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

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iHEA World Congress  
on Health Economics  
Sydney, Australia  
July 8, 2013

# 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



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# Mortality Rates for Medicare Beneficiaries Admitted to Critical Access and Non-Critical Access Hospitals, 2002-2010

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**Importance** Critical access hospitals (CAHs) provide inpatient care to Americans living in rural communities. These hospitals are at high risk of falling behind with respect to quality improvement, owing to their limited resources and vulnerable patient populations. How they have fared on patient outcomes during the past decade is unknown.

**M**ORE THAN 60 MILLION  
Americans live in rural  
areas and face unique  
challenges in accessing  
quality inpatient care. In

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



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# 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



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# 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.”



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# 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?



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# 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:

|                              | <b>CAH</b> | <b>Other</b> |
|------------------------------|------------|--------------|
| <b>60-Day Mortality rate</b> | 19.0%      | 16.2%        |
| <b>(Standard error)</b>      | (0.0021)   | (0.0006)     |



# 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

|                  | <b>CAH</b> | <b>Other</b> |
|------------------|------------|--------------|
| <b>Pneumonia</b> | 48,144     | 493,222      |
| <b>CHF</b>       | 32,063     | 566,985      |
| <b>COPD</b>      | 23,362     | 279,606      |
| <b>AMI</b>       | 6,779      | 271,538      |

- 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:

|                  | <b>60-Day Mortality Rate (Severity adjusted)</b> |                |                   |
|------------------|--|----------------|-------------------|
|                  | <b>CAH</b>                                       | <b>non-CAH</b> | <b>Difference</b> |
| <b>Pneumonia</b> | 17.3%  | 15.4%          | 1.9%              |
| <b>CHF</b>       | 11.3%  | 10.0%          | 1.3%              |
| <b>COPD</b>      | 18.1%  | 15.2%          | 2.9%              |
| <b>AMI</b>       | 25.8%  | 21.0%          | 4.8%              |

- 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)

|                                       | <b>Mortality Rates</b> |              |                   |
|---------------------------------------|------------------------|--------------|-------------------|
|                                       | <b>CAH</b>             | <b>Other</b> | <b>Difference</b> |
| <b>Conventional model</b>             | 19.0%                  | 16.2%        | 2.8%              |
| <b>Allowing CAH specialization</b>    | 17.8%                  | 15.7%        | 2.1%              |
| <b>Hospital controls</b>              | 18.2%                  | 16.5%        | 1.7%              |
| <b>Most prevalent rural diagnoses</b> | 15.5%                  | 13.9%        | 1.6%              |



# 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



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# 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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