HAC Reduction Program Scoring Methodology Using Winsorized z-scores

CMS CENTERS FOR MEDICARE & MEDICAID SERVICES

STEP 1

WINSORIZATION:

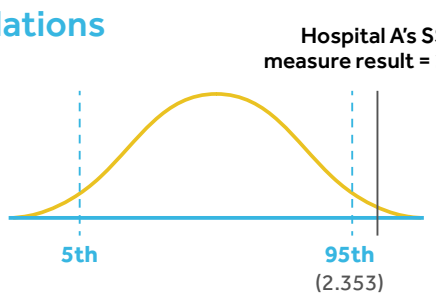
Truncating the measure distributions at the 5th and 95th percentiles to reduce the impact of outliers

a. Hospitals with a measure result between the minimum and the 5th percentile will receive the 5th percentile value for the measure.

b. Hospitals with a measure result between the 95th percentile and the maximum will receive the 95th percentile value for the measure.

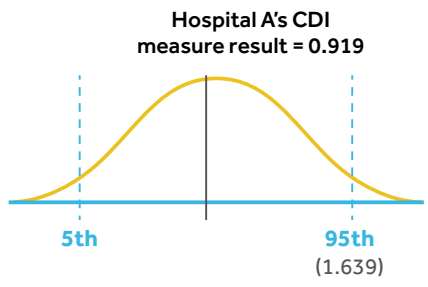
Winsorized measure result example calculations

Hospital A's SSI measure result of 2.795 is greater than the 95th percentile SSI measure result of 2.353; therefore, Hospital A's Winsorized SSI measure result will equal the 95th percentile value of 2.353.



Hospital A's Winsorized SSI measure result = 2.353

Hospital A's PSI 90 Composite, CLABSI, CAUTI, MRSA, and CDI measure results are between the 5th and 95th percentile values for those measures; therefore, Hospital A's Winsorized measure results will equal the hospital's measure results for these measures.



Hospital A's Winsorzied CDI measure result = 0.919

Hypothetical calculations for Hospital A using Winsorized z-score approach*

Table 1: Hospital A's measure results, Winsorized measure results, and Winsorized z-scores

Measure	Measure Result	5th Percentile**	95th Percentile**	Winzorized Measure Result	Mean**	Standard Deviation**	Winsorized z-score***
PSI 90	0.8485	0.6537	1.2977	0.8485	0.8885	0.1181	-0.339
CLABSI	0.922	0	1.375	0.922	1.048	0.164	-0.768
CAUTI	0.112	0	1.808	0.112	0.998	0.481	-1.842
SSI	2.795	0	2.353	2.353	0.965	0.714	1.944
MRSA	1.366	0	2.142	1.366	1.001	0.515	0.709
CDI	0.919	0	1.639	0.919	0.979	0.348	-0.172

*Hypothetical values for illustrative purposes that are not based on real data
**Calculated across eligible subsection (d) hospitals with a measure result for the given measure
***Hospitals that do not submit data and do not have a wavier will receive the maximum Winsorized z-score for that measure

STEP 2

MEASURE SCORES:

Calculate Winsorized z-scores based on Winsorized measure results

a. **Mean of Winsorized Measure Results Calculated Across Subsection (d) hospitals with a measure result ($\bar{X}$) =**

$$\frac{\sum_{i=1}^{n} X_i}{n}$$

where n includes all eligible subsection (d) hospitals with a measure result, and X_i is the Winsorized measure result of a specific eligible subsection (d) hospital with a measure result

b. **Standard Deviation of Winsorized Measure Results Calculated Across Subsection (d) hospitals with a measure result (SD(X)) =**

$$\sqrt{\frac{\sum_{i=1}^{n}(X_i-\bar{X})^2}{n-1}}$$

where n includes all eligible subsection (d) hospitals with a measure result, X_i is the Winsorized measure result of a specific subsection (d) hospital, and $\bar{X}$ is the mean of Winsorized measure results calculated across all eligible subsection (d) hospitals with a measure result

c. **Winsorized z-score for Hospital**

$$i = \frac{X_i-\bar{X}}{SD(x)}$$

where X_i is hospital i's Winsorized measure result, $\bar{X}$ is the mean Winsorized measure result calculated across all eligible subsection (d) hospitals with a measure result, and SD (x) is the standard deviation of Winsorized measure results calculated across all eligible subsection (d) hospitals with a measure result

Each individual measure result that is populated for a hospital will be calculated as a Winsorized z-score.

In place of performance deciles and points assigned (1-10) in previous years, hospitals will receive Winsorized z-scores

Winsorized z-score example calculations

Hospital A's Winsorized **PSI 90** z-score:

$$\frac{0.8485-0.8885}{0.1181} = \mathbf{-0.339}$$

Hospital A's Winsorized **CLABSI** z-score:

$$\frac{0.922 - 1.048}{0.164} = \mathbf{-0.768}$$

Hospital A's Winsorized **CAUTI** z-score:

$$\frac{0.112 - 0.998}{0.481} = \mathbf{-1.842}$$

Hospital A's Winsorized **SSI** z-score:

$$\frac{2.353 - 0.965}{0.714} = \mathbf{1.944}$$

Hospital A's Winsorized **MRSA** z-score:

$$\frac{1.366 - 1.001}{0.515} = \mathbf{0.709}$$

Hospital A's Winsorized **CDI** z-score:

$$\frac{0.919 - 0.979}{0.348} = \mathbf{-0.172}$$

STEP 3

DOMAIN SCORES:

The Domain 1 Score equals the Winsorized z-score for the PSI 90 Composite. The Domain 2 score equals the average of the Winsorized z-scores for the CLABSI, CAUTI, SSI, MRSA, and CDI.[1]

Domain 1 score and Domain 2 score example calculations

Hospital A's Domain 1 score equals its Winsorized PSI 90 z-score of **-0.339**

Hospital A's Domain 2 score equals the average of its Winsorized z-scores for CLABSI, CAUTI, SSI, MRSA, and CDI:

$$\frac{-0.768 + -1.842 + 1.944 + 0.709 + -0.172}{5} = \mathbf{-0.0260}$$

STEP 4

TOTAL HAC SCORE:

The Total HAC Score is calculated as the weighted average of the Domain 1 score (15 percent) and Domain 2 score (85 percent).[1]

[1] This step is the same as under the previous methodology

Total HAC Score example calculation

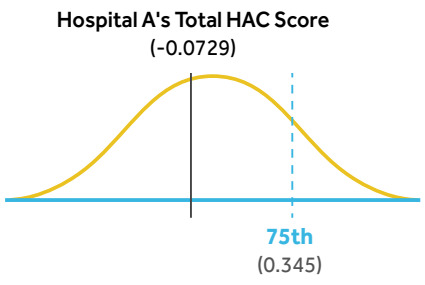
Hospital A's Total HAC Score equals the weighted average of its Domain 1 score and Domain 2 score:

$$(0.15*-0.339)+(0.85*-0.0260) = \mathbf{-0.0729}$$

STEP 5

DETERMINE WORST-PERFORMING QUARTILE STATUS:

Hospitals with a Total HAC Score above the 75th percentile will be in the worst-performing quartile



Hospital A falls below the 75th percentile, therefore it is not in the worst-performing quartile

Example Calculation of Hospital A's results using the Winsorized z-score approach