AHRQ CQuIPS, MPSMS and QSRS, and Measuring Adverse Drug Drug Events

Presentation for Interoperability Standards Priorities Task Force (ISPTF)
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Agency for Healthcare Research and Quality
Center for Quality Improvement and Patient Safety
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AHRQ and CQuIPS

- AHRQ is the lead Federal Agency for patient safety
- Most of AHRQ’s patient safety work is housed in the Center for Quality Improvement and Patient Safety
- Five Divisions – including three patient safety
  - Patient Safety Division
  - Healthcare-Associated Infections Division
  - Patient Safety Organizations (PSOs) Division
  - National Healthcare Quality and Disparities Report Division
  - CAHPS and SOPS Division
AHRQ/CMS partnership to estimate annual national hospital-acquired condition rates


Rates calculated based on human medical record abstraction

MPSMS to QSRS

Exploring feasibility of automating abstraction from EHR


Proof-of-concept for eAbstraction of one module
Hospital-acquired C. *diff* infections module selected for proof-of-concept

- e-specified the module using eCQM model (VSAC, QDM, CQL, HQMF, etc.)
- Time-consuming, had to create new value sets
One MPSMS Adverse Drug Event (ADE) Excerpt

MPSMS measures have been producing data using consistent definitions since 2005. Last data year for MPSMS will be 2019.
### Table 1. Adverse Events from 2005–2006 to 2010–2011. *

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>number of events</td>
<td>2005–2006</td>
<td>2007 and 2009</td>
</tr>
</tbody>
</table>

#### Adverse Drug Events

- **Events associated with hypoglycemic agents**: 72/550 (13.1% 2005-2006), 100/866 (11.5% 2007 and 2009)
- **Events associated with IV heparin**: 96/540 (17.8%), 78/625 (12.5%)
- **Events associated with LMW heparin and factor Xa inhibitor**: 47/566 (8.3%), 54/962 (5.6%)
- **Events associated with warfarin**: 12/150 (8.0%), 16/231 (6.9%)

### Some MPSMS ADE Data

#### Exhibit A2c. All 2014, 2015, 2016, and 2017 (preliminary) HACs (not rounded)

<table>
<thead>
<tr>
<th>HAC Type</th>
<th>Source</th>
<th>Measure</th>
<th>Total 2014 HACs</th>
<th>Total 2014 HAC Rate per 1,000 Discharges</th>
<th>Total 2015 HACs Normalized to 2014 Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse Drug Event</td>
<td>MPSMS</td>
<td>ADE Associated With Digoxin</td>
<td>6,204</td>
<td>0.21</td>
<td>795</td>
</tr>
<tr>
<td>MPSMS</td>
<td>ADE Associated With Hypoglycemic Agents</td>
<td>517,177</td>
<td>17.38</td>
<td>549,638</td>
<td></td>
</tr>
<tr>
<td>MPSMS</td>
<td>ADE Associated With IV Heparin</td>
<td>141,711</td>
<td>4.78</td>
<td>81,382</td>
<td></td>
</tr>
<tr>
<td>MPSMS</td>
<td>ADE Associated With LMWH and Factor Xa Inhibitor</td>
<td>247,441</td>
<td>8.32</td>
<td>159,633</td>
<td></td>
</tr>
<tr>
<td>MPSMS</td>
<td>ADE Associated With Warfarin</td>
<td>88,814</td>
<td>2.99</td>
<td>102,338</td>
<td></td>
</tr>
<tr>
<td>MPSMS</td>
<td>Total ADE (sum of 5 above)</td>
<td>1,001,348</td>
<td>33.66</td>
<td>883,766</td>
<td></td>
</tr>
</tbody>
</table>

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In Table 1 in:  

On page 21 in:  
### AHRQ “Common Formats – Surveillance”
(11 Modules in QSRS Software – Successor to MPSMS)

<table>
<thead>
<tr>
<th>Category</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth – Maternal / Neonatal</td>
<td>Medication</td>
</tr>
<tr>
<td>Blood</td>
<td>Other Outcomes of Interest</td>
</tr>
<tr>
<td>Device</td>
<td>Pressure Ulcer / Pressure Injury</td>
</tr>
<tr>
<td>Fall</td>
<td>Surgery or Anesthesia</td>
</tr>
<tr>
<td>Generic</td>
<td>Venous Thromboembolism (VTE)</td>
</tr>
<tr>
<td>Healthcare Associated Infection - Catheter Associated Tract Infection (CAUTI) / Clostridium Difficile Infection (CDI) / Central Line Associated Blood Stream Infection (CLABSI) / Pneumonia / Surgical Site Infection (SSI) / Urinary Tract Infection (UTI)</td>
<td></td>
</tr>
</tbody>
</table>
QSRS Medication Module Adverse Drug Events include:

1. Adverse Drug Reactions: Suspected Allergic Reactions and Overdoses
2. **Anticoagulant Adverse Events**
   (3 types that are associated with both older medications and newer medications)
3. **Hypoglycemic Adverse Events**
4. **Opioid Adverse Events**
5. Other ADEs
   - option for unprompted free text inputs not captured above, e.g., GI bleeds from NSAIDs, delirium associated with benzodiazepines, etc.
Anticoagulant Adverse Event
(1 type below)

a. Patient received Warfarin and a conspicuous lab result occurred or a conspicuous physician response indicative of a problem occurred.

b. Clinically significant finding in patient occurred that is likely due to (a)

1.2.1.2 Patient receiving warfarin during hospital stay and both of the following:
1.2.1.2.1 Either of the following lab values or actions:
   1.2.1.2.1.1 INR greater than 5.0
   1.2.1.2.1.2 Administration of any of the following:
      1.2.1.2.1.2.1 Vitamin K
      1.2.1.2.1.2.2 Fresh frozen plasma
      1.2.1.2.1.2.3 Prothrombin complex concentrate
      1.2.1.2.1.2.4 Recombinant factor VIIa
      1.2.1.2.1.2.5 Blood or red cell transfusion and no surgical operation

1.2.1.2.2 Any of the following adverse outcomes more than 24 hours after admission and within 1 day, either before or after, any of the circumstances listed above in 1.2.1.2.1:
   1.2.1.2.2.1 Hemoglobin decrease of ≥ 5 mg/dL or a ≥ 15% absolute decrease in the hematocrit following anticoagulant administration, if more than 48 hours after admission
   1.2.1.2.2.2 Bleeding not present on admission
   1.2.1.2.2.3 Cardiac arrest/emergency measures to sustain life/call for rapid response team
   1.2.1.2.2.4 Death

Paper based on a study of data from this measure available at:
https://www.journalofhospitalmedicine.com/jhospmed/article/127055/warfarin-associated-adverse-events
**Hypoglycemic Adverse Event**

Any blood glucose <50 after insulin...

1.2.2.1 Patient receiving insulin and/or other hypoglycemic agent (e.g., exanatide, glyburide, glucophage) during hospital stay and blood glucose documented as ≤ 50 mg/dL more than 24 hours after admission, including whether any of the following adverse outcomes occurred on the same day as the low blood glucose:

1.2.2.1.1 Profuse sweating
1.2.2.1.2 Confusion
1.2.2.1.3 Seizure
1.2.2.1.4 Coma or loss of consciousness
1.2.2.1.5 Cardiac arrest/emergency measures to sustain life/call for rapid response team
1.2.2.1.6 Death

...some blood glucoses <70 after insulin.

1.2.2.2 Patient receiving insulin and/or other hypoglycemic agent (e.g., exanatide, glyburide, glucophage) during hospital stay and blood glucose documented as > 50 and ≤ 70 mg/dL and being administered D50, D10, or glucagon more than 24 hours after admission, including whether any of the following adverse outcomes occurred on the same day as the low blood glucose:

1.2.2.2.1 Profuse sweating
1.2.2.2.2 Confusion
1.2.2.2.3 Seizure
1.2.2.2.4 Coma or loss of consciousness
1.2.2.2.5 Cardiac arrest/emergency measures to sustain life/call for rapid response team
1.2.2.2.6 Death
Patient receiving opioids (e.g., morphine, fentanyl, meperidine, etc.) during hospital stay and experiencing any of the following within 24 hours of opioid administration:

1. Administration of intravenous (IV) naloxone, unless:
   - IV naloxone was administered during a procedure or within 2 hours following a procedure, or
   - IV naloxone was administered for pruritis, urinary retention, or constipation, or
   - IV naloxone was administered only in combination with, or at the same time as, the opioid

2. Respiratory arrest, unless:
   - The respiratory arrest was described as due to the patient’s underlying condition or diagnosis, or
   - The respiratory arrest was described as anticipated or normal, or responded to as if it had been anticipated by the hospital's clinical personnel, based on the opioid dosage

3. Unresponsiveness or response only to noxious stimulation, unless:
   - The unresponsiveness was described as due to the patient’s underlying condition or diagnosis, or
   - The unresponsiveness was described as anticipated or normal, or responded to as if it had been anticipated by the hospital's clinical personnel, based on the opioid dosage
Questions?

• Contact information
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    - noel.eldridge@ahrq.hhs.gov
Key Points from Automation Feasibility Study re: Medications Module

• Analyzed QSRS questions and grouped them into five categories re: how information is stored in the EHR
  ► Numeric Value
  ► Structured and Coded
  ► Structured and Uncoded
  ► Structured Free Text
  ► Unstructured Free Text

• Medications Module had 64 questions
  ► 3 numeric value, 14 structured and coded, 15 structured and uncoded, 10 structured free text, 22 unstructured free text

## Summary Comparisons: 2010 baseline to Final 2013 and 2014 Estimates

<table>
<thead>
<tr>
<th>HAC Type</th>
<th>Total Change in HACs, 2010 to 2013</th>
<th>Total Change in HACs, 2010 to 2014</th>
<th>Change in HAC-related deaths, 2010 to 2013</th>
<th>Change in HAC-related deaths, 2010 to 2014</th>
<th>Change in HAC-related hospital costs, 2010 to 2013</th>
<th>Change in HAC-related hospital costs, 2010 to 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse Drug Events</td>
<td>577,000</td>
<td>838,000</td>
<td>11,540</td>
<td>16,760</td>
<td>$2,885,000,000</td>
<td>$4,190,000,000</td>
</tr>
<tr>
<td>CAUTIs</td>
<td>190,000</td>
<td>340,000</td>
<td>4,427</td>
<td>7,922</td>
<td>$190,000,000</td>
<td>$340,000,000</td>
</tr>
<tr>
<td>CLABSIs</td>
<td>10,800</td>
<td>23,800</td>
<td>1,998</td>
<td>4,403</td>
<td>$183,600,000</td>
<td>$404,600,000</td>
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<tr>
<td>Falls</td>
<td>50,000</td>
<td>50,000</td>
<td>2,750</td>
<td>2,750</td>
<td>$361,700,000</td>
<td>$361,700,000</td>
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<tr>
<td>Obstetric Adverse Events*</td>
<td>10,000</td>
<td>15,000</td>
<td>15</td>
<td>22</td>
<td>$30,000,000</td>
<td>$45,000,000</td>
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<tr>
<td>Pressure Ulcers</td>
<td>280,000</td>
<td>590,000</td>
<td>20,272</td>
<td>42,716</td>
<td>$4,760,000,000</td>
<td>$10,030,000,000</td>
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<tr>
<td>Surgical Site Infections*</td>
<td>45,000</td>
<td>62,000</td>
<td>1,269</td>
<td>1,748</td>
<td>$945,000,000</td>
<td>$1,302,000,000</td>
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<tr>
<td>Ventilator-Associated Pneumonias</td>
<td>8,000</td>
<td>8,000</td>
<td>1,150</td>
<td>1,150</td>
<td>$168,000,000</td>
<td>$168,000,000</td>
</tr>
<tr>
<td>(Post-op) Venous Thromboembolisms</td>
<td>5,000</td>
<td>17,000</td>
<td>520</td>
<td>1,768</td>
<td>$40,000,000</td>
<td>$136,000,000</td>
</tr>
<tr>
<td>All Other HACs**</td>
<td>142,000</td>
<td>164,000</td>
<td>6,433</td>
<td>7,429</td>
<td>$2,414,000,000</td>
<td>$2,788,000,000</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>1,317,800</td>
<td>2,107,800</td>
<td>50,374</td>
<td>86,669</td>
<td>$11,977,300,000</td>
<td>$19,765,300,000</td>
</tr>
</tbody>
</table>

* Final 2013 rates from NHSN and PSIs (not shown in MPSMS-based quarterly data) used for Interim 2014 rates
** Interim 2014 rate is from a combination of Interim 2014 (MPSMS) and Final 2013 (PSI) data
AHRQ Infographic with Same Data

17% REDUCTION IN HACs

2.1 MILLION INSTANCES OF HACs AVOIDED

87,000 LIVES SAVED

$19.8 BILLION IN COSTS AVERTED

Source: http://www.ahrq.gov/dental/hospitalacquired/infections.html

Publication Date: December 1, 2014

AHRQ: Agency for Healthcare Research and Quality
Trend for 2014-2017 (Preliminary): 13% Reduction in HACs

A peer-reviewed publication on 2010-2017 findings with raw and risk-adjusted data is in preparation…