AHRQ and PSI Composite Reporting in QualityAdvisor™ Frequently Asked Questions (FAQs)

Updated December 13, 2024

What Patient Safety Indicator (PSI) analyses are available in QualityAdvisor™ today and what analyses are proposed for the future?

The following table describes each type of Patient Safety Indicator (PSI) analysis provided in QualityAdvisor. For each analysis, the following is provided: purpose, reporting timeperiod, AHRQ QI version, and corporate reporting notes.

Analysis Name and Purpose	Time Period	AHRQ QI Versions	Corporate Reporting Notes
PSI – Facility Identify potentially preventable complications and adverse events for all PSIs. **Patient Safety Indicators – Peer** Provide a side-by-side comparison for your facility and an aggregated peer group to identify potentially preventable complications and adverse events for all PSIs.	Flexible timeframe selections enable you to select timeframes that coordinate with your quality reporting initiatives or corporate fiscal year.	**Version 2024:** This is the latest AHRQ version. This is an all payer (HCUPs) risk-adjusted version based on ICD-10s. **COVID-19 discharges are included.** **Version 2023:** This is an all payer (HCUPs) risk-adjusted version based on ICD-10s. **COVID-19 discharges are included.** **Version 2022:** This version is retired.	Premier Population Statistics are static values based on the CMS Federal Fiscal Year. Updated statistics are included with the release of each new AHRQ version. V2023 is the first version that AHRQ has provided risk-adjustment for COVID patients and recommended their inclusion. Previous versions excluded COVID patients since risk-adjustment was not available by AHRQ.

Analysis Name and Purpose	Time Period	AHRQ QI Versions	Corporate Reporting Notes
PSI-90 – Total Inpatient – Flex Timeframe - Facility Measure and compare your PSI-90 Composite score for your total inpatient population.	Flexible timeframe selections enable you to select timeframes that coordinate with your quality reporting initiatives or corporate fiscal year.	**Version 2024:** This is the latest AHRQ version. This is an all payer (HCUPs) risk-adjusted version based on ICD-10s. **COVID-19 discharges are included.** **Version 2023:** This is an all payer (HCUPs) risk-adjusted version based on ICD-10s. **COVID-19 discharges are included.** **Version 2022:** This version is retired.	Premier Population Statistics for this version are static. V2023 is the first version that AHRQ has provided risk-adjustment for COVID patients and recommended their inclusion. Previous versions excluded COVID patients since risk-adjustment was not available by AHRQ.
PSI-90 for CMS HAC Reduction Program – Facility Measure and compare your CMS HAC Reduction Program PSI-90 Composite value with the program Performance Decile thresholds (FY17) or Winsorized z-score thresholds (FY18).	CMS defines the AHRQ QI version for each fiscal year. Select either the program year, or a custom timeframe that coordinates with your quality reporting initiatives or corporate fiscal year.	**Version 14-** based on ICD-10: Patient Safety and Adverse Events Composite (modified (PSI-90) based on program year 2025 (Jul 1, 2019 to Dec 31, 2019 and Jan 1, 2021 to Jun 30, 2021). This is the latest version available. **Version 13-** based on ICD-10: Patient Safety and Adverse Events Composite (modified (PSI-90) based on program year 2024 (Jul 1, 2020 to Jun 30, 2022). **Version 11** this version is retired.	Premier Population Statistics are static and align with each program year performance period. Reported values for the program year FY25 are recalibrated for FFS and finalized. Version 12 was not implemented by Premier due to CMS not making the software available. CMS announced in the most recent final rule that the HAC Reduction Program would not produce results for PSI-90 for the FY2023 reporting year. CMS did release public results in January 2023; however, this did not include reports specifically for FY2023 HAC Reduction Program.

What are the differences between each of the PSI-90 analyses?

The table below summarizes key differences between each of the PSI-90 analyses:

Parameter	PSI-90 Total Inpatient	PSI-90 for CMS HAC Reduction Program	PSI-90 for CMS VBP Fixed or Flex Timeframe
Program Year and/or AHRQ QI Version	AHRQ QI v2024 AHRQ QI v2023	FY25 AHRQ QI v14 for ICD10s FY24 AHRQ QI v13 for ICD10s	All PSI-90 for CMS VBP reporting options have been retired. VBP reporting options will return within QualityAdvisor when CMS reinstates the PSI-90 measure within the VBP program.
Purpose:	For quality reporting initiatives and corporate reporting. Analysis provides an all inpatient, all payer look at CMS HAC Measures using the HCUPs reference population.	For tracking and corporate reporting of the CMS HAC Reduction Program **Patient Safety and Adverse Events Composite (Modified PSI-90)** Composite score. This version includes Premier Winsorized z-scoring comparatives. The national comparison group is based on the finalized recalibrated FFS population.	
PSI Calculation Method/ Source:	AHRQ QI software (SAS option)	AHRQ QI software, AHRQ Modified PSI-90 Fact Sheet, and final rule specifications.	
# of diagnosis codes used for PSI:	First 35	First 25	
# of procedure codes used for PSI:	First 30	First 25	
E-code Used for	Yes. External cause codes are used in PSI calculations.	Yes. ICD-10 based External Cause codes are used for PSI calculations.	
Population Included:	All Inpatients	Medicare Fee-for-Service definition aligned with CMS HACRP	
Reference Population Source:	Built into AHRQ QI software – based on all inpatient reference population data.	Built into AHRQ QI software, based on Medicare FFS reference population data.	

Can I run PSI and IQI reports outside of the AHRQ supported coding timeframe for the selected version?

Yes, PSI and IQI reporting options within QualityAdvisor support flexible timeframes even though the software from AHRQ is based on coding through a specified timeframe. In alignment with the CMS fiscal year, the AHRQ supported timeframe is normally effective through September 30 of the same year when a new version is released. This essentially means that the software is intended for retrospective reporting. Premier provides flexible timeframe reporting in order to extend reporting capabilities during the gap which occurs at the end of the supported software timeframe and the following year's AHRQ software release. However, it is important to remember that once a new AHRQ version is released, individual patients may not match across versions. New AHRQ software versions typically include refreshed patient comparison group data, revised methodologies and updated coding. It is not feasible to calibrate risk-adjustment on future coding and patient discharges which haven't occurred yet. Any variability from one version to the next depends on the degree of AHRQ harm weight updates, coding and methodology changes contained within the newest version. Specific changes can be reviewed within the AHRQ software specifications, technical specifications and change log documents. Premier recommends using AHRQ reporting results beyond the software supported timeframe with caution.

What are the CMS parameters used to calculate CMS HAC Reduction Program PSI-90 values?

The table below summarizes the CMS parameters used to calculate CMS HACRP PSI-90 values:

Program Year/ Parameter	FY24	FY25
AHRQ QI version:	AHRQ QI v13 recalibrated for FFS (Modified PSI-90)	AHRQ QI v14 recalibrated for FFS (Modified PSI-90)
Timeframe:	1/1/2021 – 6/30/22	7/1/2021 – 6/30/23

*Note- FY23 AHRQ QI v12 was not implemented since CMS did not make that software publicly available

What is the Patient Safety and Adverse Events Composite (Modified PSI-90) and when did it take affect?

The IPPS final rule published in August 2017 included plans to discontinue previous PSI-90 report specifications. The PSI-90 domain was discontinued entirely for VBP FY19 will resume in a future program year. The Patient Safety and Adverse Events Composite (Modified PSI-90) has replaced the previous version. The Modified PSI-90 specifications underwent final endorsement at the NQF on December 10, 2015.

The Modified PSI-90 included the following changes:

- Decile comparisons were discontinued.
- New comparatives were included, based on Winsorized z-scoring method. CMS adopted this method because it creates a more level playing field and eliminates the situation in which hospitals with no adverse events and no score are eligible for a penalty.
- Measure weights were adjusted.
- 3 measures were added, 1 was removed, and others have undergone significant coding

changes.

- PSI 03 - Pressure Ulcer Rate
- PSI 06 - Iatrogenic Pneumothorax Rate
- RETIRED PSI 07 - Central Line Related Bloodstream Infection Rate
- REPURPOSED PSI 08 - In-Hospital Fall With Hip Fracture Rate
- NEW PSI 09 - Postoperative Hemorrhage or Hematoma Rate
- NEW PSI 10 - Postoperative Acute Kidney Injury Rate
- NEW PSI 11 - Postoperative Respiratory Failure Rate
- REPURPOSED PSI 12 - Perioperative Pulmonary Embolism (PE) or Deep Vein Thrombosis (DVT) Rate
- PSI 13 - Postoperative Sepsis Rate
- PSI 14 - Postoperative Wound Dehiscence Rate
- REPURPOSED PSI 15 - Abdominopelvic Accidental Puncture/Laceration Rate

Detailed Patient Safety Indicator and the PSI-90 Technical Specifications can be accessed on the AHRQ website with the following links:

- https://www.qualityindicators.ahrq.gov/Modules/psi_resources.aspx
- https://qualityindicators.ahrq.gov/Downloads/Modules/PSI/V2023/TechSpecs/PSI%2090%20Patient%20Safety%20and%20Adverse%20Events%20Composite.pdf

What is the Winsorized z-scoring method that is used with the Modified PSI-90 for HAC Reduction?

The FY 17 IPPS Proposed Rule switched from a linear regression model used in previous years to a Winsorized z-scoring method. This method uses a continuous measure score rather than grouping measure results into deciles. This method was introduced in the HAC Reduction Program FY18 program year. The FY18 Modified PSI-90 analysis includes the following two metrics:

- Premier Median and Premier 75th Percentile rate based on a similar Winsorized z- scoring method proposed by CMS.

$$\text{Z-Score} = \frac{\text{(Hospital's Measure Performance – Mean Performance for All Hospitals)}}{\text{Standard Deviation for All Hospitals}}$$

How do I maximize use of PSI-90 reports?

Use the PSI Composite analysis as a tool to analyze performance trends over time or track towards the Hospital-Acquired Conditions (HAC) Program. To view information about the patients included in each PSI, you can drill to numerator or denominator patients. For additional drilling capability, you may switch to analytical view and use the standard drill menu.

For example, you may want to drill to Attending Practitioner or Principal Procedure Surgeon for a patient who had a PSI. You may also drill to Standard Payer (i.e. Medicare) for each individual PSI, etc.

What are known differences between the QualityAdvisor PSI-90 Analyses and the CMS Hospital Specific Reports (HSRs) available from QualityNet for either the CMS VBP or HAC Reduction Program?

The PSI-90 Composite analysis in QualityAdvisor is to be used as a directional indicator to measure quality improvements over time. The CMS results cannot be replicated exactly by Premier nor any other organization, therefore the analysis should not be used as an exact calculation of your organization's CMS PSI-90 composite value. This measure is to be used in concert with other quality indicators in QualityAdvisor to identify improvement opportunities through effective benchmarking with peers and within a health system.

The following are the known differences that could occur:

1. Premier accepts data through a discharge and billing file and only data that pass validations are allowed to pass through to our database and the AHRQ software to calculate a PSI-90 composite. CMS uses a claims data set with unique validations and exclusions. This could cause discrepancies when comparing the QualityAdvisor PSI-90 value to CMS HSR Scores.
2. CMS only analyzes the first 25 non-E-code diagnosis codes and 25 procedure codes to calculate the PSI-90 composite score for HAC Reduction Program. Premier cannot validate if the facility's sequencing is different from what is sent to CMS through claims data, therefore this could cause discrepancies.

What is the impact to the PSI values when not all submitted Diagnosis codes and Procedure codes are used to calculate PSI rates?

The **PSI - 90 Total Inpatient analysis** uses the first submitted 35 diagnosis codes and first submitted 30 procedure codes. The **PSI - 90 for CMS HAC Reduction Program analysis** uses the first submitted 25 diagnosis codes and first submitted 25 procedure codes. This difference has two impacts. First, using more diagnoses and procedures will detect more PSI events, which may increase PSI rates.
Second, more exclusion codes will be detected, which may reduce PSI rates.

What is the source of the AHRQ Expected Rates included on the PSI-90 Analyses?

The AHRQ expected rates included within the PSI-composite grid, are based purely on the AHRQ SAS software. The rates are not Premier-specific. They are the rates a hospital would have if the hospital performed the same as the reference population given the hospital's actual case-mix (e.g., age, gender, DRG, and comorbidity categories). For the **PSI - 90 Total Inpatient analysis,** the reference population is based on the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID). The SID is a large database of hospital discharge data maintained by AHRQ. It contains data for all hospital discharges from 47 states, representing more than 97 percent of all U.S. hospital discharges. For the **PSI - 90 for CMS HAC Reduction Program analysis** the reference population is based on the CMS Medicare Fee-for-Service population.

Why is the PSI-90 composite value not on the Analytical View?

The ability to drill to the analytical view is available for the new PSI-90 Composite report. In this view, the composite score is not available since the Composite is not a sum and not available at a patient level. All drilling capability is still available but is based on the individual PSI rather than the composite.

Why isn't the PSI-90 composite score zero when a hospital has no patients in the numerator for any of the PSI indicators?

That is because of smoothing, which reduces the influence of the hospital's own performance in the final PSI-90 Composite Score. Smoothing is part of the standard AHRQ method for computing the PSI-90 Composite, and the Hospital-Acquired Conduction (HAC) Reduction programs. For each PSI indicator, a Reliability Weight is computed based on the hospital's data. It is lowered by having a small patient population at risk for that measure (denominator) and/or for having more variability in the hospital's data. Smoothing is intended to avoid unfairly penalizing (or rewarding) small hospitals; in the process it effectively substitutes an average performer (the Reference Population Rate) in place of a given PSI indicator when computing the final CompositeScore.

For a small hospital, the software will compute a relatively low reliability weight for each PSI component. To take an extreme example, a hospital that had zero patients in the denominator for all PSI components would have a PSI-90 Composite Score equal to the Reference Population Rate, regardless of how many patients were in the numerator of each measure. The smaller the hospital (even one with zero patients in the numerator for all measures), the closer they are pulled toward the Reference Population Rate.

CMS uses smoothed rates in the composite score for the HAC Reduction program. However, because of the K-factors they apply to adjust for the Medicare-only population, the Composite is pulled toward the national rate for the Medicare Fee-For-Service population (which is the Reference Population rate for both of these CMS programs).

Each PSI's Smoothed Rate is computed as follows:

Risk-adjusted rate * Reliability Weight + Reference Population Rate * (1 − Reliability Weight)

The PSI-90 Composite is computed as follows:

Sum of the NQF Weighted PSI Smoothed Rates

Therefore, as the Reliability Weight approaches zero for each PSI component, the Smoothed Rate approaches the Reference Population Rate. For the **PSI - 90 Total Inpatient analysis,** the reference population is based on the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID). For the **PSI - 90 for CMS HAC Reduction Program analysis** the reference population is based on the CMS Medicare Fee-for-Service population.

Why does the average level of the line plotted on the composite score graph not match the composite score shown at the top of the report?

This is another artifact of the smoothing process noted in the question above.

The report first computes the composite score for the whole date range selected by the user (usually many months), then it computes the composite score for each individual one-month period to plot on the graph. Because the population for each month is only a fraction of the

population for the entire time period of the report, and the reliability weight for each measure is directly related to population size, the effect of smoothing is more pronounced for the individual monthly scores. For the whole date range, smoothing pulls each monthly score toward the national risk-adjusted rate so this causes the average level of the line plotted on the composite score to be closer to the national risk-adjusted rate.

The composite graph shows how the hospital's score trended over time during the date range selected by the user. The smoothing process is useful here –when comparing multiple short time periods each with small patient population, smoothing reduces wild swings in your score caused by a small number of negative events. But the individual monthly scores are not directly comparable to the overall score computed for the full date range.

What educational materials/resources are available regarding PSI-90?

Release Notes:
The release notes are available under the HELP menu in QualityAdvisor.

Premier Education Network (PEN) eLearning Module:
The eLearning module has been updated in the Premier Education Network (PEN) located on the QualityAdvisor homepage: ***Training > QualityAdvisor Training > QualityAdvisor Basics > Module 10: Safety and Quality Opportunities > Safety and Quality Opportunities Overview Presentation.***