<tr>
<td>Average hand hygiene audit rates</td>
<td>13.1</td>
<td>5.9</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
</tr>
<tr>
<td>Vulnerable patient marker</td>
<td>5.9</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
<td>28.0</td>
</tr>
</tbody>
</table>

Regression Model

<table>
<thead>
<tr>
<th>All Hospitals</th>
<th>Co-eff</th>
<th>se</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome: Mean annual SAB incidence rates per 10,000 bed days</td>
<td>Accreditation scores</td>
<td>0.012</td>
<td>0.004</td>
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<tr>
<td></td>
<td>Infection control scores</td>
<td>-0.012</td>
<td>0.019</td>
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<tr>
<td></td>
<td>Average hand hygiene audit rates</td>
<td>-0.180</td>
<td>0.123</td>
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<td></td>
<td>Vulnerable patient marker</td>
<td>0.009</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>Year (2009)</td>
<td>-0.011</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>-0.039</td>
<td>0.022</td>
</tr>
<tr>
<td></td>
<td>2011</td>
<td>-0.057</td>
<td>0.018</td>
</tr>
<tr>
<td></td>
<td>2012</td>
<td>-0.057</td>
<td>0.018</td>
</tr>
<tr>
<td></td>
<td>AIHW group Large (group B)</td>
<td>-0.029</td>
<td>0.016</td>
</tr>
<tr>
<td></td>
<td>Medium (group C)</td>
<td>-0.026</td>
<td>0.022</td>
</tr>
<tr>
<td></td>
<td>Small (group D)</td>
<td>-0.061</td>
<td>0.027</td>
</tr>
</tbody>
</table>

Legend: Co-eff=co-efficient, se=standard error,

Discussion

THREE KEY AREAS

We review these results by considering:

1. Whether SAB rates are an appropriate indicator of accreditation;
2. Whether accreditation scores are accurately measuring the implementation of accreditation standards; and
3. Revising our study design.

Discussion

1. There is a strong link between the infection control policies surveyed during accreditation and evidence that these policies influence infection rates.
2. SAB rates can be accurately measured and detailed protocols reduce the risk of mis-identifying community versus hospital acquired infections.
3. However, the accreditation surveys assess the corporate response to infection control policies. Staff implementation of these policies is only indirectly measured.
Discussion

2. DO ACCREDITATION SCORES MEASURE IMPLEMENTATION?

1. The higher accreditation scores for infection control relate to the hospital showing leadership and engaging in research.

2. This would be more difficult for small hospitals to achieve and could be the reason none of the group D hospitals scored above the “Meets Accreditation” pass mark (coded as 3) in either survey.

3. The combination of scoring mechanisms and group surveys indicates that the accreditation scores might not be accurately measuring implementation of accreditation standards equally across different types of facilities.

3. LIMITATIONS OF THE STUDY DESIGN

1. Determining a causal effect between accreditation scores and SAB rates is hampered by 98% of all public hospital beds being in accredited hospitals - a randomised control group was not possible.

2. Study restricted to NSW, the only state where higher hand hygiene rates have been significantly related to lower SAB rates.

3. Small hospitals under-represented in our sample, but these hospitals comprise 1.4% of total admissions.

Conclusions

- We found supportive evidence for using SAB rates to demonstrate the impact of infection control programs embedded within the accreditation program.

- However, there is less evidence to support whether accreditation scores accurately reflect implementation of the infection control accreditation standards.

- The lack of a clear relationship between accreditation infection control scores and SAB rates across hospital types highlights the challenges of identifying suitable indicators.

Our research suggests a possible disconnect between the way accreditation surveys assess compliance with rules and regulations, and the ability to measure the impact of accreditation using clinical outcome indicators, such as SAB rates.

- This helps explain the lack of consistent evidence as to whether accreditation is effective in improving patient safety and quality of care.

References