

**Removal of v6.0 PSI Software Package from QualityIndicators.AHRQ.GOV  
Replacement v6.0.2 PSI Software Package - Forthcoming**

This announcement is for all users of the AHRQ Quality Indicators (QIs) that all 6.0 versions of the Patient Safety Indicator (PSI) Software Package were temporarily removed from the AHRQ website and will be replaced with a revised 6.02 version that addresses a number of issues identified. These issues are described below.

**Fixes to the PSI v6.0 ICD9CM Software**

**1. Correction to the 2013 Reference Population**

California records were inadvertently omitted from the reference population for select PSIs (PSI 10, PSI 11, PSI 13, and PSI 04) that rely on type of admission.

Including California records expands the reference population by about 15 percent, and modestly changes both the all-payer reference population rates and coefficient values in the risk adjustment models for the selected PSIs. Specifically, the all-payer reference population observed rate for PSI 04 increases by < 1 percent, PSI 10 increases by about 1 percent, PSI 11 decreases by about 2 percent, and PSI 13 increases by < 1 percent.

**2. Inclusion of Medicare Severity – Diagnosis Related Groups 237 & 238**

Effective October 1, 2015 (FY 2016), Medicare Severity Related Groups (MS-DRGs) 237 and 238 were removed by CMS, and records previously assigned to these MS-DRGs are now assigned to MS-DRGs 268-272. Accordingly, AHRQ removed MS-DRGs 237 and 238 from the SURGI2R format used to define surgical patients at risk for various PSIs. Although the removal of these coded elements was intended only for the ICD-10 software version for use with FY 2016 and later data, this modification was also unintentionally applied to the ICD-9 version 6.0 software.

As a result, users may notice decreases in denominator and numerator counts in ICD-9 version 6.0 (FY 2015 and prior), relative to previous software versions applied to the same data. This issue affects PSIs 03-13, PSI 15, PSI 16, and PSIs 21-26. To correct the premature removal of the MS-DRG codes, MS-DRGs 237 and 238 will be added back into the SURGI2R format in the ICD-9 version 6.03 PSI software release. Because these two MS-DRGs are associated with higher risk, this correction increases ICD-9-CM all-payer reference population observed rates by about 1 percent for PSI 03, about 3 percent overall for PSI 04, < 1 percent for PSI 06, about 1 percent for PSI 07, about 3 percent for PSI 09, about 6 percent for PSI 10, < 1 percent for PSI 12, about 1 percent for PSI 13, and about 2 percent for PSI 15.

**3. Reassignment of MDRGs 520 & 521**

In PSI software v6.02 and earlier versions, Modified – Diagnosis Related Group (MDRG) 520 (ACUTE MYOCARDIAL INFARCTION, DISCHARGED ALIVE) and MDRG 521 (ACUTE MYOCARDIAL INFARCTION (AMI), EXPIRED) were included in PSI risk-adjustment models as separate covariates. The original intent of these variables was to capture the risk attributable to a principal diagnosis of AMI. However, because MDRG 521 captures all AMI-related deaths and no

deaths occur among patients assigned to MDRG 520, outcome differences among patients with AMI were unintentionally introduced into the risk-adjustment models for PSI 03, PSI 06, and PSI 08. This issue will be corrected in the revised v6.03 release of the PSI software by combining MDRGs 520 and 521 into a revised MDRG 520 (ACUTE MYOCARDIAL INFARCTION). The impact of this correction is not detectable, in terms of the overall discrimination of the three affected risk-adjustment models.

#### **4. Modified – Diagnostic Related Group (MDRG) Typographical Fixes**

Typographical fixes related to MDRG coding were identified in the v6.0rev2 Patient Safety Indicators (PSI) ICD-9-CM software program that generates the variables that are used in risk-adjustment (Mak\_Regvars\_v60rev2\_160630.sas). Specifically:

- MDRG 109 (SPINAL DISORDERS & INJURIES) was not available for selection in risk adjustment models, so records in the associated MS-DRGs 052 and 053 were scored according to the risk of the parent MDC (01). Records with MDRG 109 appear in the denominators of PSI 03, PSI 06, PSI 07, and PSI 08, but the impact of this typographical fix is minimal (<0.03 percent difference in the number of denominator cases).
- The names of the MDRG 204 and 205 variables are reversed in the software, and labeling was affected in any reports of risk adjustment coefficients. This typographical fix had no effect on the risk adjustment models or expected values generated from risk-adjustment models.
- MDRG 1009 (INBORN AND OTHER DISORDERS OF METABOLISM) was not available for selection in risk-adjustment models, so records in the associated MS-DRG 642 were scored according to the risk of the parent MDC (10). Records with MDRG 1009 appear in the denominators of PSI 03, PSI 06, PSI 07, and PSI 08, but the impact of this typographical fix is minimal (<0.04 percent difference in the number of denominator cases).
- MDRGs 601 (STOMACH, ESOPHAGEAL & DUODENAL PROC) and 621 (OTHER DIGESTIVE SYSTEM DIAGNOSES) were incorrectly combined into the same category. The effect of this typographical fix is that the estimated coefficient for the combined MDRG 601/621 was applied to records with either MDRG 601 or MDRG 621. However, MDRG 601 applies to surgical patients, whereas MDRG 621 applies to medical patients, so it is rare for both MDRGs to apply to the same cohort of PSI-eligible patients. As a result, this fix only affected the risk-adjustment models for PSIs 07 and 08, and the effect was detectable only for PSI 07.

#### **Enhancements to PSI v6.0 ICD9CM Software**

##### **1. Expanded array to assign Major Diagnostic Category (MDC) groups**

Version 6.02 and prior versions of the AHRQ QIs applied user-supplied Major Diagnostic Categories (MDCs) to define the denominators for several PSIs and to create variables for risk-adjustment purposes (i.e., if a modified DRG category is not selected in a risk-adjustment model, then the model automatically “falls back” to use the parent MDC as a covariate instead). The PSI specifications and software assumed that hospitals used the official CMS Medicare Severity Diagnostic Related (MS-DRG) Grouper (formerly available from the National Technical Information Service, NTIS, <https://classic.ntis.gov/products/grouper/>) or a similar version that would produce identical results. However, it has come to AHRQ’s attention that different vendor

versions of the MS-DRG grouper produce slightly different results with respect to certain high-resource intensity MS-DRGs. Specifically, MS-DRGs 001-017 and 981-989 are classified as “pre-MDC” MS-DRGs, which means that they are associated with such high length of stay and/or cost that they supersede the usual assignment of MS-DRGs within body system or MDC categories. For records assigned to these MS-DRGs, some versions of the grouper software retain the MDC that would be assigned based on the principal diagnosis and procedure codes, whereas other versions of the grouper software overwrite the MDC assignment with a blank, missing, or non-numeric value such as “PRE.”

This issue affects the rates of several PSI and PDI indicators that rely on MDCs for exclusion or risk-adjustment purposes. For example, PSI 11 excludes patients admitted for cardiac surgery using MDC 05. However, patients assigned to a pre-MDC MS-DRG such as 003 (ECMO and/or Tracheostomy with Mechanical Ventilation 96+ hours) may be assigned an invalid MDC value and thus may not be excluded from PSI 11, because the grouper failed to correctly assign the patient to MCD 05. Other AHRQ QIs potentially affected by this issue include PSI 04, PSI 08, PDI 01, and PDI 09.

To address the variation in MDC classification of records by different vendors, the revised v6.0.2 PSI software assigns the MDC based on the official CMS’ MS-DRG Grouper. The impact of this enhancement varies depending on whether users retained MDC values consistent with CMS grouper software.

## **2. PSI 04 Risk-Adjustment Aligned with recent NQF re-endorsement (December 2016)**

PSI 04 is a risk-adjusted inpatient surgical mortality measure in which the denominator is limited to patients with certain complications that often arise in association with surgical care. Users have expressed concern that teaching hospitals are likely to have poor PSI 04 performance compared to non-teaching hospitals as a result of high-acuity transfers with severe complications present on admission, which may have worsened in-transit from the index hospital. These patients may be more likely to expire despite optimal care and evidence-based efforts to rescue the patient. Although transfer status was included in the version 6.02 risk-adjustment model for PSI 04, this variable may not adequately capture the marginal risk of death for patients who develop complications at another facility and are transferred to a referral center. This issue will be addressed in the revised v6.03 PSI software release by implementing recommendations that emerged from the National Quality Forum’s review and re-endorsement of PSI 04 in 2016.

Specifically, two important variables (coded yes or no) will be added to each of the five stratum-specific risk models: (1) an indicator of whether any of the PSI 04 triggering complications was present on admission, and (2) an indicator of whether any of the triggering complications was severe. These additions increase the discrimination (c statistic) of the risk-adjustment models from 0.7795 to 0.7987 for PSI 04A, from 0.7725 to 0.7847 for PSI 04B, from 0.7236 to 0.7775 for PSI 04C, from 0.7122 to 0.8151 for PSI 04D, and from 0.8605 to 0.8767 for PSI 04E. At the

hospital level, these additions improve the overall risk-adjusted PSI 04 rate of teaching hospitals, relative to non-teaching hospitals, by about 0.1 percent.

### **3. Software Cleanup**

Several other minor enhancements will be made in the revised v6.03 software release to streamline the SAS code and eliminate confusing output. These cleanup enhancements include:

- Adding an analysis of missing variables to standard output reports.
- Removing variables that are created but not used in the software, such as DNR, PALLIATIVE, and certain Q variables indicating that a numerator diagnosis was present on admission.
- Removing comments and output warnings that are no longer relevant.
- Adding a note that area-level PSIs are being retired in v7.0.
- Removing setname (format) statements in the ALL\_PSI\_FORMATS.sas program that are no longer used in the software
- Updating PSI 10 label to the correct title of the indicator