Advanced National Healthcare Safety Network (NHSN) Dialysis Event Surveillance Reporting and Introduction to NHSN Reports

NHSN Dialysis Team

The findings and conclusions in this report/presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Last Modified 3/14/18

Outline

- **Case Studies**
- **Introduction to NHSN Analysis and Reports**
  - How to create reports in 3 steps
  - Quality Incentive Program (QIP) Report
  - Bloodstream Infection (BSI) Rates
  - BSI Standardized Infection Ratios (SIR)
- **Summary**

Training Objectives

1. Identify dialysis events and correctly apply the 21 day rule to case studies
2. List the three steps to create an NHSN report
3. List two report modifications
4. Describe the components of a rate
5. Interpret the "Line Listing - CMS ESRD QIP Rule" report to verify your facility has met minimum reporting requirements
6. Interpret the "Rate Table - Bloodstream Infection" (BSI) report and assess your facility's BSI rates against the national benchmarks
7. Interpret the SIR Table – Dialysis Event Bloodstream Infection (BSI) Report to track your facility's BSI SIR

Case Studies

Case 1: Sam

May 4	- Sam has a tunneled central line - He receives a prophylactic dose of **IV cefazolin** in the outpatient dialysis clinic before being admitted to the hospital for surgery to get a graft
May 6	Discharged from hospital, back to outpatient dialysis
June 11	- Sam has a fever of 101°F and reports chills - Blood cultures ordered and **IV vancomycin** is started
June 15	- Blood culture results are negative - Sam is afebrile & reports feeling better - Vancomycin is discontinued

Questions:
- What meets dialysis event reporting criteria?
- How many dialysis events should be reported?
  - Are the events related?
  - Does the 21 day rule apply?
- What are the event dates?

Case 1: Sam

May 4	o **Sam has a tunneled central line** o **He receives a prophylactic dose of IV cefazolin in the outpatient dialysis clinic before being admitted to the hospital for surgery to get a graft**
May 6	o **Discharged from hospital, back to outpatient dialysis**
June 11	o **Sam has a fever of 101°F and reports chills** o **Blood cultures ordered and IV vancomycin is started**
June 15	o **Blood culture results are negative** o **Sam is afebrile & reports feeling better** o **Vancomycin is discontinued**
Report:	**2 dialysis events: May 4 an IV antimicrobial start and June 11 an IV antimicrobial start**
Why?	**Report ALL IV antimicrobial starts, regardless of reason or duration of treatment. Report them separately because there are 21 or more days between them.**

Case 2: Alex

June 9	o While receiving maintenance hemodialysis, Alex complains of "not feeling well" o Physician orders blood cultures o IV vancomycin is started empirically
June 11	o One of four blood culture results are positive for coagulase-negative staphylococci o Alex feels better, physician discontinues vancomycin

Questions:

- What meets dialysis event criteria?
- How many dialysis events should be reported?
  - Are the events related?
  - Does the 21 day rule apply?
- What is the event date?

For positive blood cultures:
"What is the suspected source?"

Case 2: Alex

June 9	o While receiving maintenance hemodialysis, Alex complains of "not feeling well"
	o Physician orders blood cultures
	o IV vancomycin is started empirically
June 11	o One of four blood culture results are positive for coagulase-negative staphylococci
	o Alex feels better, physician discontinues vancomycin

| Report: | 1 dialysis event, date June 9, which includes a positive blood culture (suspected source is contamination) and an IV antimicrobial start. |
| Why? | Report ALL positive blood cultures collected as an outpatient. Report whether or not a true infection is suspected or whether the infection is thought to be related to hemodialysis. Report related events together. |

Case 3 - Bobbie

June 4	o Bobbie has redness and swelling at her graft, that is suspicious for infection o Oral antibiotic is prescribed
June 6	o Redness and swelling are still present o Bobbie experiences a drop in blood pressure o 4 blood samples are drawn o IV vancomycin is started
June 10	o Blood cultures positive for *Staphylococcus aureus*

Questions:

- **What meets dialysis event criteria?**
- **How many dialysis events should be reported?**
  - ➤ **Are the events related?**
  - ➤ **Does the 21 day rule apply?**
- **What is the event date?**

For positive blood cultures:
"What is the suspected source?"

Case 3 - Bobbie

June 4	○ **Bobbie has redness and swelling at her graft, that is suspicious for infection** ○ **Oral antibiotic is prescribed**
June 6	○ **Redness and swelling are still present** ○ **Bobbie experiences a drop in blood pressure** ○ **4 blood samples are drawn** ○ **IV vancomycin is started**
June 10	○ **Blood cultures positive for *Staphylococcus aureus***

Report:	**1 dialysis event, date June 4, which includes pus, redness, swelling; positive blood culture (suspected source is vascular access); and IV antimicrobial start.**
Why?	**Report related events together & use earliest event date.**

Case 3 - Bobbie

June 4	o Bobbie has redness and swelling at her graft, that is suspicious for infection ❌ **Oral antibiotic** is prescribed
June 6	o **Redness and swelling are still present** o **Bobbie experiences a drop in blood pressure** o **4 blood samples are drawn** o **IV vancomycin is started**
June 10	o **Blood cultures positive for *Staphylococcus aureus***

Do NOT Report: oral antibiotics.
- Only IV antimicrobial starts are reported for Dialysis Event surveillance.

Case Study or Protocol Questions?

Introduction to NHSN Analysis & Reports

NHSN Reports

- **NHSN includes reports that facilities and groups can run at any time to review their surveillance data**
  - These are standard reports that can be run as-they-are or modified to suit your needs
- **Different reports are available:**
  - NHSN can summarize what has been reported to date and calculate infection rates
  - Report type determines how data are displayed
  - Report types include: line listings, frequency tables, bar charts, pie charts, rate tables, run charts
- **Use reports to:**
  - Track infections
  - Inform prevention
  - Evaluate and improve practices
    - Evaluate specific infection prevention interventions
    - Identify other areas for quality improvement

Positive Blood Culture (PBC) Suspected Source and Dialysis Event Metrics

- **Four categories of suspected source of positive blood culture (defined in the protocol):**
  - Vascular access
  - A source other than the vascular access (e.g., a wound)
  - Contamination
  - Uncertain
- **Correct selection of suspected source impacts ARBSI, LASI, and VAI rates**
  - Bloodstream infection (BSI): Any positive blood culture
  - Access-related bloodstream infection (ARBSI): Positive blood culture with the suspected source reported as the vascular access or uncertain.
  - Local access site infection (LASI): Pus, redness, or swelling of the vascular access site and ARBSI is not present
  - Vascular access infection (VAI): Either an LASI or an ARBSI

Positive Blood Culture (PBC) Suspected Source and Dialysis Event Metrics

- **Four categories of susp_____ _____ _____ _____ defined in the protocol):**
  - Vascular acce____
  - A source other
  - Contamination
  - Uncertain

- **Correct selection of suspected _____ce impacts ARBSI, LASI, and VAI rates**
  - Bloodstream infection (BSI): Any positive blood culture
  - Access-related bloodstream infection (ARBSI): Positive blood culture with the suspected source reported as the vascular access or uncertain.
  - Local access site infection (LASI): Pus, redness, or swelling of the vascular access site and ARBSI is not present
  - Vascular access infection (VAI): Either an LASI or an ARBSI

> **Endorsed by the National Quality Forum (NQF) and is used for the Centers for Medicare and Medicaid Services (CMS) Quality Incentive Program (QIP)**

Create a Report in 3 Steps

Creating Reports in NHSN

- **NHSN includes reports that facilities and groups can run at any time to review their data**
    - Experiment with the Analysis function – You won't break anything!
    - NHSN does the work for you!

Step 1 - Generate New Data Sets

- **Data sets are the files NHSN uses to run reports**

- **Generating new data sets captures all of your facility's NHSN data so that reports are created using complete, up-to-date information**

- **Each user has their own analysis data sets**

- **They may take several minutes to generate, but you can work elsewhere in NHSN while you wait**

Step 1 - Generate New Data Sets

Step 2 – Select a Report

- **Once data sets are generated, select 'Reports' from the navigation bar**

- **Open "Dialysis Event" folder to find report templates**

Step 3 – 'Run' the Report

Simple Report Modifications

Modifying Reports - Optional

- **Two common modifications:**
  - Filter the data, so the report includes desired information only
  - Customize which variables are included and in what order

- **Click the 'Modify Report' button next to the template you would like to change**

Modify Screen (optional)

The modify screen can be described in three main sections:

1. Report formatting
2. Data filters
3. Variable display and organization

Variable Reference List

- **Data collected or calculated in NHSN are assigned variable names:**

Modify the Report – Filter Data

- **The second section allows you to specify which data are included in the report**

  - Filter by time period

  - Specify data filters

Modify the Report – Change Variable Display and Organization

- **Arrows move variables between 'Available Variables' and 'Selected Variables' columns**

- **Use 'Up' and 'Down' buttons to change the display order**

Modify Screen

- **When modifications are complete, click the 'Run' button to determine if report is as desired**

- **Click 'Save…' to save modified report for future use**
  - Must change the "Report Name" to save

- **Click 'Export…' to export modified dataset to use with other analysis software (e.g., Excel, SAS)**

- **Click 'Close' to close the Modify screen without running, saving or exporting reports.**
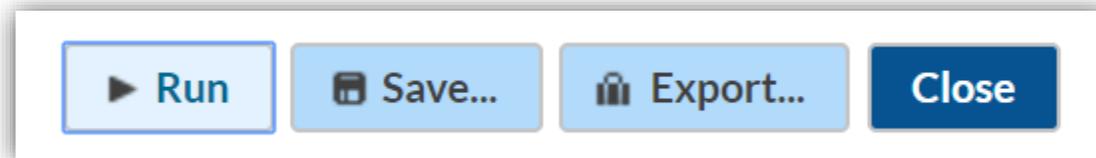
Creating Reports in NHSN

Experiment!

Create a report in 3 Steps:

1. Generate New Data Sets
2. Locate the report under "Reports"
   - Modifying is optional
3. "Run" the Report

Interpreting the Quality Incentive Program (QIP) Rule Report

Analysis

Line Listing - CMS ESRD QIP Rule

- **The Centers for Medicare and Medicaid Services (CMS) End-Stage Renal Disease (ESRD) Quality Incentive Program (QIP) NHSN Dialysis Event Reporting measure requires 12 months of complete and accurate NHSN reporting**

- **Use the "Line Listing – CMS ESRD QIP Rule" report before each quarterly reporting deadline to verify minimum reporting requirements are met for all three months**

Line Listing - CMS ESRD QIP Rule

Line Listing – CMS ESRD QIP Rule

Facility Org ID	CMS Certification Number	Facility Name	Location	Summary Year/Month	DE on Reporting Plan	Dialysis Event Numerator Reported	Dialysis Event Denominator Reported	Criteria Met this Month
10001	666666	Dialysis Test Facility 1	DF3096	2016M01	Y	Y	Y	Y
10001	666666	Dialysis Test Facility 1	DF3096	2016M02	Y	Y	Y	Y
10001	666666	Dialysis Test Facility 1	DF3096	2016M03	N	N	N	N
10001	666666	Dialysis Test Facility 1	DF3096	2016M04	N	N	N	N

Use the report before each quarterly CMS QIP NHSN reporting deadline to verify minimum reporting requirements are met for all three months

- Verify the column "Criteria Met this Month" = Y for each row

Line Listing – CMS ESRD QIP Rule

Facility Org ID	CMS Certification Number	Facility Name	Location	Summary Year/Month	DE on Reporting Plan	Dialysis Event Numerator Reported	Dialysis Event Denominator Reported	Criteria Met this Month
10001	666666	Dialysis Test Facility 1	DF3096	2016M01	Y	Y	Y	Y
10001	666666	Dialysis Test Facility 1	DF3096	2016M02	Y	Y	Y	Y
10001	666666	Dialysis Test Facility 1	DF3096	2016M03	N	N	N	N
10001	666666	Dialysis Test Facility 1	DF3096	2016M04	N	N	N	N

"DE on Reporting Plan" = Y if:
- **The "DE" checkbox is selected on that month's Reporting Plan**
  - **This indicates the data were collected according the Dialysis Event Protocol**

Line Listing – CMS ESRD QIP Rule

Facility Org ID	CMS Certification Number	Facility Name	Location	Summary Year/Month	DE on Reporting Plan	Dialysis Event Numerator Reported	Dialysis Event Denominator Reported	Criteria Met this Month
10001	666666	Dialysis Test Facility 1	DF3096	2016M01	Y	Y	Y	Y
10001	666666	Dialysis Test Facility 1	DF3096	2016M02	Y	Y	Y	Y
10001	666666	Dialysis Test Facility 1	DF3096	2016M03	N	N	N	N
10001	666666	Dialysis Test Facility 1	DF3096	2016M04	N	N	N	N

"Dialysis Event Numerator Reported" = Y if:
- **At least 1 dialysis event of each type was reported that month OR**
- **If no events occurred, confirm for that event type on that month's Denominators for Dialysis Event Surveillance form**

Line Listing – CMS ESRD QIP Rule

Facility Org ID	CMS Certification Number	Facility Name	Location	Summary Year/Month	DE on Reporting Plan	Dialysis Event Numerator Reported	Dialysis Event Denominator Reported	Criteria Met this Month
10001	666666	Dialysis Test Facility 1	DF3096	2016M01	Y	Y	Y	Y
10001	666666	Dialysis Test Facility 1	DF3096	2016M02	Y	Y	Y	Y
10001	666666	Dialysis Test Facility 1	DF3096	2016M03	N	N	N	N
10001	666666	Dialysis Test Facility 1	DF3096	2016M04	N	N	N	N

"Dialysis Event Denominator Reported" = Y if:
- **The Denominators for Dialysis Event Surveillance form was completed for the month**

Line Listing – CMS ESRD QIP Rule

Facility Org ID	CMS Certification Number	Facility Name	Location	Summary Year/Month	DE on Reporting Plan	Dialysis Event Numerator Reported	Dialysis Event Denominator Reported	Criteria Met this Month
10001	666666	Dialysis Test Facility 1	DF3096	2016M01	Y	Y	Y	Y
10001	666666	Dialysis Test Facility 1	DF3096	2016M02	Y	Y	Y	Y
10001	666666	Dialysis Test Facility 1	DF3096	2016M03	N	N	N	N
10001	666666	Dialysis Test Facility 1	DF3096	2016M04	N	N	N	N

Verify minimum NHSN reporting requirements are met, reflected by a "Y" (Yes) on each line in the "Criteria Met this Month" column.

- **For criteria to be met, all other Yes/No fields in the same row must be "Y"**
- **Also verify all months are accounted for in the table**
- **Check your facility's CCN is correct**

Line Listing – CMS ESRD QIP Rule
For Reference: Variable Names & Labels

Name	Variable Label
orgID	Facility Org ID
CCN	CMS Certification Number
name	Facility Name
location	Location
summaryYM	Summary Year/Month
de_plan	DE on Reporting Plan
de_numer	Dialysis Event Numerator Reported
de_denom	Dialysis Event Denominator Reported
criteria_met	Criteria Met this Month

Interpreting a BSI Rate Table

Analysis

Dialysis Event Rates

- Numerator = number of dialysis events

- Denominator = count of patients by vascular access type that is used to estimate the number of patient-months at risk for dialysis events

$$Rate = \frac{\text{Dialysis Events (numerator)}}{\text{Patient-Months (denominator)}} \times 100$$

- Both numerator and denominator must be correct to calculate valid rates

- Dialysis event rates are stratified by vascular access type and expressed per 100 patient-months

- Facilities are strongly encouraged to analyze their data and provide regular feedback to staff

Rate Table – Bloodstream Infection Data

Bloodstream Infection Rate Table

Access Type	Summary Yr/Qtr	Months	Number Bloodstream Infections	Patient-Months	Bloodstream Infection Rate/ 100 patient-months	NHSN Bloodstream Infection Pooled Mean Rate/100 patient-months	Incidence Density p-value	Incidence Density Percentile
All	2016Q1	3	2	211	0.95	0.64	0.5513	.
Fistula	2016Q1	3	0	97	0.00	0.26	0.7743	10
Graft	2016Q1	3	0	63	0.00	0.39	0.7802	10
Other Access	2016Q1	3	0	3	0.00	0.51	0.9849	.
Tunneled	2016Q1	3	1	45	2.22	2.17	0.8778	59
Nontunneled	2016Q1	3	1	3	33.33	2.05	0.0615	100
Any CVC	2016Q1	3	2	48	4.17	2.16	0.3661	82

Non-shaded (white) area includes the facility data.

Shaded (yellow) area includes aggregate data from all of NHSN. Use this information to compare each facility to the rest of NHSN.

Bloodstream Infection Rate Table

Access Type	Summary Yr/Qtr	Months	Number Bloodstream Infections	Patient-Months	Bloodstream Infection Rate/ 100 patient-months	NHSN Bloodstream Infection Pooled Mean Rate/100 patient-months	Incidence Density p-value	Incidence Density Percentile
All	2016Q1	3	2	211	0.95	0.64	0.5513	.
Fistula	2016Q1	3	0	97	0.00	0.26	0.7743	10
Graft	2016Q1	3	0	63	0.00	0.39	0.7802	10
Other Access	2016Q1	3	0	3	0.00	0.51	0.9849	.
Tunneled	2016Q1	3	1	45	2.22	2.17	0.8778	59
Nontunneled	2016Q1	3	1	3	33.33	2.05	0.0615	100
Any CVC	2016Q1	3	2	48	4.17	2.16	0.3661	82

Data are stratified by vascular access type

- "All" = Fistula + Graft + Other Access + Tunneled + Nontunneled
- "Any CVC" = Tunneled + Nontunneled

Bloodstream Infection Rate Table

Access Type	Summary Yr/Qtr	Months	Number Bloodstream Infections	Patient-Months	Bloodstream Infection Rate/ 100 patient-months	NHSN Bloodstream Infection Pooled Mean Rate/100 patient-months	Incidence Density p-value	Incidence Density Percentile
All	2016Q1	3	2	211	0.95	0.64	0.5513	.
Fistula	2016Q1	3	0	97	0.00	0.26	0.7743	10
Graft	2016Q1	3	0	63	0.00	0.39	0.7802	10
Other Access	2016Q1	3	0	3	0.00	0.51	0.9849	.
Tunneled	2016Q1	3	1	45	2.22	2.17	0.8778	59
Nontunneled	2016Q1	3	1	3	33.33	2.05	0.0615	100
Any CVC	2016Q1	3	2	48	4.17	2.16	0.3661	82

- **Timeframe (default is calendar quarters "Summary Yr/Qtr")**
- **"Months" is the number of complete months of data for that timeframe**

Bloodstream Infection Rate Table

Access Type	Summary Yr/Qtr	Months	Number Bloodstream Infections	Patient-Months	Bloodstream Infection Rate/ 100 patient-months	NHSN Bloodstream Infection Pooled Mean Rate/100 patient-months	Incidence Density p-value	Incidence Density Percentile
All	2016Q1	3	2	211	0.95	0.64	0.5513	.
Fistula	2016Q1	3	0	97	0.00	0.26	0.7743	10
Graft	2016Q1	3	0	63	0.00	0.39	0.7802	10
Other Access	2016Q1	3	0	3	0.00	0.51	0.9849	.
Tunneled	2016Q1	3	1	45	2.22	2.17	0.8778	59
Nontunneled	2016Q1	3	1	3	33.33	2.05	0.0615	100
Any CVC	2016Q1	3	2	48	4.17	2.16	0.3661	82

Numerator   **Denominator**   **Facility Rate**

Tunneled central line BSI rate $= \dfrac{1}{45} \times 100 = 2.22$ BSI/100 patient-months

Bloodstream Infection Rate Table

Access Type	...nt-...hs	Bloodstream Infection Rate/ 100 patient-months	NHSN Bloodstream Infection Pooled Mean Rate/100 patient-months	Incidence Density p-value	Incidence Density Percentile
All	211	0.95	0.64	0.5513	.
Fistula	97	0.00	0.26	0.7743	10
Graft	63	0.0...	...39	0.7802	10
Other Access	3	0.0...	...51	0.9849	.
Tunneled	45	2.22	2.17	0.8778	59
Nontunneled	3	33.33	2.05	0.0615	100
Any CVC	48	4.17	2.16	0.3661	82

Compare the NHSN pooled mean rate to the facility's rate.

Among patients with tunneled central lines, the facility BSI rate is higher than the NHSN pooled mean BSI rate (2.22 BSI per 100 patient-months versus 2.17 BSI per 100 patient-months)

This column shows the mean or average RATE (per 100 patient-months) for all dialysis facilities reporting to NHSN.

Bloodstream Infection Rate Table

Access Type	Summary Yr/Qtr	Months	Number Bloodstream Infections	Patient-Months	Bloodstream Infection Rate/ 100 patient-months	NHSN Bloodstream Infection Pooled Mean Rate/100 patient-months	Incidence Density p-value	Incidence Density Percentile
All	2016Q1	3	2	211	0.95	0.64	0.5513	.
Fistula	2016Q1	3	0	97	0.00	0.26	0.7743	10
Graft	2016Q1	3	0	63	0.00	0.39	0.7802	10
Other Access	2016Q1	3	0	3	0.00	0.51	0.9849	.
Tunneled	2016Q1	3	1	45	2.22	2.17	0.8778	59
Nontunneled	2016Q1	3	1	3	33.33	2.05	0.0615	100
Any CVC	2016Q1	3	2	48	4.17	2.16	0.3661	82

A p-value and percentile are provided to assist with interpretation of rate comparison.

A p-value < 0.05 indicates statistical significance

Comparing Rates Using Percentiles and p-values

- **The percentile indicates how a facility ranks for the event among all NHSN facilities**
  - The lower the percentile, the better the facility is ranked for that event

- **A p-value is a measure of statistical significance that indicates the probability that any difference between the facility's rate and NHSN's aggregate rate is due only to chance**
  - Typically, a p-value of <0.05 is considered a statistically significant difference between rates

Bloodstream Infection Rate Table

Access Type	Summary Yr/Qtr	Months	Number Bloodstream Infections	Patient-Months	Bloodstream Infection Rate/ 100 patient-months	NHSN Bloodstream Infection Pooled Mean Rate/100 patient-months	Incidence Density p-value	Incidence Density Percentile
All	2016Q1	3	2	211	0.95	0.64	0.5513	.
Fistula	2016Q1	3	0	97	0.00	0.26	0.7743	10
Graft	2016Q1	3	0	63	0.00	0.39	0.7802	10
Other Access	2016Q1	3	0	3	0.00	0.51	0.9849	.
Tunneled	2016Q1	3	1	45	2.22	2.17	0.8778	59
Nontunneled	2016Q1	3	1	3	33.33	2.05	0.0615	100
Any CVC	2016Q1	3	2	48	4.17	2.16	0.3661	82

Facility's rate is 2.22 and NHSN's rate is 2.17 – what can we conclude about the facility's tunneled central line BSI rate?

- The percentile (59) is medium
- The p-value (0.8778) is greater than 0.05, which is <u>not</u> statistically significant
  - i.e., facility's rate is not statistically different from the NHSN rate

- Conclusion: the facility's BSI rate for tunneled central lines is average

Rate Table Interpretation Examples

#	BSI Rate/100 patient-months	NHSN BSI Rate/100 patient-months	Incidence Density p-value	Incidence Density Percentile
A	0.00	2.17	0.0013	10
B	2.13	2.17	1.0000	57
C	20.00	2.17	0.0049	100

- **Example A: Facility rate is zero, NHSN rate is 2.17**
  - Percentile (10) is low
  - p-value is statistically significant (i.e., rates *are* statistically different)
  - Conclusion: facility has a lower than average BSI rate

- **Example B: Facility rate is 2.13, NHSN rate is 2.17**
  - Percentile (57) is medium
  - p-value is not statistically significant (i.e., rates are *not* statistically different)
  - Conclusion: facility has an average BSI rate

- **Example C: Facility rate is 20.00, NHSN rate is 2.17**
  - Percentile (100) is high
  - p-value is statistically significant (i.e., rates *are* statistically different)
  - Conclusion: facility has a higher than average BSI rate

Bloodstream Infection Rate Table
For Reference: Variable Names & Labels

Name	Variable Label
orgID	Facility Org ID
CCN	CMS Certification Number
state	State
location	Location
accessType	Access Type
summaryYQ	Summary Yr/Qtr
months	Months
pbcCount	Number Bloodstream Infections
numPats	Patient-months
PBCRate	Bloodstream Infection Rate/100 patient-months
PBC_Mean	NHSN Bloodstream Infection Pooled Mean Rate/100 patient-months
IDR_pval	Incidence Density p-value
IDR_pctl	Incidence Density Percentile

Importance of Data Quality and Quantity

- **Data quality:**
  - Low rates may indicate low event occurrence OR under-reporting

- **Data quantity:**
  - Rates may fluctuate over short periods of time
  - Assessing rates over greater time intervals can increase confidence in the values
  - Measures of significance, such as p-values, may not be helpful when looking at small quantities of data (e.g. small pool of patients, short time period)

All Dialysis Event Rate Tables are Interpreted Similarly

- **IV Antimicrobial Start**

- **IV Vancomycin Start**

- **Bloodstream Infection (BSI)**

- **Access Related Bloodstream Infection (ARBSI)**

- **Local Access Site Infection (LASI)**

- **Vascular Access Infection (VAI)**

SIR Table - Dialysis Event Bloodstream (BSI) Infection Report

Analysis

Dialysis Event Surveillance – BSI SIR

- **Standardized Infection Ratio (SIR)**
  - Risk-adjusted summary measure
  - Compares the observed number of infections to the predicted number of infections based on NHSN aggregate data

$$SIR = \frac{Observed\ \#\ BSI}{Predicted\ \#\ BSI}$$

$SIR > 1$: more infections than predicted
$SIR = 1$: same as predicted
$SIR < 1$: fewer infections than predicted

BSI SIR Report Available in NHSN

SIR Table – Dialysis Event Bloodstream Infection (BSI)

Facility Org ID	CMS Certification Number	Summary Yr	Months	In-Plan Patient Months	Events	Predicted BSI	SIR	95% Confidence Interval	Excess Infections
10856	111111	2014	12	519	5	4.2893	1.166	0.427, 2.584	0.711
10856	111111	2015	7	383	8	3.7512	2.133	0.990, 4.050	4.249
10856	111111	2016	8	680	20	6.0794	3.290	2.066, 4.991	13.921

- Use this report to monitor your facility's SIR

- Consider: running this report on or shortly before each Q4 CMS QIP deadline to view your SIR

SIR Table – Dialysis Event Bloodstream Infection (BSI)

Facility Org ID	CMS Certification Number	Summary Yr	Months	In-Plan Patient Months	Events	Predicted BSI	SIR	95% Confidence Interval	Excess Infections
10856	111111	2014	12	519	5	4.2893	1.166	0.427, 2.584	0.711
10856	111111	2015	7	383	8	3.7512	2.133	0.990, 4.050	4.249
10856	111111	2016	8	680	20	6.0794	3.290	2.066, 4.991	13.921

"Months":
- The number of months that had data for each timeframe of interest (e.g. number of months that had data per year)

SIR Table – Dialysis Event Bloodstream Infection (BSI)

Facility Org ID	CMS Certification Number	Summary Yr	Months	In-Plan Patient Months	Events	Predicted BSI	SIR	95% Confidence Interval	Excess Infections
10856	111111	2014	12	519	5	4.2893	1.166	0.427, 2.584	0.711
10856	111111	2015	7	383	8	3.7512	2.133	0.990, 4.050	4.249
10856	111111	2016	8	680	20	6.0794	3.290	2.066, 4.991	13.921

"In-Plan Patient Months":
- The summed number of patient-months (denominator) reported by your facility to NHSN during the timeframe of interest

SIR Table – Dialysis Event Bloodstream Infection (BSI)

Facility Org ID	CMS Certification Number	Summary Yr	Months	In-Plan Patient Months	Events	Predicted BSI	SIR	95% Confidence Interval	Excess Infections
10856	111111	2014	12	519	5	4.2893	1.166	0.427, 2.584	0.711
10856	111111	2015	7	383	8	3.7512	2.133	0.990, 4.050	4.249
10856	111111	2016	8	680	20	6.0794	3.290	2.066, 4.991	13.921

"Events":
- The number of bloodstream infections (i.e. positive blood cultures) your facility reported to NHSN during the timeframe of interest

SIR Table – Dialysis Event Bloodstream Infection (BSI)

Facility Org ID	CMS Certification Number	Summary Yr	Months	In-Plan Patient Months	Events	Predicted BSI	SIR	95% Confidence Interval	Excess Infections
10856	111111	2014	12	519	5	4.2893	1.166	0.427, 2.584	0.711
10856	111111	2015	7	383	8	3.7512	2.133	0.990, 4.050	4.249
10856	111111	2016	8	680	20	6.0794	3.290	2.066, 4.991	13.921

"Predicted BSI":
- The number of bloodstream infections predicted for your facility during the timeframe of interest
- This number is calculated using 2014 NHSN national aggregate BSI rate as the comparator

SIR Table – Dialysis Event Bloodstream Infection (BSI)

Facility Org ID	CMS Certification Number	Summary Yr	Months	In-Plan Patient Months	Events	Predicted BSI	SIR	95% Confidence Interval	Excess Infections
10856	111111	2014	12	519	5	4.2893	1.166	0.427, 2.584	0.711
10856	111111	2015	7	383	8	3.7512	2.133	0.990, 4.050	4.249
10856	111111	2016	8	680	20	6.0794	3.290	2.066, 4.991	13.921

"SIR":

Your facility's Standardized Infection Ratio (SIR) for the timeframe of interest

Recall that:

- SIR > 1: more infections than predicted
- SIR = 1: same number of infections as predicted
- SIR < 1: fewer infections than predicted

SIR Table – Dialysis Event Bloodstream Infection (BSI)

Facility Org ID	CMS Certification Number	Summary Yr	Months	In-Plan Patient Months	Events	Predicted BSI	SIR	95% Confidence Interval	Excess Infections
10856	111111	2014	12	519	5	4.2893	1.166	0.427, 2.584	0.711
10856	111111	2015	7	383	8	3.7512	2.133	0.990, 4.050	4.249
10856	111111	2016	8	680	20	6.0794	3.290	2.066, 4.991	13.921

"95% Confidence Interval":

- Provided to assist with interpretation of SIR
- If the confidence interval does not include 1, then the number of observed infections is significantly different than the number of predicted infections
- If the confidence interval does include 1, then the number of observed infections is not significantly different than the number of predicted infections

SIR Table – Dialysis Event Bloodstream Infection (BSI)

Facility Org ID	CMS Certification Number	Summary Yr	Months	In-Plan Patient Months	Events	Predicted BSI	SIR	95% Confidence Interval	Excess Infections
10856	111111	2014	12	519	5	4.2893	1.166	0.427, 2.584	0.711
10856	111111	2015	7	383	8	3.7512	2.133	0.990, 4.050	4.249
10856	111111	2016	8	680	20	6.0794	3.290	2.066, 4.991	13.921

Excess Infections = Observed # BSI – Predicted # BSI*

"Excess Infections":

Your facility's Excess Infections for the timeframe of interest

- Excess Infections > 0: more infections than predicted
- Excess Infections = 0: same as predicted
- Excess Infections < 0: fewer infections than predicted

Quick References for Reports

http://www.cdc.gov/nhsn/dialysis/event/index.html

Summary

Summary – Reporting Dialysis Events

- **Implement a process to identify dialysis events and refer to the protocol often**

- **When reporting dialysis events, consider:**
  - How many events should be reported?
  - If > one event of same type, does the 21 day rule apply?
  - If > one event of different type, should they be reported together?
  - If a positive blood culture, what is the suspected source?

- **Contact the NHSN Helpdesk if you have reporting questions (nhsn@cdc.gov), we are here to help!**

Summary – Running Reports
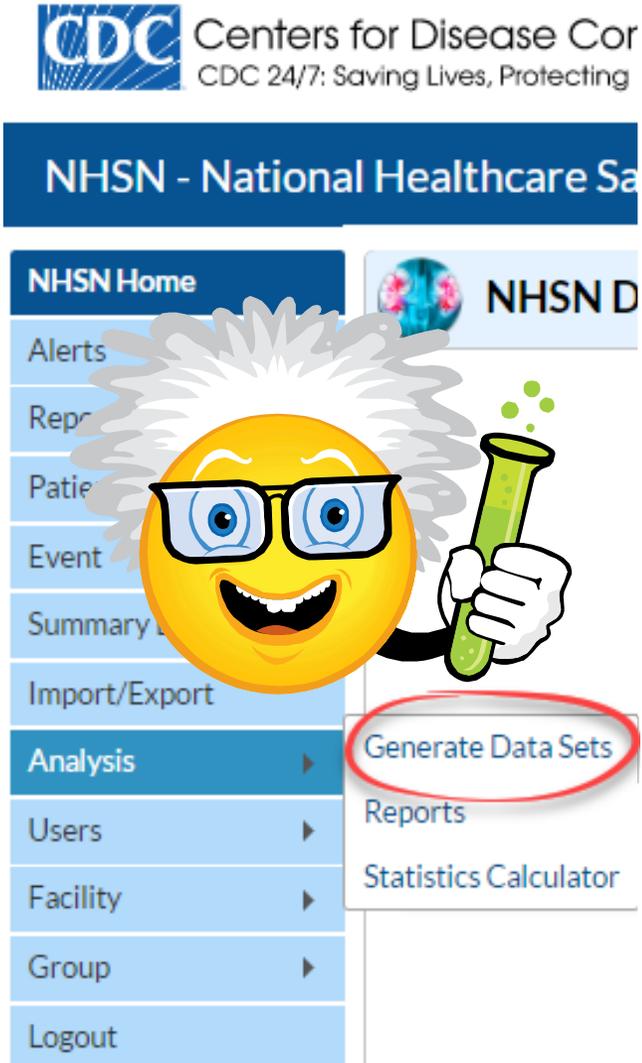
- **You can run at any time to review your data – experiment!**

- **Create a report in 3 Steps:**
  1. Generate new data sets
  2. Locate the report under "Reports"
  3. "Run" the report

- **Modifying the report is optional, you can:**
  - Filter the data, so the report includes desired information only
  - Customize which variables are included and in what order they are displayed
  - Use the variable reference list

Summary – QIP, BSI Rate, and BSI SIR Reports

- **Use the "CMS ESRD QIP Rule" report before each quarterly deadline to verify minimum reporting requirements are met**
  - Verify "Criteria Met this Month" = Y for each month/row
- **Rates are calculated by dividing the number of events by the number of patient-months and multiplying the result by 100**
  - All data must be correct to calculate valid rates
- **You can compare your facility's rates to national benchmarks for all dialysis event metrics**
  - The lower the percentile, the better the facility is ranked for that event
  - A p-value <0.05 indicates rates are statistically significantly different
- **Run the SIR Table – Dialysis Event Bloodstream Infection (BSI) report to view your facility's SIR**

Thank you!

Questions about NHSN or SIRs? NHSN Helpdesk: nhsn@cdc.gov

Questions about QIP or scoring? QIP Helpdesk: ESRDQIP@cms.hhs.gov

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348   www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.