

Outpatient Dialysis Event Surveillance in NHSN

Part 1: Understanding Surveillance Requirements

May, 2011

Dialysis Training Outlines

This presentation: Part 1

- Background
- Eligibility & Reporting Requirements
- Surveillance : Collecting & Reporting Data
- Analysis
- Groups: Data Sharing
- Final Notes
- Summary
- Next Steps

Training Part 2

- NHSN Enrollment : (Steps 1–5)
- Get Started: NHSN Set-Up
- Data Entry
- Analysis
- Next Steps
- Summary

Reference Materials

- For this presentation, find reference materials on the Dialysis Event website at http://www.cdc.gov/nhsn/psc_da_de.html
 - Dialysis Event Protocol
 - Forms and Patient Safety Manual Table of Instructions:
 - Dialysis Event form
 - Instructions: Table 9 and Table 2a
 - Denominators for Outpatient Dialysis: monthly census form
 - Instructions: Table 10
 - Outpatient Dialysis Center Practices Survey
 - Available online: http://www.cdc.gov/nhsn/psc_da_de.html

BACKGROUND

Why perform surveillance?

- ❑ In 2008, > 350,000 patients were treated with chronic hemodialysis in the U.S.
- ❑ Bloodstream infections and localized vascular access infections cause substantial morbidity
 - Often involve drug-resistant bacteria
- ❑ Need to identify and implement best practices
- ❑ Requires data for evaluation
- ❑ Surveillance data is essential to quality improvement

Why perform surveillance?

- ❑ **Surveillance requires specific definitions and instructions so data is collected uniformly**
- ❑ **This allows facilities to :**
 - Make meaningful comparisons
 - between facilities (aggregated)
 - within the facility (over time)
 - Evaluate interventions
 - Identify problems
 - Engage staff & provide regular & consistent feedback
- ❑ **Surveillance data has limitations:**
 - Generic definitions may not capture nuanced or facility-specific information
 - Facilities cannot make specific causal attributions

Infection Risk by Vascular Access

Risk of infection varies by vascular access type:

LOW RISK



Arteriovenous fistulas

Arteriovenous grafts

Tunneled central lines

HIGH RISK

Nontunneled central lines

NHSN data is stratified by vascular access type

NHSN

- National Healthcare Safety Network
- Secure, internet-based surveillance system



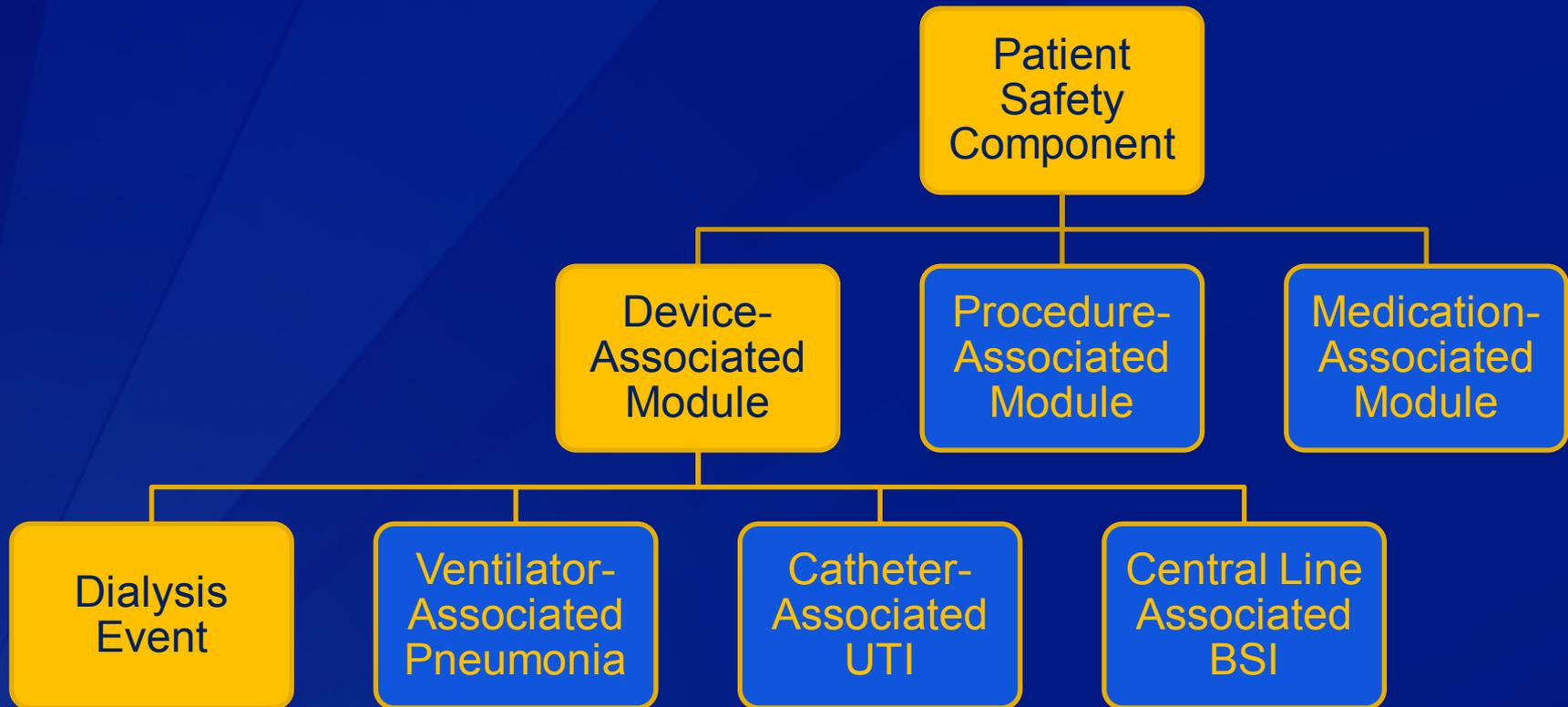
**Patient Safety
Component**

**Healthcare
Personnel Safety
Component**

**Biovigilance
Component**

Dialysis Event Module

NHSN's Patient Safety Component Structure



NHSN - Dialysis Event Homepage

http://www.cdc.gov/nhsn/psc_da_de.html

CDC Home



Centers for Disease Control and Prevention

CDC 24/7: Saving Lives. Protecting People. Saving Money Through Prevention.

SEARCH

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National Healthcare Safety Network (NHSN)

NHSN

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[Patient Safety Component](#)

[Device-associated Module](#)

▶ DE - Dialysis Event

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[Healthcare Personnel Safety Component](#)

[NHSN](#) > [Patient Safety Component](#)

DE - Dialysis Event

Infections, including bacteremia, are the second leading cause of death among hemodialysis patients. Bacteremia and localized infections of the vascular access site are common in hemodialysis patients. These and other adverse outcomes are related to the patient's vascular access type. Common vascular access types (ordered by increasing risk of infection) include: arteriovenous (AV) fistulas created from the patient's own blood vessels, arteriovenous grafts constructed from synthetic materials, permanent (tunneled) central venous catheters, and temporary (nontunneled) central venous catheters.

Among patients with a hemodialysis catheter, the rate of catheter-related bacteremias has been estimated to be 0.9 – 2.0 episodes per patient-year.¹ Despite efforts to increase AV fistula placements and decrease catheters, catheter use among both incident and prevalent hemodialysis patients has been steadily increasing in the U.S.² National data also demonstrate that cause-specific hospitalization rates among hemodialysis patients have increased 29% for bacteremia and 24% for cellulitis since 1993.²

NHSN can be used to conduct infection surveillance, which is required by the Centers for Medicare

On This Page

- [FAQ's](#)
- [Protocols and Instructions](#)
- [Training](#)
- [Forms](#)

Dialysis Event Module

- ❑ **Previously Dialysis Surveillance Network (DSN)**
 - 1999-2005
- ❑ **Focus on outpatient hemodialysis setting**
- ❑ **Designed to be used by various dialysis center personnel**
 - Do not need to be an infection prevention professional

Dialysis Event Module

□ Surveillance allows:

- Calculation of risk-stratified Dialysis Event rates
- Benchmarking
 - Dialysis Event rates & process measures
- Variety of analysis options
 - Line listings, frequency tables, rates, & control charts
- Informs quality improvement decisions

□ Dialysis Event Module can be used in a prevention collaborative:

- Allows uniform system of measurement

Practical Experience with CDC Dialysis Event Surveillance

- ❑ **Busy London dialysis unit with 112 patients implemented CDC dialysis surveillance**
- ❑ **Described their experience for an 18 month data collection period**
- ❑ **After the initial set up, surveillance required 2 hours per month**

Surveillance Outcomes Reported

- ❑ **Dialysis unit reported reductions in:**
 - Access-related bacteremia
 - Antibiotic usage
 - Hospital admissions
- ❑ **These reductions occurred simply by doing surveillance and providing feedback to staff**
- ❑ **There were no other interventions!**

NHSN ELIGIBILITY & REPORTING REQUIREMENTS

NHSN Eligibility

- ❑ **U.S. healthcare facility (e.g., with CMS ID#)**
- ❑ **Information technology (IT) needs:**
 - Email address for NHSN users
 - High-speed internet access
 - Ability to download digital certificate
- ❑ **Facility leadership signs written consent**
- ❑ **Willing to:**
 - Follow protocols
 - Report data in a timely manner
 - Share data with CDC

NHSN Reporting Requirements

- ❑ **Complete annual Outpatient Dialysis Center Practices Survey**
- ❑ **Submit Monthly Reporting Plans**
- ❑ **Submit data for ≥ 6 months/year to maintain active status in NHSN**
- ❑ **Report Dialysis Event (numerator data) and Monthly Patient Census (denominator data) within 30 days of the end of the month**
- ❑ **Failure to comply = withdrawal from NHSN**
 - 6 months after withdrawal, may apply for re-enrollment

Dialysis Event Data Collection/Reporting

General Data	Frequency
Outpatient Dialysis Center Practices Survey	Enrollment & Annually
Patient Safety Monthly Reporting Plan	Monthly – Annually

Denominator	Frequency
Denominators for Outpatient Dialysis: Census Form	Monthly

Numerator	Frequency
Dialysis Event	As needed

SURVEILLANCE: COLLECTING & REPORTING YOUR DATA

Dialysis Event Protocol & Instructions

- ❑ Read the Dialysis Event Protocol for instructions, definitions and procedures:
<http://www.cdc.gov/nhsn/PDFs/pscManual/8pscDialysisEventcurrent.pdf>
- ❑ Collecting data uniformly is essential to meaningful surveillance

Data Collection Forms & Instructions

- ❑ **Where to find all Patient Safety forms:**
 - <http://www.cdc.gov/nhsn/PatientSafety.html>
- ❑ **Print from within NHSN**
- ❑ **All Patient Safety forms instructions in the Patient Safety Component Manual – Chapter 14: Tables of Instructions:**
 - http://www.cdc.gov/nhsn/PDFs/pscManual/14_Tables_of_Instructions.pdf

Monthly Reporting Plans

General Data

- ❑ **Indicates what Patient Safety surveillance your facility intends to do:**
 - Device Associated Module >> Dialysis Events
- ❑ **You can create 1 year of Monthly Reporting Plans in advance**
- ❑ **If you are not planning on doing surveillance for a given month, you need to indicate this on that month's Reporting Plan**

Patient Safety Monthly Reporting Plan



Patient Safety Monthly Reporting Plan

OMB No. 0920-0666
Exp. Date: 09-30-2012

Page 1 of 2

* required for saving 12345 Facility ID: _____ *Month/Year: Feb / 2011

No NHSN Patient Safety Modules Followed this Month

Device Associated Module

Locations	CLA BSI	DE	VAP	CAUTI	CLIP
<u>outpatient dialysis</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Procedure Associated Module

Procedures	SSI (Circle one setting)	Post-procedure PNEU (Circle)
_____	In Out Both	In
_____	In Out Both	In

Patient Census – Denominator Data

□ Population:

- Chronic hemodialysis outpatients

□ Denominator:

- Number of dialysis outpatients on the first 2 working days of the month
- Stratified by 5 vascular access types

□ Complete Patient Census once per month

- Complete a Denominators for Outpatient Dialysis – Census form

□ Count each patient once

- If they have > 1 access, record the highest risk access only:
 - Fistula < Graft < Tunneled Central Line < Nontunneled Central Line

Denominators for Outpatient Dialysis – Census Form

* required for saving	
Record the number of chronic hemodialysis patients who received hemodialysis at your center on the first two working days of the month. Count each patient only once. If a patient has both an implanted access (graft or fistula) and a catheter, count this patient as having the catheter.	
Facility ID# : <i>12345</i>	
*Location code: <i>Outpatient Dialysis</i> *Month: <i>April</i> *Year: <i>2011</i>	
*Vascular Access Type	*Number of Chronic Hemodialysis Patients
Fistula	
Graft	
Tunneled central line	
<u>Nontunneled</u> central line	
Other access device (e.g., hybrid access)	
*Total patients (sum of all patients listed above)	



Denominators for Outpatient Dialysis Census Form – completed once per month

OMB No. 0920-0666
Exp. Date: 10-101-XXXX

Dialysis Event – Numerator Data

- ❑ Population: chronic hemodialysis outpatients**
- ❑ Numerator: Dialysis Events**
 - IV antimicrobial start
 - Positive blood culture
 - Pus, redness, or increased swelling at the vascular access site
- ❑ Collect Dialysis Event information as events occur**
 - Complete a Dialysis Event form for each dialysis event
- ❑ Optional – use Dialysis Event Log form & complete Dialysis Event forms later**

Dialysis Event Form



Dialysis Event

*required for saving	
Facility ID #:	Event ID #:
*Patient ID #:	Social Security #:
Secondary ID #:	
Patient Name, Last:	First: Middle:
*Gender: F M Other	*Date of Birth:
Ethnicity (Specify):	Race (Specify):
*Event Type: DE	*Date of Event:
*Location:	
Risk Factors	
*Vascular accesses: (check all that apply)	Access Placement Date: Date Unknown:
<input type="checkbox"/> Fistula	____/____/____ <input type="checkbox"/>
<input type="checkbox"/> Graft	____/____/____ <input type="checkbox"/>
<input type="checkbox"/> Tunneled central line	____/____/____ <input type="checkbox"/>
<input type="checkbox"/> Nontunneled central line	____/____/____ <input type="checkbox"/>
<input type="checkbox"/> Other access device (e.g., hybrid)	____/____/____ <input type="checkbox"/>
Event Details	
*Specify Event: (check one or more)	
<input type="checkbox"/> IV antimicrobial start. Was IV vancomycin started? <input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> Patient with a positive blood culture:	
* Suspected source of positive blood culture (check one):	
<input type="checkbox"/> Vascular access <input type="checkbox"/> A source other than the vascular access <input type="checkbox"/> Contamination <input type="checkbox"/> Uncertain	
If positive blood culture, specify pathogen on pages 2-3.	
<input type="checkbox"/> Pus, redness, or increased swelling at vascular access site	
* Check the access site(s) with pus, redness, or increased swelling:	
<input type="checkbox"/> Fistula <input type="checkbox"/> Graft <input type="checkbox"/> Tunneled central line <input type="checkbox"/> Nontunneled central line <input type="checkbox"/> Other access device	
*Problem(s): (check one or more)	
<input type="checkbox"/> Fever $\geq 37.8^{\circ}\text{C}$ (100°F) oral <input type="checkbox"/> Chills or rigors <input type="checkbox"/> Drop in blood pressure	
<input type="checkbox"/> Wound (NOT related to vascular access) with pus or increased redness	
<input type="checkbox"/> Cellulitis (skin redness, heat, or pain without open wound)	
<input type="checkbox"/> Pneumonia or respiratory infection	
<input type="checkbox"/> Other (specify) _____	
*Outcome:	Hospitalization <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
	Death <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown

Dialysis Event Type: IV Antimicrobial Start

- ❑ **Include all outpatient IV antimicrobial starts**
 - Not just those with vancomycin
 - Not just those for a vascular access problem
- ❑ **IV antimicrobials must be stopped for more than 21 days and then restarted to be considered a new event**
 - If IV antimicrobials are stopped for ≤ 21 days it is still the same event

Dialysis Event Type: Positive Blood Culture

- ❑ Include all positive blood cultures taken as an outpatient or within 1 day after a hospital admission**
- ❑ If you have > 1 positive blood culture, they must be more than 21 days apart to be considered separate dialysis events**

Suspected Source of Positive Blood Culture

Identify the source of the PBC, choose:

- ❑ **“Vascular access”** only if there is objective evidence of vascular access infection (VAI)
- ❑ **“A source other than the vascular access”** if either:
 - a) a culture from another site has the same organism as in the blood
 - b) clinical evidence of infection at another site, but site was not cultured
- ❑ **“Contamination”** if organism is thought by the physician, Infection Preventionist, or head RN to be a contaminant
- ❑ **“Uncertain”** if there is insufficient evidence to decide among the 3 previous categories

Positive Blood Culture Pathogen Information

- ❑ On the back of the dialysis event form, enter pathogen information for positive blood cultures**
- ❑ List up to 3 pathogens (in rank order of importance)**
- ❑ For each pathogen, include antimicrobial susceptibility information (i.e., susceptible, resistant, intermediate, or not tested)**
- ❑ Only certain bug/drug combinations are required**
- ❑ Recommend attaching microbiology lab report to the dialysis event form**

Dialysis Event Type: Pus, Redness or Increased Swelling at the Vascular Access Site

- All episodes of one or more symptoms of pus, redness or increased swelling at a vascular access site**
- There must be 21 or more days between the onset of a first and second episode of pus, redness, or increased swelling at a vascular access site to be considered separate dialysis events**

Dialysis Event Problems & Outcomes

- ❑ **Specify problems associated with the dialysis event**
 - Fever, chills or rigors, drop in blood pressure
 - Wound (not related the vascular access) with pus, redness
 - Cellulitis
 - Pneumonia or respiratory infection
 - Other problem
- ❑ **Specify outcomes associated with the dialysis event or problem**
 - Hospitalization
 - Death

Dialysis Event Combinations

- ❑ **1 Dialysis Event report may have multiple parts, combining IV antimicrobial start; positive blood culture; & pus, redness or increased swelling at VA site**
 - E.g., if a positive blood culture is the reason that a patient is treated with IV antimicrobials, this is really the same “event” and they can be reported together
- ❑ **Protocol and Tables of Instructions for forms provide rules for reporting correctly, refer to these as needed**

Dialysis Event Case Examples

Case 1

- Patient completes 1 week IV antimicrobials
- 4 weeks after first treatment ends, IV antimicrobials are restarted



REPORT: 2 separate IV antimicrobial start dialysis events

WHY? There is ≥ 21 days between IV antimicrobial starts

Case 2

- Patient completes 1 week IV antimicrobials
- 2 weeks after first treatment ends, IV antimicrobials are restarted



REPORT: 1 IV antimicrobial start dialysis event

WHY? There is < 21 days between IV antimicrobial starts

Dialysis Event Case Examples continued

Case 3

- Patient has redness and swelling at vascular access site
- As a result, doctor prescribes IV antimicrobials

REPORT: 1 pus, redness or swelling at VA site dialysis event, includes IV antimicrobial start

WHY? IV antimicrobials were started because of redness and swelling, they are clearly related

Case 4

- Patient has redness and swelling at vascular access site
- Symptoms resolve on their own, then recur 10 days later

REPORT: 1 pus, redness or increased swelling at vascular access site dialysis event

WHY? Symptom recurrence was within 21 days

Dialysis Event Case Examples continued

- Patient has symptoms of a bloodstream infection:

Case 5

- Blood is drawn on Monday
- Tuesday: IV antimicrobial start
- Wednesday: blood culture results are positive



REPORT: 1 positive blood culture Dialysis Event, includes IV antimicrobial start

WHY? Blood was drawn before antimicrobials started, both relate to same infection

Case 6

- Patient is hospitalized
- 4 hours after admission, blood is drawn, culture results are positive next day



REPORT: 1 positive blood culture Dialysis Event, with hospitalization outcome

WHY? PBC sample was drawn within a day of admission. Both relate to same infection.

Dialysis Event Case Examples continued

Case 7

- Patient's vascular access site has pus, redness and swelling
- Blood culture grows Staph



REPORT: Pus, redness, or increased swelling at the VA site Dialysis Event with positive blood culture
PBC suspected source: vascular access

WHY? There is objective evidence of infection at vascular access site

Case 8

- Patient's vascular access site has pus, redness and swelling
- Blood culture grows Staph
- Visibly infected leg wound grows Enterococcus



REPORT: Pus, redness, or increased swelling at VA site Dialysis Event with positive blood culture
PBC suspected source: vascular access

WHY? Objective evidence of infection at VA site exists. Different organisms in blood & wound: cannot attribute PBC to a 'source other than vascular access'

Dialysis Event Case Examples continued

Case 9

- Patient's leg wound has pus, redness and swelling
- Vascular access looks normal
- Wound culture: Staph aureus
- Blood culture: Staph aureus

REPORT: Positive blood culture
Suspected source: A source other than vascular access site

WHY? Evidence of infection at wound site, no evidence at VA site. Both wound and blood grow same organism.

Case 10

- Patient has 4 blood draws
- 1 draw grows coagulase negative staphylococci
- Doctor does not treat patient

REPORT: Positive blood culture
Suspected source: contaminant

WHY? Only 1 of 4 blood draws was positive & it was a common skin organism. Doctor did not treat, which shows no suspicion of infection.

Reporting Difficult Dialysis Events

- ❑ If you are unsure how to report a Dialysis Event, get the opinion of the physician, infection preventionist, or head nurse
- ❑ Refer to the Protocol and Tables of Instructions for reference
- ❑ Additional assistance is available through the NHSN Helpdesk at nhsn@cdc.gov

Dialysis Event Data Collection/Reporting

General Data	Frequency
Outpatient Dialysis Center Practices Survey	Enrollment & Annually
Patient Safety Monthly Reporting Plan	Monthly - Annually

Denominator	Frequency
Denominators for Outpatient Dialysis: Census Form	Monthly

Numerator	Frequency
Dialysis Event	As needed

ANALYSIS



Analysis

- ❑ **Assess the number of dialysis events, stratified by access type, over a specified period**
 - 100 patient months
- ❑ **Access-Related Infection Rates Outcomes**
 - Local access site infection
 - Pus, redness, or swelling of the VA site, without bloodstream infection
 - Access-related bloodstream infection
 - Blood culture positive with suspected source identified as the vascular access site or uncertain
 - Vascular access infection
 - Either local access site infection or access-related bloodstream infection

Analysis

- ❑ **There are different analyses the user can perform within NHSN**
 - Template line listings, rate tables, and control charts
 - Templates can be modified to create custom output
 - Generally assessing the number of dialysis events/the number of patient months to determine a rate
- ❑ **User can also export data for analysis with preferred software**

How dialysis events (numerator) & census info (denominator) come together

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Klevens et al.

TABLE 1. Pooled means and key percentiles of the distribution of rates of dialysis surveillance events by type of vascular access, device-associated module, patient safety component, National Healthcare Safety Network, 2006

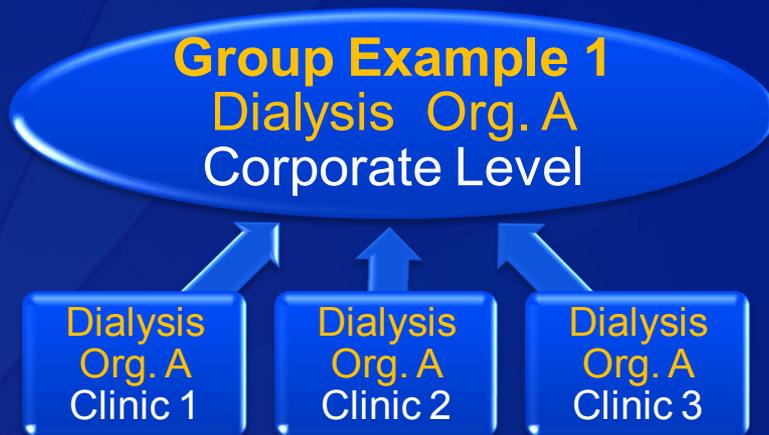
Type of access	Event ^a	Percentile					
		Pooled mean	10%	25%	50% (median)	75%	90%
Hospitalization							
Fistula	932	7.7	0.1	2.9	7.9	10.4	11.3
Graft	632	9.2	0	3.6	9.8	13.2	15.1
Perm. central line	1380	15.7	0.3	9.5	15.8	21.2	25.2
Temp. central line	41	34.7	—	—	—	—	—
Antibiotic starts							
Fistula	218	1.8	0	0.3	1.4	2.8	3.9
Graft	163	2.4	0	0.6	1.8	3.7	5.5
Perm. central line	566	6.4	0	2.2	4.8	10.5	12.8
Temp. central line	30	25.4	—	—	—	—	—
Vancomycin							
Fistula	148	1.2	0	0	1.2	2	2.7
Graft	113	1.6	0	0.3	1.2	2.2	4
Perm. central line	436	5.0	0	1.8	3.1	7.8	9.5
Temp. central line	19	16.1	—	—	—	—	—
Bloodstream infection							
Fistula	63	0.5	0	0	0.3	0.7	1.1
Graft	63	0.9	0	0	0.6	1.6	2.2
Perm. central line	374	4.2	0	1.6	3.4	6	9.4
Temp. central line	32	27.1	—	—	—	—	—
Local access infection							



GROUPS: DATA SHARING

Groups

- ❑ Physically separate facilities should enroll in NHSN independently
- ❑ Group Function is used to share data
 - Example 1: affiliated facilities (e.g., satellite clinics) share data with their overarching organization
 - Example 2: un-affiliated facilities share data for a specific purpose (e.g., quality improvement, mandated reporting)



Groups

- ❑ **Groups enroll in NHSN differently than facilities**
 - Contact nhsn@cdc.gov for instructions on how to create a Group
- ❑ **To join an existing group, the Facility Administrator must contact the Group Administrator for the Group ID and joining password**
- ❑ **Facilities agree to which data they would like to share with the group by conferring rights**
- ❑ **Member facilities cannot access one another's data; only the Group can access the data**
- ❑ **One facility can join multiple groups**
 - E.g., ESRD Network Group and state health department Group

FINAL NOTES

NHSN Changes & Updates

- ❑ **NHSN changes & updates occur periodically**
 - Reflect changes in healthcare
 - Web improvements
- ❑ **Changes are communicated via email & NHSN newsletter**



NHSN Support

- Email the NHSN Helpdesk: nhsn@cdc.gov

Summary

- ❑ **Background**
- ❑ **NHSN Eligibility & Reporting Requirements**
- ❑ **Surveillance Collecting & Reporting Data**
 - Data collection types: General, Denominator, Numerator
 - Dialysis Event definitions
 - Dialysis Event Case Examples
- ❑ **Analysis**
- ❑ **Groups**
- ❑ **Support**

Next Steps

□ If you are planning to enroll:

- Print & begin Outpatient Dialysis Center Practices Survey
 - Available under “Essential Forms” at http://www.cdc.gov/nhsn/psc_da_de.html
- Complete dialysis training Part 2
 - How to enroll in NHSN (Steps 1 – 5)
 - NHSN Set-up
 - Surveillance data entry & analysis
 - Reference documents:
 - NHSN Facility Administrator Enrollment Guide
 - Facility Start-up Guide

Questions?

NHSN Helpdesk nhsn@cdc.gov

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333

Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348

E-mail: cdcinfo@cdc.gov Web: <http://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.