An Introduction to the 3M™ APR™ DRG Model

Developed by 3M Health Information Systems and the Employer Health Care Alliance Cooperative

Overview of the APR DRG methodology

- APR-DRGs stands for All Patient Refined Diagnostic Related Groups
- APR-DRGs are NOT the same as the CMS DRGs nor MS DRGs
- APR-DRGs are a categorical clinical model that has been extensively refined with historical data
  - Different clinical models are developed for 314 different types of patients
  - Clinical models are verified with data
  - Final decisions are always clinical

Source: Dr. Norbert Goldfield, 3M HIS Medical Director
APR DRGs are an open system

- Complete definitions manual containing all clinical logic is provided to all users
- User review and comment is encouraged
- As opposed to some severity of illness systems, APR DRGs are not a “black box”

Source: Dr. Norbert Goldfield, 3M HIS Medical Director

Structure of APR DRGs

Final APR-DRGs

Subdivide each APR-DRG into subclasses

Four severity of illness subclasses

Four risk of mortality subclasses

Source: Dr. Norbert Goldfield, 3M HIS Medical Director
Definitions of the subclasses

• **Severity of Illness (SOI):** The extent of physiologic decompensation or organ system loss of function
  - Each APR DRG SOI has a relative weight assigned to it to reflect resource consumption

• **Risk of Mortality (ROM):** The likelihood of dying in the admission

Level of severity of illness & risk of mortality can be different

• A patient with acute cholecystitis may have a significant amount of organ decompensation, but a low risk of dying:
  
  SOI: 3  
  ROM: 1  

While unlikely to die, such cases can be resource intensive. In internal QI work, patients with a ROM of 1 or 2 who expired could be an area of focus.
APR DRG subclasses

- The base APR-DRG
- Two Subclasses
  - Severity of Illness (SOI)
  - Risk of Mortality (ROM)
- Four Subclass Values given to each base APR-DRG SOI & ROM:
  - 1 = Minor, 2 = Moderate, 3 = Major, 4 = Extreme
- Subdivision of 314 base APR-DRGs into 4 subclasses plus 2 error APR-DRGs (not subdivided) equals:
  \[(314 \times 4) + 2 = 1,258\] APR-DRGs

Source: Dr. Norbert Goldfield, 3M HIS Medical Director

3 phases to determine SOI / ROM subclass

- **Phase 1:** Determine SOI / ROM level of each secondary diagnosis (sdx)
- **Phase 2:** Determine base SOI / ROM subclass of the patient based on all the sdxs
- **Phase 3:** Determine final SOI / ROM subclass of the patient by incorporating the impact of the primary diagnosis, age, OR procedure, non-OR procedures, multiple OR procedures, and combination of categories of sdxs

Source: Dr. Norbert Goldfield, 3M HIS Medical Director
### Observations from the table in the prior slide

- **Medicare DRG:**
  - The Medicare DRG is unresponsive to the case with additional conditions. Thus, the relative weight remains unchanged.

  *(Represented with red text in the table)*

- **APR DRG:**
  - The APR DRG is sensitive to the added conditions in second case. This is reflected in a sharp increase in relative weight & risk of mortality.

  *(Represented with blue text in the table)*

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**Sensitivity to Illness Burden & Risk of Mortality: An Example**

<table>
<thead>
<tr>
<th>PRINCIPAL DX: CONGESTIVE HEART FAILURE</th>
<th>CASE 1</th>
<th>CASE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SECONDARY DIAGNOSIS</strong></td>
<td>COPD</td>
<td>COPD</td>
</tr>
<tr>
<td></td>
<td>atrial fibrillation</td>
<td>atrial fibrillation</td>
</tr>
<tr>
<td></td>
<td>&amp; Shock</td>
<td>&amp; shock</td>
</tr>
<tr>
<td><strong>MEDICARE DRG</strong></td>
<td>127</td>
<td>127</td>
</tr>
<tr>
<td>APR DRG</td>
<td>heart failure &amp; Shock</td>
<td>heart failure &amp; shock</td>
</tr>
<tr>
<td>APR DRG SOI</td>
<td>1 minor</td>
<td>4 extreme</td>
</tr>
<tr>
<td>APR DRG ROM</td>
<td>1 minor</td>
<td>4 extreme</td>
</tr>
<tr>
<td><strong>MEDICARE DRG RELATIVE WEIGHT</strong></td>
<td>1.0103</td>
<td>1.0103</td>
</tr>
<tr>
<td><strong>APR DRG RELATIVE WEIGHT</strong></td>
<td>0.07847</td>
<td>2.9128</td>
</tr>
<tr>
<td><strong>MORTALITY RATE (APR DRG ADJUSTED)</strong></td>
<td>1.7%</td>
<td>36.3%</td>
</tr>
</tbody>
</table>
Why The Alliance selected APR DRGs?

- Open method of risk adjustment versus "black box"

- Independent analysis by Stanford on behalf of the Agency for Healthcare Research & Quality (AHRQ) concluded that APR DRG’s performed as well or better than other systems

- Most commonly licensed risk adjustment method used by hospitals & broadly used in a variety of settings (as discussed in next slide)

APR DRGs in use: Some examples

- Purchasing & quality based purchasing, e.g.:
  - **CMS**: Medicare - Premier quality based reimbursement program
  - **Maryland**: All inpatient reimbursement based on APRs
  - **Massachusetts & Pennsylvania**: Medicaid payment
  - **Belgium**: Hospital payment

- Research, quality & cost measurement, public reports, e.g.:
  - **AHRQ**: AHRQ Inpatient Quality Indicators
  - **Joint Commission**: Shared Visions – New Pathways
  - **MedPAC**: Research to advise Congress on the Medicare program
  - **Texas Health Care Information Council**: public report
  - **WI Collaborative for Healthcare Quality**: public report
  - **WI Hospital Association Information Center**: public report
APR-DRGs Applied to Severity Adjusted Charges

Calculating a given hospital’s severity adjusted charges:

1) Compute a hospital’s average relative weight (RW) = HRW
2) Compute the average RW for cases in the state = SRW
3) HRW divided by SRW = a hospital’s refined RW (HRRW)

For example:

\[
\begin{array}{c|c|c}
\text{Hosp. A’s HRW} & \text{SRW} & \text{Hosp. A’s HRRW} \\
.35 & .30 & 1.16 \\
\end{array}
\]

Meaning, Hosp. A’s cases are 16% more severe in re to RW

Calculating a given hospital’s severity adjusted charges (cont)

\[
\begin{array}{c|c|c}
\text{Hosp. A’s Avg charge} & \text{Hosp. A’s HRRW} & \text{Hosp. A’s severity adjusted charge (SAC)} \\
$13,476 & 1.16 & $11,617 \\
\end{array}
\]

Meaning, Hosp. A’s charges to serve the average case in the state is $11,617
## Calculating Expected Charges

<table>
<thead>
<tr>
<th>Hosp. vol.</th>
<th>SAC</th>
<th>WI vol.</th>
<th>% of cases by hosp.</th>
<th>portion of expected charges</th>
<th>expected charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>38</td>
<td>$11,617</td>
<td>2,700</td>
<td>.0141</td>
<td>$165</td>
</tr>
<tr>
<td>B</td>
<td>37</td>
<td>$16,181</td>
<td>2,700</td>
<td>.0137</td>
<td>$222</td>
</tr>
</tbody>
</table>

Hosp. SAC times % of cases by hosp.  
Hosp. vol. divided by WI vol.  
Sum of column = $16,900

For additional information, please contact:

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