Measuring Rural Hospital Quality and the Role of Service-Line Specialization

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The Importance of Measuring Hospital Quality

• Health reform aims to identify and reward high-performing health care providers.
• Rural providers must show they are providing high-quality care...
  – to participate in new care models (e.g., ACOs)
  – to demonstrate meaningful use of EHRs
  – to justify continuation of differential rural payments (e.g., cost-based reimbursement)
Critical Access Hospitals in the US

• 1997 Federal program allowed small hospitals to be licensed as critical access hospitals (CAHs)
  – Rural area, no other hospitals within certain range
  – 24-hour emergency care services
  – Maximum of 25 acute care and swing beds
  – Average length-of-stay of 96 hours or less (acute care)

• CAHs receive Federal cost-based reimbursement for services

• Currently 1,328 CAHs in the US
By 2010, CAHs had higher mortality rates compared with non-CAHs... New efforts may be needed to help CAHs improve.”
-- April 2013
Response to JAMA Article

• Problems with data and methods
  – “Small” hospitals defined as 1-99 beds; CAHs are limited to 25 beds
  – At least 5% of CAHs in study were misclassified as having 100+ beds in 2002 and 2010
  – Assumptions required for matching estimation were likely violated
  – We cannot be confident that identified differences in mortality were significant
Response to JAMA Article

• Interpretation of Results
  – Absence of quality reporting mandate overstated: most CAHs are reporting data
  – Transfer of emergency patients not addressed
  – Patient-centered care means respecting informed decisions to remain in CAHs
Ioannidis Editorial in *JAMA*

- “Only a small portion of the variation in mortality risk was explained by CAH status.”
- “There is an incentive for non-CAHs to report more severe background conditions” than CAHs.
- Factors underlying differences in mortality are “numerous, overlapping, and difficult to disentangle.”
The Bottom Line

• All hospitals have substantial room to improve in terms of quality.
  – The question: what approaches, measures, & policies will result in meaningful improvements?
Quality Measurement: Conventional Approach

• Identify high-mortality diagnoses nationally
  – Usually pneumonia, congestive heart failure (CHF), acute myocardial infarction (AMI)

• Adjust for observable severity measures
  – Demographics, Comorbidities, Diagnostic and treatment history

• Use regression techniques to measure hospital-specific mortality on observed patients

• Adjust for differences in patient populations
  – Apply hospital-specific effect to a national average population
Mortality by critical access status

- Average US patient with pneumonia, CHF, or COPD was 2.8% more likely to die in CAHs, 2005-2009:

<table>
<thead>
<tr>
<th></th>
<th>CAH</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-Day Mortality rate</td>
<td>19.0%</td>
<td>16.2%</td>
</tr>
<tr>
<td>(Standard error)</td>
<td>(0.0021)</td>
<td>(0.0006)</td>
</tr>
</tbody>
</table>
Critical Access Hospitals are Different

• Conventional approach measures *effect of CAHs on the average US patient*
  – The prevalence of diagnoses differs. AMIs, for example, represent a small share of CAHs’ admissions

<table>
<thead>
<tr>
<th></th>
<th>CAH</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>48,144</td>
<td>493,222</td>
</tr>
<tr>
<td>CHF</td>
<td>32,063</td>
<td>566,985</td>
</tr>
<tr>
<td>COPD</td>
<td>23,362</td>
<td>279,606</td>
</tr>
<tr>
<td>AMI</td>
<td>6,779</td>
<td>271,538</td>
</tr>
</tbody>
</table>

• Conventional approach is wrong if CAHs are specialized
Mortality Differentials by Condition

• More relevant question: the effect of CAHs on their own patients
  – Mortality is higher in CAHs, but differential is lower for rural-prevalent conditions:

<table>
<thead>
<tr>
<th>Condition</th>
<th>60-Day Mortality Rate (Severity adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAH</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>17.3%</td>
</tr>
<tr>
<td>CHF</td>
<td>11.3%</td>
</tr>
<tr>
<td>COPD</td>
<td>18.1%</td>
</tr>
<tr>
<td>AMI</td>
<td>25.8%</td>
</tr>
</tbody>
</table>

– Weighting by CAH population reduces average mortality differential by one fourth, to about 2.1%
Additional Controls

- Differentials fall further if we
  - Incorporate hospital controls, and
  - Restrict analysis to three most prevalent high-mortality DRGs in CAHs (Pneumonia, CHF, COPD)

<table>
<thead>
<tr>
<th></th>
<th>CAH</th>
<th>Other</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional model</td>
<td>19.0%</td>
<td>16.2%</td>
<td>2.8%</td>
</tr>
<tr>
<td>Allowing CAH specialization</td>
<td>17.8%</td>
<td>15.7%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Hospital controls</td>
<td>18.2%</td>
<td>16.5%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Most prevalent rural diagnoses</td>
<td>15.5%</td>
<td>13.9%</td>
<td>1.6%</td>
</tr>
</tbody>
</table>
Conclusions

• Traditional risk adjustment strategies measure quality for the average US patient

• CAHs are specialized, both by the conditions they treat and the severity of their patients

• Failing to account for this specialization will underestimate CAH quality for their own patient population
Next Steps

- CAH specialization may reflect selection bias related to patient choice of hospitals
- Model estimates of mortality rates that take into account this selection bias
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