Development of the Emergency Department Prevention Quality Indicators (ED PQI)

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Potentially preventable healthcare encounters
- Hospitalizations or ED visits which may be preventable through high quality outpatient care.

Ambulatory care sensitive conditions (ACSC)
- Conditions for which hospitalizations are assumed to reflect poor access to high quality outpatient care.

Prevention Quality Indicators (PQI)
- A set of area level hospital discharge data based indicators of potentially avoidable hospitalizations.
Makes sense to expand to ED:
  • Capture less severe, but significant events
  • Account for practice pattern variation
  • Examine different types of avoidable encounters

Challenges
  • ED data less developed
  • ED takes all comers, no gatekeeper
  • Fewer coding guidelines, potentially poorer documentation
  • Currently split data for those treated and released and those admitted
Clinical exacerbations that are typically treated and released from the ED but are clinically significant. These may also be treated in well-equipped outpatient facilities.

Exacerbations that might be treated and released in some hospitals yet treat and admit in others.

Utilization of the ED as a medical home for non-emergent conditions.

Events requiring emergent care that may be preventable given public health intervention (e.g. trauma) or that reflect injuries or complications resulting from outpatient care (e.g. healthcare acquired infection).
Expanding PQIs to ED

- Adapt the PQIs to ED data
  - Consider alternative ways to specifying the data
- Understand what we are capturing (AKA: characterization)
- Evaluate based on National Quality Forum (NQF) framework and identify evidence gaps
- Understand the relationship with other indicators of access to care (AKA: validation)
Measure development and validation process

SOURCES
- Literature
- Actual Use
- Concept

Candidate Indicators

Evaluation

Selection
Literature review methods

- Reviewed literature of ED specific applications of ACSC based indicators
- Reviewed PubMed for past 10 years
- Re-abstracted literature cited in recent literature reviews for inpatient indicators.
Evidence from Literature Review

- Most frequent ACSC related visits: asthma (45%), COPD (26%), hypertension (13%)
- Quality of care or interventions associated with lower ED visits: Overall ACSC, asthma, COPD, pneumonia (vaccination)
- Inconsistent associations with quality of care and ED visits: Diabetes, CHF
- Racial disparities: Overall ACSC, CHF, asthma, UTI
- Potential biases: Asthma/COPD (air quality) Pneumonia, UTI (residential care)
- Practice patterns can impact relationship with inpatient indicators: Asthma/COPD, Pneumonia, dehydration/gastroenteritis
## Gaps in Literature Evidence

<table>
<thead>
<tr>
<th></th>
<th>Usability/Feasibility</th>
<th>Face Validity</th>
<th>Reliability</th>
<th>Construct Validity</th>
<th>Criterion Validity</th>
<th>Bias</th>
<th>Relation to Inpatient</th>
<th>Type of ED visit</th>
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<tbody>
<tr>
<td>All ACSC</td>
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<td>Pneumonia</td>
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<td>Dehydration</td>
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<td>Urinary Tract Infection</td>
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Orange = little evidence, Yellow = mixed evidence, red = no evidence
## Indicators Not Considered Further

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Reasons</th>
</tr>
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<tbody>
<tr>
<td>Diabetes long term complications</td>
<td>• Most long term complications don’t present to ED as the reason for visit.</td>
</tr>
<tr>
<td></td>
<td>• Infections due to vascular complications are present in data.</td>
</tr>
<tr>
<td>Lower extremity amputations</td>
<td>• Major procedures, not applicable to ED</td>
</tr>
<tr>
<td>Perforated appendix</td>
<td>• Perforation is often seen as a reflection of ED care, not outpatient care (ED patient safety indicator)</td>
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<tr>
<td></td>
<td>• Recent evidence suggests the delay in presentation may not be related to access to quality care</td>
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<tr>
<td>Angina</td>
<td>• Recent evidence suggests that coding practices drive rate.</td>
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<td>• Initial empirical analyses support concern (low rates)</td>
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Data from 8 states: AZ, CA, FL, HI, IN, NE, SC, TN, UT

SEDD: Treat and release cases
- Removes all procedure, DRG and MDC based specifications
- Most analyses use first listed diagnosis only

SID: Treat and admit
- ED listed as admission source
- Uses principal diagnosis
ED treat and release (SEDD) and ED treat and admit rates (SID)

Data Source: HCUP SEDD and SID (2005 and 2006) from selected states
What are these visits?

- Characterizing the indicators
  - NYU algorithm
  - Percent admitted as rough surrogate for severity of illness
Developed by Billings et al. (2000)
- Panel of ED Physicians
- Evaluated complete ED records
  - 1994: N = 3,500 records
  - 1999: N = 2,200 records
- 6 Bronx, NY Hospitals

4 Categories for Classified Cases
- Non-Emergent
- Emergent, Primary Care Treatable
- Emergency Department Care Needed, Preventable/Avoidable
- Emergency Department Care Needed, Not Preventable/Avoidable

5 Categories for Unclassified Cases
- Injury
- Mental Health
- Alcohol
- Other Drug
- “Unclassified”*

*Issue for comparison between current NYU ED Algorithm and ED-PQI definitions
Applying the NYU algorithm

- **Maintenance**
  - Coding that is reflected in PQI definitions are unclassified by NYU ED algorithm in some cases (most PQIs 8-14%)
  - Dehydration 75% cases unclassified (5th digit codes added in 2006)

- **Application across all diagnosis codes**
  - First listed does not tell the whole story
  - Second listed may not be the same severity as algorithm assumes

- Does not take into account non-diagnosis based risk factors
  - Age, comorbidities, socioeconomic status

- Final diagnosis not always the chief complaint
- Validated on urban setting, rural application unknown
### Applying NYU algorithm

Mean probabilities for cases by indicator

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Non-Emergent</th>
<th>Emergent, Primary Care Treatable</th>
<th>ED Care Needed, Preventable</th>
<th>ED Care Needed, Non-Preventable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>COPD</td>
<td>.02</td>
<td>.28</td>
<td>.70</td>
<td>0</td>
</tr>
<tr>
<td>Hypertension</td>
<td>.61</td>
<td>.18</td>
<td>.21</td>
<td>0</td>
</tr>
<tr>
<td>CHF</td>
<td>.04</td>
<td>.05</td>
<td>.91</td>
<td>0</td>
</tr>
<tr>
<td>Dehydration</td>
<td>.45</td>
<td>.38</td>
<td>.13</td>
<td>.03</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>.09</td>
<td>.24</td>
<td>.67</td>
<td>0</td>
</tr>
<tr>
<td>UTI</td>
<td>.40</td>
<td>.25</td>
<td>.30</td>
<td>.04</td>
</tr>
<tr>
<td>Asthma</td>
<td>0</td>
<td>.02</td>
<td>.98</td>
<td>0</td>
</tr>
</tbody>
</table>
Applying the NYU algorithm

- No differences in urban/rural settings
  - Exception: COPD
- No differences in payer, after adjusting for age
- In general, no differences in age categories
  - Diagnoses more common in older age groups aren’t assigned higher risk
  - Exceptions: COPD, UTI
Average NYU probabilities by age

All ED-PQI Candidate Indicators by Age

Data Source: HCUP NEDD (2008) from selected states
Data Source: HCUP SEDD and SID (2005 and 2006) from selected states
Does it matter what healthcare encounters you include?

- If practice patterns vary systematically, then the picture will skewed if using an incomplete set.
- Examine differences in admission by patient and area characteristics.
- Examine relationship between indicators.
- Examine relative area performance by indicator.
Data Source: HCUP SEDD and SID (2005 and 2006) from selected states
Correlation between healthcare encounter indicators

Data Source: HCUP SEDD and SID (2005 and 2006) from selected states
Percent areas remaining in extreme deciles: Inpatient and ED routed (SEDD+ED SID)

Data Source: HCUP SEDD and SID (2005 and 2006) from selected states
Further work

- Continue investigating which indicators should be defined with one vs. all listed diagnoses
- Continue to characterize indicators based on alternative methods
- Examine variation between areas
- Continue to understand relationship between indicators and impact on area level performance
- Validation analyses
Acknowledgements

Stanford University:
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AHRQ:
Mamatha Pancholi, Ryan Mutter, Pamela Owens (by contract)
| All ACSC conditions | Continuity of care associated with few ED visits
Disparities for black race, women, Hispanic Payer relationship unclear |
<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>Unclear relationship between ED visits and quality interventions (- Construct Validity)</td>
</tr>
<tr>
<td>CHF</td>
<td>Disparities for black race and Hispanic. Unclear relationship between ED visits and quality interventions</td>
</tr>
<tr>
<td>Condition</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
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</tr>
<tr>
<td>Hypertension</td>
<td>Little literature</td>
</tr>
<tr>
<td>Asthma</td>
<td>High prevalence (45% of aCSC related visits, 2.3% of all pediatric visits) Disparities for black race, Hispanics Quality care such as care coordination, care plans, education and appropriate drug use associated with fewer ED visits</td>
</tr>
<tr>
<td>COPD</td>
<td>Some evidence that quality interventions reduce ED visits</td>
</tr>
<tr>
<td>Condition</td>
<td>Details</td>
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</tbody>
</table>
| Pneumonia | Residential care facilities have higher rates  
Evidence of practice pattern variation  
Vaccination rates associated with lower ED visit rates |
| Dehydration | Young children at higher risk  
Evidence of practice pattern variation |
| UTI | Residential care facilities have higher rates  
Disparities noted for race |