Refining the hospital readmissions reduction program
Comparison of readmission measures
## Comparison of different hospital readmission measures

<table>
<thead>
<tr>
<th>Factors</th>
<th>Hospital Compare / CMS Readmission Reduction Program</th>
<th>Yale/CMS All Condition</th>
<th>3M Potentially Preventable Readmissions</th>
</tr>
</thead>
</table>
| Purpose of measure and uses of measure | • Hospital quality reporting  
   • Used in calculation of excess readmissions in hospital readmission reduction program  
   • NQF endorsed | • Hospital quality reporting  
   • NQF endorsed | • Hospital quality reporting and/or payment adjustments:  
   Medicaid or other state health departments (CA, FL, IL, MA, NC, NY, UT)  
   Managed care plans (Wellmark BCBS, IBC, Washington Premera BC)  
   State hospital associations (MN, OR, WA) |
| Time period covered | 30 days | 30 days | 15, 30, 60, or 90 days |
| Patient population | Medicare 65+ | Medicare 65+ | All patients, all Medicare, Medicare 65+ |
| Types of cases included | Diagnosis specific:  
   • AMI, heart failure, pneumonia  
   • Others for reporting  
   • PCI  
   • Total hip and knee replacements | All conditions categorized into 5 groups:  
   • Cardiology  
   • Cardiovascular  
   • Neurology  
   • Surgery  
   • Other medicine | All conditions |
| Initial admission exclusions | • In-hospital death  
   • Transfers out  
   • Left against medical advice  
   • Rehospitalizations within 30 days for the same condition are not considered initial admissions  
   • Patients w/o 12 months prior FFS enrollment  
   • Patients w/o 30 days post-discharge information | • In-hospital death  
   • Transfers out  
   • Left against medical advice  
   • Patients w/o 12 months prior FFS enrollment  
   • Patients w/o 30 days post-discharge information  
   • Admissions for primary psychiatric diagnosis, rehabilitation, medical treatment of cancer | • In-hospital death  
   • Transfers out  
   • Left against medical advice  
   • Rehospitalizations (chained)  
   • Admissions for metastatic cancer, trauma, burns, neonates, certain chronic conditions (CF), eye care |
| Readmissions counted | All cause | Unplanned admission for any cause | Potentially preventable:  
   • Medical readmission for continuation or recurrence for initial condition  
   • Medical readmission for acute decomposition of chronic problem  
   • Medical readmission for acute medical complication plausibly related to initial admission  
   • Surgical procedure to address problem that caused initial admission  
   • Surgical procedure to address complications of initial admission |

Note: NQF (National Quality Forum), BCBS (Blue Cross and Blue Shield), IBC (Independence Blue Cross), BC (Blue Cross), AMI (acute myocardial infarction), PCI (percutaneous coronary intervention), FFS (fee-for-service), CF (cystic fibrosis).

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<tr>
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<th>Hospital Compare / CMS Readmission Reduction Program</th>
<th>Yale/CMS All Condition</th>
<th>3M Potentially Preventable Readmissions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Readmission exclusions</strong></td>
<td>* None for heart failure or pneumonia</td>
<td>Planned readmissions:</td>
<td>Planned and clinically unrelated events:</td>
</tr>
<tr>
<td></td>
<td>* AMI has limited set of exclusions for certain cardiac procedures so long as they are not accompanied by an AMI diagnosis on readmission</td>
<td>* Nonacute readmission in which 1 of 35 typically planned procedures occurs</td>
<td>* Multiple trauma and burns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Maintenance chemotherapy or rehabilitation</td>
<td>* Major or metastatic malignancies</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Clinically related, not preventable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Probably planned</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Transplants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Obstetrics</td>
</tr>
<tr>
<td><strong>Risk adjustment</strong></td>
<td>* Hierarchical logistic regression for each diagnosis (results in shrinking all rates toward the national mean)</td>
<td>* Hierarchical logistic regression in 5 categories of cases (some shrinking of results toward the national mean)</td>
<td>* Uses DRG, age, and severity level cell average to calculate expected value</td>
</tr>
<tr>
<td></td>
<td>* Selected HCCs based on 1 year of prior hospital and outpatient claims</td>
<td>* AHRQ CCS to classify condition</td>
<td>* Base DRG</td>
</tr>
<tr>
<td></td>
<td>* Age</td>
<td>* CMS CCs categorized into 31 groups based on inpatient hospital data for current admission and prior admissions</td>
<td>* Severity level within DRG</td>
</tr>
<tr>
<td></td>
<td>* Sex</td>
<td>* Age</td>
<td>* Mental health–related diagnosis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Age</td>
</tr>
</tbody>
</table>

Note: DRG (diagnosis related group), HCCs (hierarchical condition categories), AHRQ (Agency for Healthcare Research and Quality), CCS (Clinical Classifications Software), CCs (complications or comorbidities).

References


Qualitynet.org. 2013. Hospital readmissions reduction program, frequently asked questions: 30-day risk-standardized readmission measures for acute myocardial infarction (AMI), heart failure (HF), and pneumonia (PN) calculated for the fiscal year 2013 hospital readmissions reduction program. https://www.qualitynet.org/dcs/ContentServer?c=Page&papage%2FQnetPublic%2FPag...cid=1228772412995.

Vertrees, J. C., 3M Health Information Systems, Inc. 2013. Personal communication, April 14.
Computation of how penalty is not reduced with a decline in readmission rates
In this appendix, we present an intuitive explanation of the readmission penalty and a simplified formula. We show the penalty is roughly equivalent to:

**Excess cost penalty multiplier**

\[
\text{Excess cost penalty multiplier} = \left( \frac{\text{Payment rate for initial DRG}}{\text{adjusted number of excess readmissions}} \right) \times \frac{1}{\text{national readmission rate for the condition}}
\]

where:

- DRG is diagnosis related group.

The purpose of this appendix is to show how the language in the law governing readmission penalties is roughly equivalent to the simplified formula above for cases in which the initial admission has a DRG payment similar to the DRG payment for the readmission. We also show that, under current law, the penalty does not decline as national readmission rates decline. The reason is that the reduction in penalties due to a lower cost of excess readmissions (first box above) is offset by an increase in the multiplier (second box above).

The actual computation is shown below. We start with the criteria that readmission measures must meet under the law, which requires that: “measures of such readmissions—

I. have been endorsed by the entity with a contract under section 1890(a) [which refers to the National Quality Forum (NQF)];

II. such endorsed measures have exclusions for readmissions that are unrelated to the prior discharge (such as planned readmission or transfer to another applicable hospital).”

CMS has chosen to use three condition-specific readmissions measures developed by Yale University and endorsed by the NQF. These measures meet criterion I but have very limited exclusions. The measures incorporate a statistical technique that is intended to reduce the chance that a hospital will appear to have excess readmissions solely due to random variation. In effect, that technique blends the hospital’s actual readmission value with the national mean readmission value. The national mean value is given less weight as the number of cases in the hospital increases. This blending tends to dampen the effect of random variation in readmission rates that is due to small numbers of cases. But, as we show here, using this measure will have a large influence on computation of the penalty.

The formula in the law can be written as follows:

The readmission penalty reduces a hospital’s total base operating DRG payments (DRGP):

**Equation 1**

\[
\text{DRGP}_A = \text{DRGP}_B \times A
\]

where:

- \(\text{DRGP}_A\) = total base DRG payments after readmission penalty
- \(\text{DRGP}_B\) = total base DRG payments before readmission penalty
- \(A\) = readmission penalty adjustment factor

The readmission penalty is limited by law not to exceed 1 percent in fiscal year 2013, 2 percent in fiscal year 2014, and 3 percent in 2015 and later years:

**Equation 2**

\[
A = \text{greater of } [R, \text{floor}]
\]

<table>
<thead>
<tr>
<th>Floor</th>
<th>2013</th>
<th>2014</th>
<th>2015 and after</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.99</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0.98</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0.97</td>
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</tr>
</tbody>
</table>

The preliminary readmission penalty ratio (before applying the annual limit) is 1 minus the ratio of two amounts:

**Equation 3**

\[
R = 1 - \frac{\sum_{i=1}^{c} \text{DRGP}_{Bi} \times n_i \times (X_i - 1)}{\sum_{j=1}^{k} \text{DRGP}_{Bj} \times n_j}
\]

where:

- \(R\) = penalty ratio (preliminary)
- \(c\) = number of conditions for which readmissions are assessed
- \(n_i\) = number of admissions for \(\text{DRG}_i\)
- \(k\) = total number of DRGs in hospital
- \(n_j\) = total number of admissions in \(\text{DRG}_j\), and
For cases in which the computed number of excess readmissions is positive, this is equivalent to:

**Equation 5a**

\[ P_i = DRGP_{Bi} \times n_i \times \left( \frac{n_{Pi}}{n_{Ei}} - 1 \right) \]

or

**Equation 5b**

\[ P_i = DRGP_{Bi} \times (n_{Pi} - n_{Ei}) \times \left( \frac{n_i}{n_{Ei}} \right) \]

The cost to the government of excess readmissions at a hospital for that DRG (including DRG payments only) would be the product of the average cost of a readmission stemming from initial admissions for that DRG and the number of excess readmissions stemming from that DRG.

If we further simplify by assuming that the cost of the average readmission equals the cost of the initial admission, then the cost of excess readmissions \((C_i)\), where excess is defined as in the regulation, becomes:

**Equation 6**

\[ C_i = DRGP_{Bi} \times (n_{Pi} - n_{Ei}) \]

That is the cost of a readmission (assumed equal to the cost of the initial admission) times the adjusted actual (CMS refers to this as predicted) number of readmissions \((n_{Pi})\) minus the expected number of readmissions \((n_{Ei})\).

Substituting the cost \((C_i)\) into Equation 5 for the term \(DRGP_{Bi} \times (n_{Pi} - n_{Ei})\), we have the following magnitude of a penalty (Equation 7).

**Equation 7**

\[ P_i = C_i \left( \frac{n_i}{n_{Ei}} \right) \]

In other words, the penalty will exceed the cost by a factor equal to the number of admissions in that DRG divided by the expected number of readmissions in that DRG. We refer to this multiplier as the “penalty multiplier.” If the readmission rate \((n_{Ei})\) were 20 percent, the penalty would be five times larger than the cost. If the national rate were 5 percent, the penalty would be 20 times higher than the cost of the shrunken estimate of excess readmissions in...
Now we model a 10 percent reduction in readmissions for all hospitals. We start with the existing penalty formula:

**Excess cost penalty multiplier**

\[
\frac{\text{Payment rate for initial DRG} \times (\text{adjusted number of excess readmissions})}{1/\text{national readmission rate for the condition}}
\]

If the national readmission rate improves by 10 percent at the hospital in question and nationally, the excess cost will decline by 10 percent, but the penalty multiplier will increase by 10 percent because the national readmission rate declined. The result is that the penalty does not change. An example is shown in Table 4-B1.

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<table>
<thead>
<tr>
<th>TABLE 4-B1 Example of why national reductions in hospital readmission rates do not affect average penalties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial case</strong></td>
</tr>
<tr>
<td>Admissions</td>
</tr>
<tr>
<td>Base payment per admission</td>
</tr>
<tr>
<td>Base payments</td>
</tr>
<tr>
<td>Expected readmission rate</td>
</tr>
<tr>
<td>Actual readmission rate</td>
</tr>
<tr>
<td>Penalty</td>
</tr>
<tr>
<td>Penalty as a share of base payments if all payments declined by 2% when readmission rates were reduced</td>
</tr>
</tbody>
</table>

that DRG. The difference between the penalty and the cost will increase as conditions with smaller readmission rates are included in the policy.

We have made a simplifying assumption that the cost of a readmission equals the cost of the initial admission. If the cost of the average readmission were less, then the penalty would be even more than the cost. This could be the case, for example, if the original DRG included an expensive implant. If the cost of the average readmission were more than the cost of the initial admission, then the penalty would exceed the cost by somewhat less—namely, the ratio of the cost of the admission’s DRG divided by the cost of the average readmission’s DRG. This is one more reason why the formula needs to be reevaluated.