Patient Safety Indicators: A Critical Review

American College of Medical Quality
September 23, 2009

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Presentation Outline

- Measuring patient safety
- Level setting: What are the AHRQ Patient Safety Indicators (PSIs)?
- PSI measurement challenges
- Studies of AHRQ PSIs
- Using AHRQ PSIs for quality improvement: The University of Michigan experience
- Using PSIs for public reporting and accountability
Measuring Patient Safety

Institute of Medicine *To Err is Human* – identifying and learning from errors is a key strategy for improving safety

Most methods of identifying and reporting errors are limited:

- Voluntary patient safety reporting systems
- Mandatory patient safety reporting
- Medical record searches

AHRQ PSIs based on readily available data source: hospital administrative (billing) data
Level Setting
What are the AHRQ PSIs?

“Measures that screen for adverse events that patients experience as a result of exposure to the health care system; these events are likely amenable to prevention by changes at the system or provider level”

Method of identifying potentially preventable adverse events using hospital administrative data

From AHRQ Guide to Patient Safety Indicators, Version 3.1 (March 12, 2007)
# List of Current AHRQ PSIs

<table>
<thead>
<tr>
<th>Medical – Surgical</th>
<th>Surgical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidental puncture / laceration *</td>
<td>Postoperative hip fracture</td>
</tr>
<tr>
<td>Pressure ulcer (<em>formerly, Decubitus Ulcer</em>) *</td>
<td>Postoperative hemorrhage / hematoma *</td>
</tr>
<tr>
<td>Foreign body left during procedure *</td>
<td>Postoperative physiologic or metabolic derangements</td>
</tr>
<tr>
<td>Iatrogenic pneumothorax *</td>
<td>Postoperative respiratory failure *</td>
</tr>
<tr>
<td>Central line associated bloodstream infection (<em>formerly, Selected infections due to medical care</em>) *</td>
<td>Postoperative pulmonary embolism / deep vein thrombosis</td>
</tr>
<tr>
<td>Transfusion reaction *</td>
<td>Postoperative sepsis *</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Birth Trauma</th>
<th>Surgical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury to neonate *</td>
<td>Postoperative wound dehiscence *</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Obstetric Trauma</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal with instrument</td>
<td>Death in low mortality DRGs (adults)</td>
</tr>
<tr>
<td>Vaginal without instrument</td>
<td>Death among surgical inpatients with serious treatable complications</td>
</tr>
</tbody>
</table>

* Subset of patient safety indicators that apply to pediatric patients
**Definition of Terms**

**Adverse event or complication**: “An injury caused by medical management rather than by the underlying disease or condition of the patient”

**Medical error**: “The failure of a planned action to be completed as intended (i.e., error of execution) or the use of a wrong plan to achieve an aim (i.e., error of planning)”

**Preventable adverse event**: “An adverse event attributable to error”

*From AHRQ Guide to Patient Safety Indicators, Version 3.1 (March 12, 2007)*
AHRQ PSI Development Steps

1. Developed framework to define and evaluate candidate indicators and conducted literature search to identify potential PSIs
2. Candidate indicators evaluated for face validity; definitions and risk adjustment methods refined
3. Clinical panels completed structured review to produce the final list of PSIs
4. Empirical analysis of PSIs conducted using all-payer data from 19 different states
Evolution of AHRQ PSIs

- **2003:** First release (v 2.1 R 1)
  - Extension of complications screening programs
  - One set of indicators for both adult and pediatric populations
- **2006:** Separate safety indicator set developed for pediatric patients (v 3.0)
- **2007:** Addition of present on admission (PoA) variable (v 3.1)
- **2008:** Failure to rescue indicator replaced with deaths among surgical inpatients indicator (v 3.2)
- **2009:** Complications of anesthesia and OB trauma for C-section eliminated (v 4.0)
Structure of AHRQ PSIs

Example: Pressure ulcer

Denominator (at-risk population): medical and surgical discharges, excluding patients

- Less than age 18
- With a length of stay less than 5 days
- With an ICD-9-CM diagnosis of hemiplegia, paraplegia or quadraplegia or spina bifida or anoxic brain damage
- With major diagnostic category (MDC) for diseases of the skin, subcutaneous tissue or breast
- With ICD-9-CM procedure code for debridement or pedicle graft
- With ICD-9-CM diagnosis of stage I or II pressure ulcer
- Admitted from a long term care facility or transferred from an acute care facility
Structure of AHRQ PSIs (continued)

Example: Pressure Ulcer (continued)

- Numerator: discharges with ICD-9-CM diagnosis for decubitus ulcer any secondary diagnosis field

Important characteristics restrict the denominator to patients for whom the PSI event is more likely to be preventable:

- Exclude patients with short lengths of stay, transferred from a nursing home or acute care hospital, undergoing procedure for debridement to reduce chance that pressure ulcer was present on admission
- Exclude patients with skin disorders and paralysis who are susceptible to pressure ulcers.
Structure of AHRQ PSIs (continued)

- **Risk Adjustment**
  - Based on age, gender, comorbidities and DRGs
  - Produces estimate of performance assuming an “average” patient case-mix, based on the hospital’s actual performance
    - Risk-adjusted rate is higher than observed rate for hospitals with less severe case-mix
    - Risk adjusted rate is lower than observed rate for hospitals with more severe case-mix
# National Adult PSI Rates, 2004

<table>
<thead>
<tr>
<th>Patient Safety Indicator</th>
<th>All Ages</th>
<th>Age 18 - 39</th>
<th>Age 40 - 64</th>
<th>Age 65 - 74</th>
<th>Age 75+</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Complications of Anesthesia</td>
<td>0.044</td>
<td>0.698</td>
<td>0.939</td>
<td>1.180</td>
<td>1.100</td>
</tr>
<tr>
<td>2. Death in Low Mortality DRG</td>
<td>0.563</td>
<td>0.151</td>
<td>0.464</td>
<td>1.359</td>
<td>3.248</td>
</tr>
<tr>
<td>4. Failure to Rescue</td>
<td>123.173</td>
<td>69.949</td>
<td>120.928</td>
<td>146.332</td>
<td></td>
</tr>
<tr>
<td>5. Foreign Body Left In During Procedure</td>
<td>0.085</td>
<td>0.065</td>
<td>0.108</td>
<td>0.101</td>
<td>0.069</td>
</tr>
<tr>
<td>6. Iatrogenic Pneumothorax</td>
<td>0.570</td>
<td>0.341</td>
<td>0.452</td>
<td>0.658</td>
<td>0.782</td>
</tr>
<tr>
<td>7. Infection Due to Medical Care</td>
<td>2.087</td>
<td>1.190</td>
<td>2.668</td>
<td>2.844</td>
<td>2.064</td>
</tr>
<tr>
<td>8. Postoperative Hip Fracture</td>
<td>0.274</td>
<td>0.037</td>
<td>0.087</td>
<td>0.310</td>
<td>0.834</td>
</tr>
<tr>
<td>9. Postop Hemorrhage or Hematoma</td>
<td>2.706</td>
<td>2.634</td>
<td>2.578</td>
<td>2.737</td>
<td>2.976</td>
</tr>
<tr>
<td>10. Postop Physio Metabol Derangement</td>
<td>1.106</td>
<td>0.456</td>
<td>0.833</td>
<td>1.499</td>
<td>1.759</td>
</tr>
<tr>
<td>14. Postoperative Wound Dehiscence</td>
<td>2.101</td>
<td>0.854</td>
<td>1.673</td>
<td>3.438</td>
<td>3.813</td>
</tr>
<tr>
<td>16. Transfusion Reaction</td>
<td>0.004</td>
<td>0.003</td>
<td>0.004</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>17. Birth Trauma - Injury to Neonate</td>
<td>2.599</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. OB Trauma - Vaginal w Instrument</td>
<td>186.248</td>
<td>188.237</td>
<td>161.991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. OB Trauma - Vaginal w/o Instrument</td>
<td>42.513</td>
<td>42.510</td>
<td>29.587</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. OB Trauma - C Section</td>
<td>4.359</td>
<td>4.337</td>
<td>6.178</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rates for almost all PSIs increase with patient age

Based on AHRQ PSI v3.1; Data source: Nationwide Inpatient Sample, 2004
Measurement Challenges
Measurement Challenges

Identifying *preventable* adverse events

Limitations of administrative data

- Incomplete and inaccurate ICD-9-CM coding
- Absence of ICD-9-CM codes that describe important complications
- Presence of codes that are vague and do not adequately describe the clinical problem
- Prior to October 2007, diagnosis codes were not dated; unable to distinguish between diagnoses present on admission and those acquired during hospitalization
Measurement Challenges (continued)

- Heterogeneity of populations
  - Lack of specific definition of at-risk population
  - Includes patients with different risks for event
  - Includes codes that encompass different levels of severity (e.g., pressure ulcer, death in low mortality DRG)
Studies of AHRQ PSIs
Studies using AHRQ PSIs

- Profile patient safety in U.S. hospitals
- Report impact of PSI events on morbidity, mortality and use of hospital resources
- Assess health disparities
- Evaluate relevance of PSIs for pediatric population
- Assess impact of PoA variable on PSI rates
- Study validity of selected PSIs
Impact of PSI Events on Outcomes

Excess Length of Stay, Charges and Mortality Attributable to Medical Injuries During Hospitalization
Zhan C, Miller MR
JAMA 2003;290: 1869-1874

Applied PSIs to Nationwide Inpatient Sample to assess excess length of stay, charges and deaths attributed to medical injuries

- PSIs with largest excess mortality were postop sepsis, postop respiratory failure and postop physiologic and metabolic derangement
- Postop sepsis by far the most serious event in terms of excess LOS, charges and mortality, followed by postop wound dehiscence and infection due to medical care
Impact of PoA Variable

Do the AHRQ Patient Safety Indicators Flag Conditions that are Present at the Time of Admission?
Med Care 2008;46: 516-522

 Evaluated impact of PoA values on PSI rates at University of Michigan

- Rates for all but 1 of 13 PSIs decreased; reduction was statistically significant for decubitus ulcer, foreign body left in, selected infections due to medical care, postop physiologic and metabolic derangement and postop PE / DVT
- Study also raises questions about the accuracy of PoA values
# Impact of PoA Variable

## TABLE 3. Impact of PoA Values on PSI Rates

<table>
<thead>
<tr>
<th>Patient Safety Indicator</th>
<th>Without PoA Variable Rates (1)/1000</th>
<th>With PoA Variable Rates (2)/1000</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Complications of anesthesia</td>
<td>0.95</td>
<td>0.68</td>
<td>1.40</td>
<td>0.63–3.25</td>
</tr>
<tr>
<td>3 Decubitus ulcer</td>
<td>33.24</td>
<td>8.77</td>
<td>3.89</td>
<td>3.080–4.954*</td>
</tr>
<tr>
<td>4 Failure to rescue</td>
<td>95.95</td>
<td>155.73</td>
<td>0.58</td>
<td>0.448–0.743*</td>
</tr>
<tr>
<td>5 Foreign body left during procedure</td>
<td>0.42</td>
<td>0.14</td>
<td>3.00</td>
<td>1.162–9.224*</td>
</tr>
<tr>
<td>6 Iatrogenic pneumothorax</td>
<td>1.18</td>
<td>0.90</td>
<td>1.31</td>
<td>0.787–2.198</td>
</tr>
<tr>
<td>7 Selected infections due to medical care</td>
<td>5.19</td>
<td>2.27</td>
<td>2.29</td>
<td>1.600–3.343*</td>
</tr>
<tr>
<td>8 Postoperative hip fracture</td>
<td>0.33</td>
<td>0.00</td>
<td>Undefined</td>
<td>—</td>
</tr>
<tr>
<td>9 Postoperative hemorrhage or hematoma</td>
<td>5.82</td>
<td>5.03</td>
<td>1.16</td>
<td>0.835–1.609</td>
</tr>
<tr>
<td>10 Postoperative physiologic and metabolic derangement</td>
<td>4.15</td>
<td>2.33</td>
<td>1.78</td>
<td>1.040–3.131*</td>
</tr>
<tr>
<td>11 Postoperative respiratory failure</td>
<td>14.59</td>
<td>14.45</td>
<td>1.01</td>
<td>0.766–1.331</td>
</tr>
<tr>
<td>12 Postoperative pulmonary embolism or deep vein thrombosis</td>
<td>22.13</td>
<td>11.49</td>
<td>1.95</td>
<td>1.601–2.378*</td>
</tr>
<tr>
<td>13 Postoperative sepsis</td>
<td>9.39</td>
<td>6.03</td>
<td>1.56</td>
<td>0.725–3.550</td>
</tr>
<tr>
<td>15 Accidental puncture or laceration</td>
<td>7.09</td>
<td>6.43</td>
<td>1.10</td>
<td>0.912–1.336</td>
</tr>
<tr>
<td>16 Transfusion reaction</td>
<td>0.00</td>
<td>0.00</td>
<td>Undefined</td>
<td>—</td>
</tr>
</tbody>
</table>

*Significant difference.

95% confidence intervals (CI) were derived from the asymptotic distribution of the generalized likelihood ratio test (Ventzen and Moolgavkar, 1988).
Impact of PoA Variable

How Often are Potential Patient Safety Events Present on Admission?
Houchens RL, Elixhauser A, Romano PS
Jt Comm J Qual Saf 2008;34: 154-163

Evaluated face validity of PoA information in CA and NY and extent to which PSIs without PoA values are valid measures of quality

- PoA coding suspect
- Indicators that are compromised without PoA values are decubitus ulcer, postop hip fracture and postop PE / DVT; other PSIs can be used to screening cases for quality of care
Validation of PSIs

Validity of Selected AHRQ Patient Safety Indicators Based on VA National Surgical Quality Improvement Program Data
Romano PS, Mull HJ, Rivard PE, et al. Health Serv Res 2009;44: 182-204

Evaluated criterion validity of 5 surgical PSIs that match NSQIP adverse events

- PSI sensitivity and positive predictive values were low to moderate; values improved for postop respiratory failure and postop wound dehiscence with modification of definition
- Findings lead AHRQ to adopt changes to definition of 3 surgical PSIs
Table 3: Criterion Validity of the Original and Alternative Patient Safety Indicators (PSIs) versus NSQIP Adverse Events

| PSI                                      | Hospitalizations at-Risk for PSI | NSQIP Adverse Events: Gold Standard | Sensitivity (%)
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Original PSI Def*</td>
<td>Current/Alternative Def</td>
<td>Original PSI Def*</td>
</tr>
<tr>
<td>Postoperative physiologic/metabolic derangement</td>
<td>27,722</td>
<td>62</td>
<td>44</td>
</tr>
<tr>
<td>Postoperative respiratory failure</td>
<td>24,273</td>
<td>344</td>
<td>19</td>
</tr>
<tr>
<td>Postoperative PE/DVT</td>
<td>55,682</td>
<td>241</td>
<td>56</td>
</tr>
<tr>
<td>Postoperative sepsis</td>
<td>12,011</td>
<td>75</td>
<td>32</td>
</tr>
<tr>
<td>Postoperative acute myocardial infarction</td>
<td>26,925</td>
<td>111</td>
<td>81</td>
</tr>
<tr>
<td>Postoperative iatrogenic complications: cardiac</td>
<td>56,305</td>
<td>609</td>
<td>17</td>
</tr>
</tbody>
</table>

Parentheses contain 95% confidence intervals. All specificity values are > 99.1%. Paired sensitivity estimates that were statistically significantly different, based on the continuity corrected McNemar statistic (p < .05) for matched pairs, are shown in boldface. The “alternative definitions” shown for “postoperative physiologic/metabolic derangement,” “postoperative respiratory failure,” and “postoperative sepsis” were adopted in AHRQ PSI version 3.0 (and subsequent versions).

*Original definition from AHRQ PSI version 2.1, revision 2.

Sensitivity represents the proportion of the NSQIP postoperative adverse events that were found using the AHRQ PSI algorithms.

Positive predictive value (PPV) represents the proportion of the AHRQ-defined PSIs that were confirmed as true events using NSQIP.

Positive likelihood ratio measures how many times more likely a flagged PSI was to occur in a hospitalization that had a “true” event (based on NSQIP) versus a hospitalization that did not have the true event.
Using PSIs for Improvement
University of Michigan Experience

1. Analysis of rates
   a. Select indicators for analysis
   b. Identify patient populations at-risk
   c. Identify clinical services with higher rates and possible opportunities for process improvement

2. Evaluation of individual cases
   a. Review details of patient risk factors, process of care
   b. Assess preventability of adverse event
   c. Identify factors that contribute to occurrence of event
Analysis of PSI Rates

Report rates and trends
- Compare to AHRQ national statistics or other benchmark
- Select indicators for analysis
  - High rates relative to comparison / peer hospitals
  - Rates increasing
  - Satisfies particular clinical interest

Conduct analysis
- AHRQ software identifies numerator and denominator populations; append with administrative data fields -
  - Patient age and gender, diagnoses, procedures, DRG, length of stay, clinical services
Analysis of PSI Rates (continued)

Conduct analysis (continued)

- Report population characteristics
  - Age distribution
  - Common diagnoses, procedures and DRGs
  - Use of hospital resources (ICU, overall length of stay)
  - Clinical services where event likely occurred

- Review details for a sample of numerator cases

Outcome of analysis

- Patient risk factors
- PSIs that are useful to monitor
- Opportunities to improve care and medical record documentation and coding
Sample Report - Failure to Rescue

Analysis conducted using an early version of indicator

Intent of Indicator
- Intended to identify patients who die following the development of a complication.
- Risk adjustment based on age, gender, DRG and comorbidity categories.
- Potential problems with validity and comparing rates across hospitals: 1) includes pediatric patients, who have lower failure to rescue rates, 2) does not exclude “do not resuscitate” (DNR) patients.

Informal Validation
- A review of a sample of 45 of 228 cases in CY’02 showed that:
  - Of the 45 cases, 36 (80%) were confirmed as having the coded complication.
  - Twenty six cases (11.4%) were admitted when they may have been beyond the point of rescue and died within 1 day of admission.
  - Seven (15%) were transferred from another acute hospital but were recorded in our administrative data as admissions from the ED and therefore were not excluded.
  - The Indicator is not very specific and includes complex cases, like transplants and advanced cancer.

Findings
- Of the 228 cases in the numerator in CY’02, 31% had acute renal failure as a complication, 18% had pneumonia, 16% had DVT/PE and 13% had GI hemorrhage. Sepsis and shock / cardiac arrest occurred in 5% or fewer cases.
- The failure to rescue rate was highest for shock / cardiac arrest (42%), sepsis (16%), acute renal failure (15%) and GI hemorrhage (12%).
- The unadjusted rate in CY’02 was 11.5% (206 / 1,797) for adult cases and 10.5% (22 / 204) for pediatrics.
- Seventy-nine percent of cases in the numerator had the highest APR-DRG risk of mortality (risk of mortality class 4) compared to 19% of cases in the denominator population. In other words, patients in the numerator probably had other complications that contributed to their death.

Conclusions
- UMH rates were relatively low compared to those of selected peer hospitals. (Differences were probably not statistically significant.)
- The results of this indicator do not reflect its intent; patients in the numerator may have expired due to many factors beyond the complications that were identified in the denominator population. This is evident from the significantly higher risk of mortality for patients in the numerator.
- UMH rates are overstated due to inaccurate coding of patients who were transferred from an acute care hospital. Must improve coding of transfer cases.
- For this and all AHRQ Patient Safety Indicators, administrative data are unlikely to capture cases of complications without false positives and negatives.
Sample Findings

Accidental puncture and laceration

- A number of events not accidental
  - Enterotomies during surgery to resect tumors that involve the bowel
  - Entry tear in femoral artery following insertion of large stent during endovascular abdominal aortic aneurysm repair

- Guidelines for documentation and coding of accidental lacerations needed

Selected infections due to medical care

- Pediatric patients on long term parenteral nutrition
Sample Findings (continued)

**Iatrogenic pneumothorax**
- Occurred most often during thoracentesis

**Postoperative wound dehiscence**
- Risk factors - multiple abdominal surgeries, obesity
- Inconsistent physician documentation

**Pressure ulcer**
- Many pressure ulcers present on admission

**Postoperative hemorrhage or hematoma**
- No exclusion for patients with coagulopathies

**OB trauma**
- Completely dependent on accurate coding of 3rd and 4th degree lacerations
Sample Findings (continued)

Postoperative Pulmonary Embolism (PE) / Deep Vein Thrombosis (DVT)
- Many PE / DVT present on admission
- Identifies superficial venous thrombosis

Failure to rescue *(later revised to include only surgical patients in at-risk population)*
- Does not exclude significant percentage of patients admitted with “Do Not Resuscitate” or comfort care orders
- Appears to identify patients who expired because of severity of medical condition rather than incidence of complications
Most Useful PSIs for QI

Useful only if PoA values are available

- Foreign body left in
- Iatrogenic pneumothorax
- Postop hemorrhage or hematoma
- Postop hip fracture
- Postop PE / DVT (after excluding code that captures superficial venous thrombosis)
- Postop wound dehiscence
- Accidental puncture / laceration (only after implementation of guidelines for appropriate documentation and coding)
- Death in low mortality DRGs
Potentially Useful PSIs for QI

Given AHRQ improvements to indicator definitions, must be re-evaluated (Again, can only be useful if PoA values are available)

- Decubitus ulcer
- Selected infection due to medical care
- Postop physiologic and metabolic derangement
- Postop respiratory failure
- Postop sepsis
Evaluation of Individual Cases

- Began routine evaluation of discharges flagged by PSIs after implementing PoA variable
- Focused on PSIs deemed most valid, useful
- Developed software to flag discharges after they are coded and refer to clinicians from service where event occurred for review
- Clinicians assess accuracy of coded diagnosis that flagged the discharge; for confirmed events, evaluate preventability and contributing factors
Evaluation of Individual Cases

- Provides routine feedback about adverse events to clinicians
- Identifies many events not captured in voluntary patient safety reporting system
- Reports of clinician findings used to develop improvement strategies

Example: PE / DVT
- Risk assessment not performed
- Prophylaxis inadequate or started late
- Prophylaxis withheld for removal of epidural catheter, which may not occur when planned
Public Reporting & Accountability
Public Reporting & Accountability

- Centers for Medicare & Medicaid Services (CMS) Hospital Acquired Conditions
- CMS public reporting of selected PSIs on hospitalcompare.gov
- U.S. News & World Report Best Hospitals ranking
- HealthGrades.com
- Premier Hospital Quality Incentive demonstration project
<table>
<thead>
<tr>
<th>AHRQ Patient Safety Indicator (PSI)</th>
<th>CMS Hospital Acquired Conditions *</th>
<th>CMS hospitalcompare.gov</th>
<th>U.S. News &amp; World Report</th>
<th>HealthGrades.com</th>
<th>Premier</th>
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<tbody>
<tr>
<td>Accidental Puncture / Laceration</td>
<td>✓ , C</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Pressure Ulcer</td>
<td>✓ **</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Foreign Body Left In</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iatrogenic Pneumothorax</td>
<td>✓ , C</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Line Associated Bloodstream Infection</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfusion Reaction</td>
<td>✓</td>
<td></td>
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<td>Postoperative Hip Fracture</td>
<td>C</td>
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<td>Postoperative Hemorrhage / Hematoma</td>
<td>C</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Postoperative Physiologic / Metabolic Derangement</td>
<td>C</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Postoperative Respiratory Failure</td>
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<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postoperative PE / DVT</td>
<td>✓ #</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postoperative Sepsis</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postoperative Wound Dehiscence</td>
<td>✓ , C</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death in Low Mortality DRGs</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death Among Surgical Inpatients</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure to Rescue</td>
<td></td>
<td>✓</td>
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</tbody>
</table>

**Other “PSI-Like” Events**

<table>
<thead>
<tr>
<th>Event</th>
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<tbody>
<tr>
<td>Air Embolism</td>
<td>✓</td>
</tr>
<tr>
<td>Manifestations of Poor Glycemic Control</td>
<td>✓</td>
</tr>
<tr>
<td>Falls and Trauma</td>
<td>✓</td>
</tr>
<tr>
<td>Mediastinitis following Coronary Artery Bypass</td>
<td>✓</td>
</tr>
<tr>
<td>Surgical Site Infection – Orthopedic, Bariatric Surgery</td>
<td>✓</td>
</tr>
</tbody>
</table>

* CMS Hospital Acquired Conditions policy uses “PSI-like” logic to identify events rather than to produce rates, like the AHRQ PSIs

** Includes only stage III and stage IV pressure ulcers

# Includes only PE or DVT following selected orthopedic surgery procedures

C Included in a composite PSI rate, one of five PSIs to be reported in hospitalcompare.gov

† PSI is applied to coronary artery bypass and hip replacement procedures rather than all surgical procedures, as specified by AHRQ
CMS Hospital Acquired Conditions

Use of “AHRQ PSI-like” indicators to identify discharges with an adverse event for potential reduction in reimbursement

Introduced in October 2008 for Medicare; is being adopted by other payors

Targets about 10 conditions

Operational problems

- Relies on ICD-9-CM and PoA coding
- Lack of clear definitions of conditions
- Mismatch between method coders and clinicians use to identify conditions
Other Public Reporting

CMS hospitalcompare.gov
- First “dry run” of results revealed problems with data; second dry run planned
- Rates derived from Medicare data
- First public report will probably be produced using PoA values

U.S. News & World Report
- Now part of formula for ranking hospitals
- Rates derived from Medicare data
- Set of 7 PSIs appear to include failure to rescue, which AHRQ substantially revised in 2008
**Other Public Reporting** (continued)

- **HealthGrades.com**
  - Uses PSIs to rank hospital performance, select hospitals for “Patient Safety Excellence Award”
  - Rates derived from Medicare data

- **Premier Hospital Quality Incentive**

**Problems**

- PoA variable often not used
- Variation in documentation and coding practices between hospitals making comparisons problematic
- PSIs not validated
Summary

- The Agency for Healthcare Research & Quality’s Patient Safety Indicators (PSI) take advantage of readily available hospital administrative data to identify potentially preventable adverse events.
- Though developed through a systematic process, PSIs have not been validated; findings from some studies raise questions about their validity.
- PSIs were intended to be used by hospitals for quality improvement.
Experience at the University of Michigan shows that analysis of rates and individual cases for selected PSIs can identify improvement opportunities.

PSIs are being used for public reporting and accountability despite inherent flaws of administrative data and lack of validation.
Selected References