NHSN 2023 Dialysis BSI SIR Rebaseline Guide

April 2026

Purpose:

This document explains the NHSN Dialysis Event Bloodstream Infection (BSI) measure and the calculation of the new Standardized Infection Ratio (SIR), based on 2023 data, used to evaluate dialysis facility performance against national infection BSI rates.

Background:

What is an NHSN Dialysis Event Bloodstream Infection (BSI)? In healthcare practice, healthcare facilities use measures of infection rates to track and assess the quality of care. In dialysis healthcare, bloodstream infection (BSI) rates are monitored and compared to nationwide BSI rates. To measure BSI rates, NHSN defines a BSI as any positive blood culture, regardless of the suspected source of infection (e.g., the patient's vascular access, a wound or other source, like a UTI).

Outpatient dialysis facilities following the NHSN Dialysis Event Protocol are required to report all positive blood cultures , including specimens collected in other outpatient settings or collected on the day of or day after a hospital admission. These positive blood cultures are reported regardless of whether a true infection is suspected, or the infection is thought to be unrelated to hemodialysis.

What is the NHSN BSI measure? In the NHSN Dialysis Event Protocol the NHSN BSI measure is the standard for counting the number of positive blood cultures observed by a facility. Although other dialysis event types are reported to NHSN, the BSI measure only captures the number of positive blood cultures reported.

What is a standardized infection ratio (SIR)? The BSI standardized infection ratio (SIR) compares the number of observed BSIs to the number predicted based on national NHSN data, adjusting for risk factors. The predicted number of BSIs was derived from a multivariate regression model constructed from nationally aggregated data from a baseline period. A value above 1 indicates more infections than predicted and values below 1 indicate fewer infections than predicted. While the old SIR was based on 2014 data, the new SIR is based on 2023 data and an updated set of risk factors. The SIR summarizes data into a single number and adjusts for facility differences in risk factors, allowing for fairer and simpler comparisons of BSI rates across facilities and overtime.

Key Changes:

- The baseline data for the Dialysis BSI SIR was updated from 2014 to 2023.
- **2014 Baseline Prediction:** Predicted BSIs are estimated from the national pooled rate of BSIs by access type in the 2014 data.
- **2023 Baseline Prediction:** Predicted BSIs are computed using a negative binomial regression model and 2023 data incorporating multiple risk factors, including the patient's vascular access type, and the facility's location/hospital affiliation and the number of stations (an indicator of facility size).

What is the difference between the 2014 baseline and the 2023 baseline?

Considerations	2023 Baseline	2014 Baseline
National Comparison Used in the SIR	Compares a facility's observed BSI count to the number of predicted BSI (based on 2023 national data, adjusting for risk factors)	Compares a facility's observed BSI count to the number of predicted (based on 2014 national pooled BSI rates by access type)
Available time periods	Can be used to measure BSI incidence from 2023 and forward	Can be used to measure BSI incidence from 2014 and forward
Calculation Methods	The number of predicted BSIs is calculated using a negative binomial regression model that adjusts for the following risk factors: access type, clinic location (free-standing vs hospital affiliated), and number of stations (an indicator of facility size). Predicted BSI events are calculated for each access type by exponentiating the sum of the intercept and facility-specific linear predictors (from the regression model) and then multiplying the exponentiated sum by patient-months for that access type. Lastly, the predicted BSI for each access type is summed across the access types to get the total predicted BSI for the facility.	The number of predicted BSIs is calculated for each access type by multiplying the 2014 national aggregate BSI rate for each specific access type by the number of patient-months for that access type. Then, each predicted BSI is summed across the access types to get the total predicted BSI for the facility.

Calculating Predicted BSIs Using the 2023-Baseline Method:

The figure below shows the parameter estimates used in calculating new SIRs, followed by information from an example facility used to demonstrate the calculation of the new SIR.

Parameter	Category	Parameter Estimate
Intercept	-	-6.9888
Access Type	Fistula	REF
	Graft	0.6168
	CVC non-tunneled	0.9552
	CVC tunneled	1.8175
Location/Hospital Association	Freestanding (F)	REF
	Hospital affiliated (H and FH): includes both hospital-located and hospital-affiliated	0.8731
Number of in-center hemodialysis stations	1 – 21 stations	REF
	22 or more stations	0.0785

Example: Calculating predicted BSIs 2023-baseline method

Example data for a FREESTANDING facility with 26 stations.

Access Type	# Observed BSI*	Patient-Months
Fistula	2	591
Graft	0	163
CVC tunneled	4	242
CVC non-tunneled	0	0

*BSI = any positive blood culture regardless of source

Step 1: Calculate number of predicted BSI within each facility+access type row:

- Compute the formula for each access type row
- Sum the parameter estimates (values in the intercept, access type, location and number of stations columns/ cells) for each access type row
- Compute the exponent of that sum (negative binomial model is on the log scale) in each access type row
- Multiply the exponentiated sum by the number of patient months for each access type row (this result is the predicted number of BSI for each access type)

Step 1: Calculate number of predicted BSIs*

	Intercept	Access Type	Location/ Hosp-association	Stations	Sum of parameter estimates	Exp(Sum of parameter estimates)	Patient Months	# Predicted BSI
Fistula	-6.9888	0	0	0.0785	-6.9103	0.0010	591	**0.5910**
Graft	-6.9888	0.6168	0	0.0785	-6.2935	0.0018	163	**0.2934**
Tunneled	-6.9888	1.8175	0	0.0785	-5.0928	0.0061	242	**1.4762**
Non-Tunneled	-6.9888	0.9552	0	0.0785	-5.9551	0.0026	0	**0.0000**

*This example uses rounding and is for illustrative purposes only. The predicted events and SIRs may be minimally different based on this rounding

Step 2: Calculate the facility SIR:

- Sum number predicted and number observed across all access type rows
- Divide number observed by number predicted, and this is the facility SIR.

Step 2: Calculate facility SIR

Access Type	# Predicted BSI	# Observed BSI
Fistula	0.5910	2
Graft	0.2934	0
Tunneled	1.4762	4
Non-Tunneled	0.0000	0
TOTAL	**2.3606**	**6**

Observed BSI Events = 6

Predicted BSI Events = 2.3606

SIR = *Observed Events/Predicted Events*

SIR = *6 / 2.3606* = **2.542**

Time Period for SIR Data Analysis Using Different Baselines:

- The following diagram depicts the years of available data that can be analyzed under each national baseline in NHSN. The blue rectangles represent the years of BSI data in NHSN from participating dialysis facilities, and the arrows indicate the years of data that each baseline may be used with.

- As indicated in the diagram above, NHSN users can run analytic reports that use either 2014 or 2023 data. The 2014 baseline was created using national BSI incidence data from 2014.
- The new SIR, based on 2023 data, is a way to incorporate updated surveillance definitions, diagnostic testing practices and infection prevention methods when assessing BSI counts and allows facilities to compare their BSI incidence to more recent national data that reflect current practice.
- While the old SIR (based on 2014 data) can be used for 2014 data and beyond, the new 2023 SIR should be used with 2023 data and forward.

Careful Interpretation is Essential

- An SIR greater than 1 indicates the facility had more infections than predicted; an SIR equal to 1 means the number of BSI observed is equal to the number predicted, and an SIR less than 1 means there were fewer infections than predicted.
- SIRs must be interpreted in the context of the applicable baseline (2014 vs 2023) used for the calculation.
- SIRs under two different baselines should not be displayed together, visually, in a single graph or plot.
- SIRs calculated under either baseline should always be analyzed and assessed independently of one another.

More information about the 2023 SIR Rebaseline can be found on the NHSN Dialysis BSI Rebaseline page under "Education and Training".

- 2023 BSI Rebaseling FAQs
- Dialysis BSI Rebaseline SIR Training