A Market-level Study of Ambulatory Care Sensitive Hospitalization Rates
Lister Hill Center for Health Policy Seminar
April 14, 2010

Agenda

• Background on ambulatory care sensitive hospitalizations (ACSH)

• Design, analysis, and results

• Conclusions and policy implications
ACSH Defined

• Definition: hospitalizations for health conditions that potentially could have been avoided with timely and effective outpatient care

• AHRQ Prevention Quality Indicator for 14 conditions
  • Acute care conditions: dehydration, perforated appendix, pneumonia, urinary tract infection, low birth weight*, amputation related to diabetes*
  • Chronic care conditions: angina, asthma, COPD, CHF, hypertension, short-term diabetes complications, long-term diabetes complications, uncontrolled diabetes without complications

* Low volume conditions excluded from this study.

Incidence and Cost of ACSH in the U.S.

• Nearly 4.4 million admissions

• One in five Medicare admissions

• $30.8 billion in hospital costs

• CHF and pneumonia most common conditions, accounting for over half of all ACSH costs

(Jiang, Russo, and Barrett., 2009)
ACSH Conceptual Frameworks

• Access to care frameworks
  • Two types of factors used to explain ACSH
    • Population characteristics (Demand)
      • E.g., race/ethnicity, age, gender, SES, health status, payer/insurance status
    • Provider supply (Supply)
      • E.g., physicians, community health centers

• Coordination of care framework
  • Relational properties of health care delivery system
    • Inter-organizational relationships

Objectives of Study

• Expand the provider types considered when examining the relationship between provider supply and ACSH rates

• Expand the theoretical frameworks and the types of factors that may be associated with ACSH rates

• Compare the relative contributions of population characteristics, provider supply, and inter-organizational relationships to variations in market-level ACSH rates
Study Setting

- 58 California markets from 1998-2005
- Market defined at the county-level
  - Unit of analysis: market-year hospitalization rate
  - Inclusive of multiple provider types responsible for primary care
- Diverse range of markets

Design & Analytic Strategy

- Pooled, cross-sectional design
- Linear mixed model to account for repeated observations
- Data sources
  - AHA Annual Survey
  - California Office of Statewide Health Planning and Development (OSHPD)
    - Hospital discharge data
    - Cost and utilization data for hospitals, CHCs, home health agencies, SNFs
  - Area Resource File
Variables

• Dependent variable
  • # of ACSH / # of total admissions (log transformed)
    • Aggregated conditions (acute care, chronic care, all conditions)
    • Condition-specific rates (e.g., CHF, COPD)

• Independent variables
  • Population characteristics
    • Gender, race/ethnicity, age, geography (urban vs. rural), socio-economic status (SES), health status
  • Provider supply (per 1,000 residents)
    • Primary care physicians, specialists, community health centers, hospitals, home health agencies, skilled nursing facilities
  • Inter-organizational relationships (proportion of hospitals in market)
    • Same system hospitals, hospital owns insurance product, hospital owns skilled nursing facility, hospital has formal relationship with physician organization

ACSH as a Percentage of All Hospitalizations (ACSH rate), 1998-2005

- Acute conditions
- Chronic conditions
- Combined conditions

Graph showing the percentage of ACSH from 1998 to 2005 for acute, chronic, and combined conditions.
### Descriptives, 2005

<table>
<thead>
<tr>
<th>Pop. Characteristics</th>
<th>Mean</th>
<th>Provider supply</th>
<th>Mean</th>
<th>Interorg relationships</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Male</td>
<td>51%</td>
<td>PCPs per 1,000</td>
<td>9.74</td>
<td>Prop. from same system</td>
<td>23%</td>
</tr>
<tr>
<td>% African-American</td>
<td>3%</td>
<td>Spec. per 1,000</td>
<td>9.54</td>
<td>Prop. own insurance</td>
<td>12%</td>
</tr>
<tr>
<td>% Hispanic</td>
<td>23%</td>
<td>CHCs per 1,000</td>
<td>0.05</td>
<td>Prop. own SNF</td>
<td>26%</td>
</tr>
<tr>
<td>% with college educ.</td>
<td>14%</td>
<td>Hospitals per 1,000</td>
<td>0.03</td>
<td>Prop. with formal phys. relationship</td>
<td>35%</td>
</tr>
<tr>
<td>% uninsured</td>
<td>18%</td>
<td>HHAs per 1,000</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% ages 0-14</td>
<td>22%</td>
<td>SNFs per 1,000</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% ages 15-64</td>
<td>66%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% ages over 65</td>
<td>12%</td>
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</table>

N=58 markets

### Multivariate Result Highlights

<table>
<thead>
<tr>
<th></th>
<th>Total ACSH Rate</th>
<th>Acute care ACSH Rate</th>
<th>Chronic care ACSH Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Male</td>
<td>0.004</td>
<td>0.004</td>
<td>0.003</td>
</tr>
<tr>
<td>% Urban</td>
<td>0.0007</td>
<td>0.0009</td>
<td></td>
</tr>
<tr>
<td>% residents ages 15-44</td>
<td>-4.885</td>
<td>-4.760</td>
<td></td>
</tr>
<tr>
<td>% residents ages 45-64</td>
<td>-5.965</td>
<td>-6.409</td>
<td></td>
</tr>
<tr>
<td>Diabetes mortality rate</td>
<td>-0.516</td>
<td>-0.702</td>
<td>-0.472</td>
</tr>
<tr>
<td>CHCs per 1,000</td>
<td>-0.707</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home health per 1,000</td>
<td>-1.163</td>
<td></td>
<td>-1.919</td>
</tr>
<tr>
<td>Nursing home per 1,000</td>
<td>-0.854</td>
<td>-2.505</td>
<td></td>
</tr>
<tr>
<td>Prop. hospitals that own SNF</td>
<td>-0.068</td>
<td></td>
<td>-0.081</td>
</tr>
<tr>
<td>All time trend controls except 1999</td>
<td>Consistently Negative</td>
<td>Consistently Negative</td>
<td>Consistently Negative</td>
</tr>
</tbody>
</table>

Significant at p<0.05 or smaller.
Explained Variance\(^1\) in Market-level ACSH Rate by Variable Category, Aggregated Rates

<table>
<thead>
<tr>
<th>Variable category</th>
<th>Acute conditions</th>
<th>Chronic conditions</th>
<th>Combined conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population characteristics</td>
<td>50.3%</td>
<td>3.6%</td>
<td>24.6%</td>
</tr>
<tr>
<td>Provider supply</td>
<td>20.7%</td>
<td>5.5%</td>
<td>14.0%</td>
</tr>
<tr>
<td>Inter-organizational</td>
<td>4.4%</td>
<td>0.0%</td>
<td>1.7%</td>
</tr>
<tr>
<td>relationships</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All variables</td>
<td>58.5%</td>
<td>26.6%</td>
<td>45.6%</td>
</tr>
</tbody>
</table>

\(^1\) Relative to unconditional model.

Total Cost of ACSH in California, 1998-2005

* In millions of U.S. dollars
### Potential Cost Savings by Preventing ACSH

<table>
<thead>
<tr>
<th>Variable type</th>
<th>Acute conditions</th>
<th>Chronic conditions</th>
<th>Combined conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>0.067</td>
<td>0.069</td>
<td>0.135</td>
</tr>
<tr>
<td># of admissions</td>
<td>155,676</td>
<td>160,112</td>
<td>318,021</td>
</tr>
<tr>
<td>Average cost per admission</td>
<td>$7,218</td>
<td>$8,021</td>
<td>$7,644</td>
</tr>
<tr>
<td>-10% reduction in admissions</td>
<td>~$112M</td>
<td>~$128M</td>
<td>~$240M</td>
</tr>
</tbody>
</table>

Savings by high/low cost and volume conditions:
- 10% reduction in pneumonia admissions associated with ~$69M in savings
- 10% reduction in CHF admissions associated with ~55M in savings
- 10% reduction in uncontrolled diabetes admissions associated with ~1.6M in savings

1 Based on 2005 data.

### Conclusions

- Population characteristics explain most variation across markets
- Provider types other than physicians and community health centers important for explaining variations across markets
- Effects of factors may depend on the way ACSH rates are operationalized
- Significant potential cost savings, but some conditions hold more potential than others
• Population characteristics
  • How mutable are these characteristics?

• Importance of other provider types
  • Who is accountable for ACSH? How can policy be expanded to be more inclusive of other provider types?

• Appropriateness of aggregated measures
  • How to balance parsimony with precision?