Using indicators to describe the quality and safety of New Zealand hospitals

Enhancing Hospital Outcomes (EcHO) study - Work in progress

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- Funding: Health Research Council of New Zealand
Indicators using administrative data

- Many advantages
  - International experience developing, measuring and reporting indicators as key measures of hospital quality
  - All hospitals included
  - Existing definitions, collection processes.
  - Easy/cheap
Study aim and hypotheses

- Use indicators to describe inpatient quality and safety across hospitals and time (1994-2009)

- For each indicator it is hypothesised that there is variation in appropriately adjusted results for:
  - Hospitals in the same year
  - A hospital over the study period
  - Similar groups of hospitals in a year and over the study period
  - Populations in different regions with particular socio-demographic groupings in one year and over the study period.
Key study methods

- Identification and selection of indicators
- Preparation of datasets and data linkage
- Use of Bestgrid computing platform
- Risk adjustment - case mix
- Bayesian modeling - random variation
Identification and selection of indicators

- Identification – systematic search published and unpublished sources

- Selection using criteria:
  - Represent at least one dimension of quality
  - Relevant for hospital care (reported elsewhere)
  - Use available datasets (with linkage) at NZHIS (i.e. feasible in NZ)
  - Validated (face, case note, construct)
  - Reliable (data on variation)
Basket of 137 Indicators

- 18 Patient safety indicators (perioperative, medical adverse events)
- 15 Other specific indicators – e.g. ulcers, SMR, cost per case mix
- 26 Mortality (all admissions; med/surg admissions; 23 conditions/procedures)
- 26 Readmission (all; med or surg; 23 conditions)
- 26 Length of stay (all; med or surg; 23 conditions)
- 26 Throughput (all; med or surg; 23 conditions)
23 Conditions and procedures

- Asthma, CHF, MI, CVA, pneumonia, COPD, diabetes, GI haem, 3 cancers

- Appendectomy, cholecystectomy, CABG, PTCA, bowel resection, prostatectomy, hip and knee replacements, hysterectomy, cataract removal, tonsillectomy, c section.
<table>
<thead>
<tr>
<th>Indicator group</th>
<th>Effectiveness</th>
<th>Efficiency</th>
<th>Safety</th>
<th>Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throughput</td>
<td>√</td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Readmission</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Mortality</td>
<td>√</td>
<td></td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Length stay</td>
<td>√</td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>PSI</td>
<td>√</td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Other</td>
<td>√</td>
<td></td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>
Preparation of datasets and indicators

- **Stage 1** (NMDS; Mortality)
  - Stage 2 (Non-admitted NNPACS; Cancer Registry; Bookings NBRS)

- **Data filtering NMDS** (deletion duplicates, errors, well babies, rehab etc)

- **Selection of core list of 37 hospitals** (3 groups; ED; >500 admissions/yr; closures)

- **Coding of indicators** - SAS ICD-9-AM & ICD-10-AM
## Preliminary descriptive results

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full data set</td>
<td>776,145</td>
<td>783,404</td>
<td>798,193</td>
<td>815,900</td>
<td>844,538</td>
<td>858,618</td>
<td>893,147</td>
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<tr>
<td>37 facilities</td>
<td>689,742</td>
<td>727,790</td>
<td>768,004</td>
<td>782,954</td>
<td>810,465</td>
<td>823,728</td>
<td>856,906</td>
</tr>
</tbody>
</table>
Average separations per year for each hospital type (tertiary, base, satellite) for each study year

<table>
<thead>
<tr>
<th></th>
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<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>17,327</td>
<td>17,515</td>
<td>17,575</td>
<td>18,485</td>
<td>19,301</td>
<td>20,044</td>
<td>20,994</td>
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<tr>
<td>Satellite</td>
<td>4,029</td>
<td>4,121</td>
<td>4,300</td>
<td>4,355</td>
<td>4,322</td>
<td>4,428</td>
<td>4,618</td>
</tr>
</tbody>
</table>
Descriptive results

- Average length of stay across 37 facilities ’02–’08

![Graph showing trend of average length of stay across 37 facilities from 2002 to 2008.](image)
Descriptive rates

- Readmission rates across 37 filtered facilities ’02–’08
Descriptive results

- 30-day mortality rates across 37 facilities ’02–’07
Next stages - risk adjustment and Bayesian modeling

Risk adjustment – propensity scores

Hierarchical Bayesian models – allows for pooling of information across levels.

- Individual – age, sex, ethnicity, comorbidities
- Staff – numbers, turnover
- Hospital – type, size