NHSN Dialysis Event Surveillance: Improving and Using Data for Infection Monitoring

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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.
Outline

- Review common causes of poor data quality and how to avoid them

- Review monthly Dialysis Event Surveillance reporting criteria
  - How to apply the protocol to various reporting examples
  - Emphasis on most challenging areas

- Introduction to NHSN analysis and reports

- How to interpret NHSN rate tables to assess facility infection prevention performance
CAUSES OF COMMON DIALYSIS EVENT DATA ERRORS & STRATEGIES TO AVOID THEM
Common Causes of Poor Dialysis Event Surveillance Data Quality

- Person collecting, reporting and/or reviewing data is not familiar with or misunderstands the Dialysis Event Protocol
- Problems with data collection processes
- Lack of data quality checks
Strategies to Prevent Reporting Errors

- Acquire knowledge and understanding of the Protocol
- Implement data collection processes to capture necessary surveillance data
- Review reported data for completeness and accuracy
DIALYSIS EVENT PROTOCOL
Strategies to Prevent Reporting Errors

✓ Acquire knowledge and understanding of the Protocol

✓ Implement data collection processes to capture necessary surveillance data

✓ Review reported data for completeness and accuracy
**Training**

- All staff involved in data collection or reporting should complete training annually and as needed.

- **Required reading: Dialysis Event Protocol**
  - Includes surveillance definitions and reporting Instructions: [http://www.cdc.gov/nhsn/dialysis/dialysis-event.html](http://www.cdc.gov/nhsn/dialysis/dialysis-event.html)

- **Self-paced, online instruction: Dialysis Event Surveillance Training**
Required Reading: Dialysis Event Protocol

- The Dialysis Event Protocol is a document that provides instructions for reporting in NHSN.

- All users must read the Dialysis Event Protocol to become familiar with instructions, definitions and procedures.

Training

- New! Self-paced, online instruction: Dialysis Event Surveillance Training
  - Includes knowledge checks and ends with a multiple-choice test

Free Continuing Education Credit!
- 1.3 CNE (nurses)
- 1.5 CME (physicians)
- 0.1 CEU (other)
Protocol Terminology and Components of a Rate

- **Numerator** = number of dialysis events
  - Information from “Dialysis Event” form

- **Denominator** = count of patients by vascular access type used to estimated number of patient-months considered at risk for dialysis events
  - Information from “Denominators for Outpatient Dialysis” form

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

- Both numerator and denominator data must be correct to calculate valid rates
DE PROTOCOL: DENOMINATORS
Protocol: Report Denominator Data Monthly

- Each month, report the number of hemodialysis outpatients by vascular access type who received hemodialysis at the center during the first two working days of the month.
  - Report all hemodialysis outpatients, including transient patients.
  - Exclude non-hemodialysis patients and exclude inpatients.

- Count each patient only once by vascular access type; if the patient has multiple vascular accesses, report only the vascular access with the highest risk of infection.
  - This may not be the vascular access currently in use for dialysis.

<table>
<thead>
<tr>
<th>Higher Risk</th>
<th>Nontunneled Central Line</th>
<th>Tunneled Central Line</th>
<th>Other Access Device</th>
<th>AV Graft</th>
<th>AV Fistula</th>
<th>Lower Risk</th>
</tr>
</thead>
</table>


“Working Days”

- Working days are days hemodialysis treatment occurs at the facility.

- The first two “working days” of the month should provide the opportunity to capture all regularly scheduled hemodialysis shifts and patients.

- Remember to count each patient only once!
## Working Day Examples

- A facility dialyzes patients 6 days a week, Mon-Sat. If the 1st day of the month is a Sunday, then Mon/Tues are the 1st two “working days” of the month.

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<td>1</td>
<td>Closed</td>
<td>Working Day 1</td>
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<td>Working Day 2</td>
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<td>Count each patient only once.</td>
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- A facility dialyzes patients Mon/Wed/Sat, and a nocturnal only shift on Sunday. If the 1st day of the month is a Sunday, then Mon/Wed are the 1st two “working days” of the month.

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  - This may not be the vascular access currently in use for dialysis.

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Refer to Protocol for Vascular Access Definitions

- **Nontunneled central line**: a central venous catheter that travels directly from the skin entry site to a vein and terminates close to the heart or one of the great vessels, typically intended for short term use.

- **Tunneled central line**: a central venous catheter that travels a distance under the skin from the point of insertion before entering a vein, and terminates at or close to the heart or one of the great vessels.
  - E.g., Hickman® or Broviac® catheters*

- **Graft**: a surgically created connection between an artery and a vein using implanted material (typically synthetic tubing) to provide a permanent vascular access for hemodialysis.

- **Fistula**: a surgically created direct connection between an artery and a vein to provide vascular access for hemodialysis.

- **Other access device**: includes catheter-graft hybrid access devices (e.g., HeRO® vascular access device*), ports, and any other vascular access devices that do not meet the above definitions.

*Use of trade names and commercial sources is for identification only and does not imply endorsement.
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Consider all vascular accesses present, even if they are not used for dialysis, and even if they are abandoned/non-functional.
Denominator Data Collection Example

Hemodialysis Outpatients

<table>
<thead>
<tr>
<th>Vascular Access</th>
<th>Abbreviation</th>
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</thead>
<tbody>
<tr>
<td>Fistula</td>
<td>(F)</td>
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<tr>
<td>Graft</td>
<td>(G)</td>
</tr>
<tr>
<td>Tunneled CL</td>
<td>(TCL)</td>
</tr>
<tr>
<td>Nontunneled CL</td>
<td>(NTCL)</td>
</tr>
<tr>
<td>Other Access Device</td>
<td>(O)</td>
</tr>
</tbody>
</table>

Transient Patient

1 F
2 TCL
3 F
4 G
5 NTCL
6 G
7 O

Fistula (F)
Graft (G)
Tunneled CL (TCL)
Nontunneled CL (NTCL)
Other Access Device (O)
For the Denominator form, exclude patients who are not physically present for outpatient hemodialysis treatment on the first two working days of the month (such as hospitalized patients).
Denominator Data Collection Example

For the Denominator form, count each patient only once.

Among patients with more than 1 vascular access, identify their highest infection risk access.

HIGHER RISK
- Nontunneled central lines
- Tunneled central line
- Other access devices
- Arteriovenous grafts
- Arteriovenous fistulas

LOWER RISK

Hemodialysis Outpatients

1 F
2 TCL
3 F
4 G
5 NTCL
6 G
7 T

TCL
O
G
NTCL
### Denominator Data Collection Example

#### Hemodialysis Outpatients

<table>
<thead>
<tr>
<th>Vascular Access</th>
<th>#</th>
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</thead>
<tbody>
<tr>
<td>Fistula (F)</td>
<td>1</td>
</tr>
<tr>
<td>Graft (G)</td>
<td>2</td>
</tr>
<tr>
<td>Tunneled CL (TCL)</td>
<td>2</td>
</tr>
<tr>
<td>Nontunneled CL (NTCL)</td>
<td>1</td>
</tr>
<tr>
<td>Other Access Device (O)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7</strong></td>
</tr>
</tbody>
</table>
Denominator Data Summary

- Each month, report the number of hemodialysis outpatients who received in-center hemodialysis during the first two working days of the month.
  - The first two days of the month that the facility provides hemodialysis treatment and are days that include all regular shifts
- Count each patient only once
- If the patient has multiple vascular accesses, report the vascular access with the highest risk of infection.
  - This may not be the vascular access currently in use for dialysis.

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DE PROTOCOL: NUMERATORS
Protocol: Report Numerator (Event) Data

- Throughout the month, monitor all outpatients who undergo hemodialysis at your facility for dialysis events.
  - Even if they were not counted on the denominator form.
  - Include transient patients who have an event at your facility.

- Report a dialysis event for any of the following:
  - IV antimicrobial start
  - Positive blood culture
  - Pus, redness or increased swelling at the vascular access site

- On the event form under Risk Factors, report all of the patient’s vascular accesses, regardless of whether they are in use for hemodialysis, abandoned/non-functional.
Protocol: Report Numerator Data
Dialysis Event Types

- **IV antimicrobial start**: Report all starts of intravenous antibiotics or antifungals administered in an outpatient setting.
  - A “start” is defined as a single outpatient dose or first outpatient dose of a course.
  - Report regardless of the reason for administration or duration of treatment.

- **Positive blood culture**: Report all positive blood cultures from specimens collected as an outpatient or collected on the day of or the day following hospital admission.
  - Report regardless of whether the infection is thought to be related to hemodialysis or whether or not a true infection is suspected.

- **Pus, redness, or increased swelling at the VA site**: Report each new outpatient episode where the patient has pus, >expected redness, and/or >expected swelling at any vascular access site.
  - Report regardless of whether the patient receives treatment for infection.
  - Always report pus.
  - Report redness or swelling if greater than expected and suspicious for infection.
Protocol: Report Numerator Data

Dialysis Event Types

- **IV antimicrobial start**: Report all starts of intravenous antibiotics or antifungals administered in an outpatient setting.
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  - Report regardless of whether the patient receives treatment for infection.
  - Always report pus.
  - Report redness or swelling if greater than expected and suspicious for infection.
Reportable Positive Blood Cultures

- **Report all positive blood cultures (PBC)**
  - Collected as an outpatient
  - Collected within 1 calendar day after a hospital admission

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**Chart Description:**

- **Days 1-3:** 
  - Collected as an outpatient.
  - Days of admission.

- **Days 4-6:** 
  - 1 calendar day after admission.
  - PBC should be reported.

- **Days 7-13:** 
  - Discharged outpatient.
  - Do NOT report PBC if specimen was collected during this time.

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**Legend:**

- REPORT PBC if specimen was collected during this time.
- Do NOT report PBC if specimen was collected during this time.
Protocol: Report Numerator Data
Dialysis Event Types

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**Protocol: Report Numerator Data**

- **21 Day Rule**: 21 or more days must pass between two dialysis events of the *same* type for the second occurrence to be reported as a separate (new) dialysis event.

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Date of Event</th>
<th>21 Day Rule</th>
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</thead>
<tbody>
<tr>
<td>IV Antimicrobial Start</td>
<td>Date of first outpatient dose of an antimicrobial course</td>
<td>Days from the <strong>end</strong> of one IV antimicrobial course to the <strong>beginning</strong> of a second IV antimicrobial start (even if antimicrobials differ)</td>
</tr>
<tr>
<td>Positive Blood Culture</td>
<td>Date of specimen collection</td>
<td>Days between specimen collection dates (even if microorganisms differ)</td>
</tr>
<tr>
<td>Pus, Redness, or Swelling at VA Site</td>
<td>Date of onset</td>
<td>Days from first <strong>onset</strong> to second <strong>onset</strong></td>
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<tr>
<td>Combination of the above events</td>
<td>Earliest date of the 3 event types</td>
<td>Individual 21 day rules still apply</td>
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21 Day Rule Applies Across Calendar Months

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<td>Positive Blood Culture</td>
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Positive Blood Culture
21 Day Rule: IV Antimicrobial Starts

- There must be 21 or more days from the end of the first outpatient IV antimicrobial course to the beginning of a second outpatient IV antimicrobial start for two starts to be reported separately.
  - Even if different antimicrobials are used.
  - If IV antimicrobials are stopped and then restarted within 21 days, the second start is NOT considered a new dialysis event and is not reported.

- For outpatient IV antimicrobial starts that are continuations of inpatient treatment, consider the start day to be the first day of outpatient administration.
IV Antimicrobial Starts on the 21\textsuperscript{st} Day

21 Day Rule: IV Antimicrobial Starts (continued)

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<td>IV Antimicrobial Start</td>
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Report new IV antimicrobial starts that occur on or after 21 days without antimicrobials have passed.
IV Antimicrobial Administrations Longer than 21 Days

21 Day Rule: IV Antimicrobial Starts (continued)

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<td>Final Dose</td>
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</table>

Do NOT report a new IV antimicrobial start, unless 21 days **without** antimicrobials have passed.
IV Antimicrobial Start Continuations

21 Day Rule: IV Antimicrobial Starts (continued)

- Report all occurrences where IV antibiotics or antifungals are administered in an outpatient setting, regardless of the reason and duration of treatment.
- Report outpatient starts that are continuations of inpatient treatment.

![Table]

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<tbody>
<tr>
<td>H</td>
<td>INPATIENT IV Antimicrobial Start</td>
<td>Continuing Inpatient Dose</td>
<td>Continuing Inpatient Dose</td>
<td>DISCHARGED</td>
<td>Continuing Inpatient Dose</td>
<td>OUTPATIENT IV Antimicrobial Start</td>
</tr>
</tbody>
</table>

Although IV antimicrobial treatment was started in the hospital, report the **OUTPATIENT** IV antimicrobial start that is a continuation of the inpatient treatment.
21 Day Rule: Positive Blood Cultures

- There must be 21 or more days between positive blood cultures for each positive blood culture to be considered a separate dialysis event, even if organisms are different.
  - Positive blood cultures are attributed to the date the blood specimen(s) were collected.
  - If positive blood cultures occur less than 21 days apart, the second positive blood culture(s) is NOT considered a new dialysis event and therefore, is not reported.
  - If different organisms grow from these subsequent positive blood cultures, add the new organisms to the initial report.
21 Day Rule: Positive Blood Cultures with Multiple Microorganisms

- If different microorganisms grow from subsequent positive blood cultures, add the new organism(s) to the initial report.

<table>
<thead>
<tr>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>1</td>
<td>2</td>
<td>Positive Blood Culture</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Blood</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Enterococcus faecalis**
- **Enterococcus faecalis**
- **Staphylococcus epidermidis**
21 Day Rule: Pus, Redness, Increased Swelling

- There must be 21 or more days between the onset of a first episode and the onset of a second episode of pus, redness, or increased swelling at a vascular access site for the two episodes to be considered separate dialysis events.
  - If an episode of pus, redness, or increased swelling at a vascular access site resolves and then recurs at the same site within 21 days of the first onset, the recurrence is NOT considered a new dialysis event and therefore, is not reported.
Pus, Redness, or Increased Swelling at the Vascular Access Site 21 Day Rule Example

<table>
<thead>
<tr>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset of redness</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Redness continues</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Onset of pus; redness continues</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>Symptoms resolve</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Onset of redness</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
</tr>
</tbody>
</table>

Report the new onset of redness because the 21 days are counted from onset to onset.
“Report No Events”

- Each dialysis event type needs to be accounted for every month.

- Either the event type is reported on one or more Dialysis Event forms or the “report no events” box for that event type must be checked on the Denominators for Outpatient Dialysis form to confirm no events (i.e., zero) of that type occurred during the month.

- If you “report no events,” that numerator = 0.
Report No Events:

- No IV antimicrobial start events:
- No positive blood culture events:
- No pus, redness, or increased swelling at vascular access site events:
Numerator (Event) Data Summary

- Report a dialysis event for any of the following:
  - IV antimicrobial start
  - Positive blood culture
  - Pus, redness or increased swelling at the vascular access site

- Apply the 21 day rule across calendar months
  - 21 or more days must pass between two dialysis events of the same type for the second occurrence to be reported as a separate (new) dialysis event

- Account for each event type each month:
  - If there no events occurred, “report no events” for that event type on that month’s denominator form
IMPLEMENT PROSPECTIVE DATA COLLECTION PROCESSES AND VERIFY THEY ARE COMPLETE
Strategies to Prevent Reporting Errors

- Acquire knowledge and understanding of the Protocol
- Implement data collection processes to capture necessary surveillance data
- Review reported data for completeness and accuracy
Denominator Data Collection Process

- Each month, report the number of hemodialysis outpatients by vascular access type who received hemodialysis at the center during the first two working days of the month.
  - Report all hemodialysis outpatients, including transient patients.
  - Exclude non-hemodialysis patients and exclude inpatients.

- Count each patient only by vascular access type; if the patient has multiple vascular accesses, report only the one with the highest risk of infection. This may not be the vascular access currently in use for dialysis.

Does your facility's denominator data collection process:
1. Correctly identify the first two working days of the month? and collect data for those days only?
2. Include transient patients?
3. Exclude patients who did not receive hemodialysis treatment?
Denominator Data Collection Process

Does your facility's denominator data collection process:

1. Count each patient only once?
2. Collect all of a patient’s vascular accesses, even those not currently in use or not in use for dialysis?
3. Report that patient by their highest infection risk access?

- Report all hemodialysis outpatients, including transient patients.
- Exclude non-hemodialysis patients and exclude inpatients.

- Count each patient only once by vascular access type; if the patient has multiple vascular accesses, report only the one with the highest risk of infection
  - This may not be the vascular access currently in use for dialysis.
All Numerator Data Collection Processes

- Throughout the month, monitor all outpatients who undergo hemodialysis at your facility for dialysis events
  - Even if they were not counted on the denominator form.
  - Include transient patients who have an event at your facility.

- On the event form under Risk Factors, report all of the patient’s vascular accesses, regardless of whether they are in use for hemodialysis

Do your facility’s event data collection processes:
1. Capture events for transient patients?
2. Include all of a patient’s vascular accesses?
Numerator Data Collection Process: IV Antimicrobial Starts

- IV antimicrobial start: Report all starts of intravenous antibiotics or antifungals administered in an outpatient setting.
  - A “start” is defined as a single outpatient dose or first outpatient dose of a course.
  - Report regardless of the reason for administration or duration of treatment.

Does your facility's IV antimicrobial start data collection process:
1. Capture all outpatient administrations?
2. Capture single doses?
3. Capture administrations not related to hemodialysis infections?
Numerator Data Collection Process:
Positive Blood Cultures

- Positive blood culture: Report all positive blood cultures from specimens collected as an outpatient or collected on the day of or the day following hospital admission.
  - Report regardless of whether the infection is thought to be related to hemodialysis or whether or not a true infection is suspected.

Does your facility's positive blood culture data collection process:
1. Capture all outpatient positive blood cultures?
2. Follow-up on hospitalizations?
3. Include positives regardless of diagnosis or treatment?
Numerator Data Collection Process:

Pus, Redness, Increased Swelling at Vascular Access Site

- Pus, redness, or increased swelling at the VA site: Report each new outpatient episode where the patient has pus, >expected redness, and/or >expected swelling at any vascular access site.
  - Report regardless of whether the patient is treated for infection.
  - Always report pus. Report redness or swelling if greater than expected and suspicious for infection.

Does your facility's pus, redness, swelling data collection process:

1. Capture all three symptoms prospectively?
2. Capture all three symptoms regardless of diagnosis or treatment?
Checking Data Collection Methods

- For manual methods (either direct observation of patients or review of patient records):
  - Two facility staff members can collect surveillance data independently and compare their findings

- For electronic methods (e.g., using electronic health record reports):
  - One staff member can collect data manually and compare to their findings to electronic data

- Follow-up:
  - Determine the source of any discrepancies and adjust data collection processes as needed
  - Correct NHSN records as needed
  - Continue checking until there is agreement
INTRODUCTION TO NHSN ANALYSIS AND REPORTS
Introduction to NHSN Analysis & Reports

- NHSN includes reports that you can run at any time to review your surveillance data

- Different reports are available to choose from
  - NHSN can summarize what has been reported to date and display infection rates for you

- Use reports to:
  - Track infections
  - Inform prevention
  - Evaluate and improve performance
    - Evaluate specific infection prevention interventions
    - Identify other areas for improved performance
Strategies to Prevent Reporting Errors

- Acquire knowledge and understanding of the Protocol
- Implement data collection processes to capture necessary surveillance data
- Review reported data for completeness and accuracy
Review Your Data

- **Monthly to:**
  - Ensure all data have been accurately reported

- **Quarterly to:**
  - Detect problems in your facility
  - Provide feedback to your staff
  - Get staff engaged in quality improvement

- Better understand your facility’s performance by comparing your facility’s rates against NHSN aggregate rates
Creating Reports in NHSN

- Experiment with the analysis function – you can’t break anything!

- NHSN does the work for you!
Steps to Use the Analysis Function

1. Generate new data sets
2. Select the CDC-defined output option (report)
   - Modify output (optional)
3. “Run” the report
NHSN Analysis: (1) Generate new data sets

Generate Data Sets

Generate Dialysis Analysis Data Sets

Datasets generated will include data for the 3 most recent full calendar years up until today's date for the Patient Safety Component. To include all years check the box below.

For all other components, datasets generated will include all years. Note that any analysis options you run will be limited to the time period shown on the date range bar.

☐ Include all data reported to NHSN for this component.


Generate New

Last Generated: Sep 11 2014 9:44AM
NHSN Analysis: (2) Select output option (report)

The “Dialysis Event” folder has 25 template reports, organized in 4 sub-folders: numerators, denominators, rates, and outcomes.
NHSN Analysis: (3) “Run” output option (report)

“Run” a report as-is or “Modify” it (advanced).
**Reference Guide: 3 Steps to Review NHSN Dialysis Event Surveillance Data**


1. Verify minimum monthly reporting requirements are met
2. Verify data submitted are correct and complete
3. Verify how your facility is doing
Summary of Strategies to Prevent Errors

1. Know and understand the Protocol
   - Especially definitions and rules
   - Email the NHSN Helpdesk (nhsn@cdc.gov) with any questions

2. Implement robust, prospective data collection processes
   - Verify processes capture all necessary data

3. Review reported data for completeness and accuracy
Corrections

- Even if QIP reporting deadlines have passed, corrections can be made:
  - Improve your data for facility performance assessments
  - Improve national data quality for CDC analyses (benchmarking)

Find the record, scroll to the bottom and click the “Edit” button.
Using Reports to Assess Facility Infection Prevention Performance

NHSN BSI RATE TABLE
Data entered into NHSN are used to calculate specific metrics including rates for:

- **Bloodstream infection (BSI)**
  - Any positive blood culture

- **Access-related bloodstream infection (ARB)**
  - Positive blood culture with the suspected source identified as the vascular access site or uncertain

- **Local access site infection (LASI)**
  - Pus, redness, or swelling of the vascular access site and access-related bloodstream infection is not present

- **Vascular access infection (VAI)**
  - Either a local access site infection or an access-related bloodstream infection
Click “Run” for the “Rate Table – Bloodstream Infection Data”

- On the nav bar: “Analysis,” then “Output Options”
- Open folders:
  - Dialysis Events > Rates > CDC Defined Output
## Bloodstream Infection Rate Table

<table>
<thead>
<tr>
<th>Access Type</th>
<th>Summary Yr/Qtr</th>
<th>Months</th>
<th>Number Positive Blood Cultures</th>
<th>Patient-months</th>
<th>Bloodstream Infection Rate/100 patient-months</th>
<th>NHSN Bloodstream Infection Rate/100 patient-months</th>
<th>Incidence Density p-value</th>
<th>Incidence Density Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>2014Q2</td>
<td>3</td>
<td>2</td>
<td>211</td>
<td>0.948</td>
<td>1.27</td>
<td>0.4998</td>
<td>.</td>
</tr>
<tr>
<td>Fistula</td>
<td>2014Q2</td>
<td>3</td>
<td>0</td>
<td>97</td>
<td>0</td>
<td>0.48</td>
<td>0.6271</td>
<td>25</td>
</tr>
<tr>
<td>Graft</td>
<td>2014Q2</td>
<td>3</td>
<td>0</td>
<td>63</td>
<td>0</td>
<td>0.88</td>
<td>0.5750</td>
<td>50</td>
</tr>
<tr>
<td>Other Acc.</td>
<td>2014Q2</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td></td>
</tr>
<tr>
<td>Tunneled</td>
<td>2014Q2</td>
<td>3</td>
<td>1</td>
<td>45</td>
<td>2.222</td>
<td>3.24</td>
<td>0.0572</td>
<td>46</td>
</tr>
<tr>
<td>Nontunneled</td>
<td>2014Q2</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>33.333</td>
<td>2.78</td>
<td>0.0799</td>
<td>100</td>
</tr>
<tr>
<td>Any CVC</td>
<td>2014Q2</td>
<td>3</td>
<td>2</td>
<td>48</td>
<td>4.167</td>
<td>3.21</td>
<td>0.4551</td>
<td>69</td>
</tr>
</tbody>
</table>

*Non-shaded (white) area is the facility data.*

*Shaded (yellow) area is aggregate data from *all of NHSN*. Use it to compare the facility to the rest of NHSN (i.e., benchmark).*
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</tr>
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</table>

“Summary Yr/Qtr” = “Summary Year/Quarter”
- Quarter 1 = Jan/Feb/Mar
- Quarter 2 = Apr/May/Jun
- Quarter 3 = July/Aug/Sept
- Quarter 4 = Oct/Nov/Dec

“Months” is the number of months for the time period that data were reported (i.e., a quarter may have 1 - 3 months).
# Bloodstream Infection Rate Table

<table>
<thead>
<tr>
<th>Access Type</th>
<th>Summary Yr/Qtr</th>
<th>Months</th>
<th>Number Positive Blood Cultures</th>
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</table>

Rate = \( \frac{1}{45} \times 100 = 2.222 \) BSI/100 patient-months for tunneled central lines.
### Bloodstream Infection Rate Table

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<thead>
<tr>
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<tr>
<td>All 2012Q2</td>
<td>3</td>
<td>211</td>
<td>0.948</td>
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Compare the facility’s rate to this NHSN average rate.

The mean rate of BSI in patients with tunneled central lines for all of NHSN was higher than for this facility (3.24 BSI per 100 patient-months versus 2.222 BSI per 100 patient-months).

This column shows the mean or average RATE (per 100 patient-months) for all dialysis facilities reporting to NHSN.
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“p-value” and “percentile” are provided to assist with rate comparisons.
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 (i.e., fewer BSIs)

- A p-value is a measure of statistical significance that indicates the probability that any difference between the facility’s rates and NHSN aggregate rates is due only to chance
  - Typically, a p-value of <0.05 is considered a statistically significant difference between rates
### Rate Table Interpretation Examples

#### Example 1: Facility rate is zero, NHSN rate is 3.24
- 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 2: Facility rate is 3.333, NHSN rate is 3.24
- Percentile (58) is medium
- p-value is not statistically significant (i.e., rates are not statistically different)
- Conclusion: facility has an average BSI rate

#### Example 3: Facility rate is 13.333, NHSN rate is 3.24
- Percentile is (98) high
- p-value is statistically significant (i.e., rates are statistically different)
- Conclusion: facility has a higher than average BSI rate

<table>
<thead>
<tr>
<th></th>
<th>BSI Rate/100 patient-months</th>
<th>NHSN BSI Rate/100 patient-months</th>
<th>Incidence Density p-value</th>
<th>Incidence Density Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.000</td>
<td>3.24</td>
<td>0.0013</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>3.333</td>
<td>3.24</td>
<td>0.6215</td>
<td>58</td>
</tr>
<tr>
<td>3</td>
<td>13.333</td>
<td>3.24</td>
<td>0.0173</td>
<td>98</td>
</tr>
</tbody>
</table>
Act on the Data

- Get the most benefit by acting on the data
- Recognize areas for improvement
  - Suggestion: look at your rates for BSI, do any vascular access types have higher rates than expected?
  - Set measurable goals
- Provide feedback to frontline staff
  - Inspire staff engagement in preventing dialysis events
- Continue NHSN surveillance, monitor for changes in rates
Resources for Infection Prevention in Dialysis

- Go to [http://www.cdc.gov/dialysis/](http://www.cdc.gov/dialysis/) for tools and resources:
  - Free Continuing Education: Infection Prevention in Outpatient Dialysis
  - Training Video for Preventing Bloodstream and Other Infections in Outpatient Hemodialysis Patients (11 minutes)
  - The list of CDC’s Core Interventions for Dialysis BSI Prevention
  - Protocols, checklists, and audit tools can help promote and reinforce CDC-recommended practices
    - In January 2015, track the results of audits using NHSN and run reports to track the percent adherence over time
      - Dialysis Component “Prevention Process Measures” Module
SUMMARY
Summary

- Most data errors result from inadequate understanding of protocol reporting requirements or incomplete data collection processes.

- Avoid data quality problems by:
  - Completing training
  - Reading the Protocol and referring to it when reporting
  - Asking for help (nhsn@cdc.gov)
  - Implementing thorough data collection processes
  - Verifying those processes for completeness
  - Reviewing reported data

- It’s not too late to make corrections!
Summary

- NHSN analysis is a tool for:
  - Reviewing reported data for completeness and accuracy
  - Assessing facility performance (if data quality is good)

- Create an NHSN report in 3 steps:
  - Generate new data sets
  - Locate the output option (report)
  - “Run” the report

- “Rate Table – Bloodstream Infection Data” calculates BSI rates by quarter and vascular access type:
  - Report includes NHSN aggregate rate data for benchmarking
  - Low rates/low incident density percentile = better performance
Summary

- Act on the data for the most benefit:
  - Recognize areas for improvement
  - Provide feedback to frontline staff
  - Continue NHSN surveillance, monitor for changes in rates

- Use the available infection prevention resources at [http://www.cdc.gov/dialysis/](http://www.cdc.gov/dialysis/)