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

  - 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

- Device-Associated Module
  - Dialysis Event
  - Ventilator-Associated Pneumonia
- Procedure-Associated Module
- Medication-Associated Module
  - Catheter-Associated UTI
  - Central Line Associated BSI
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
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

<table>
<thead>
<tr>
<th>General Data</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatient Dialysis Center Practices Survey</td>
<td>Enrollment &amp; Annually</td>
</tr>
<tr>
<td>Patient Safety Monthly Reporting Plan</td>
<td>Monthly – Annually</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Denominator</th>
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<tr>
<td>Denominators for Outpatient Dialysis: Census Form</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Numerator</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dialysis Event</td>
<td>As needed</td>
</tr>
</tbody>
</table>
SURVEILLANCE: COLLECTING & REPORTING YOUR DATA
Dialysis Event Protocol & Instructions

- Read the Dialysis Event Protocol for instructions, definitions and procedures:

- 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:
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

**Facility ID:** 12345  
**Month/Year:** Feb. 2011

- **Device Associated Module**
  - **Locations:** outpatient dialysis
  - **CLA BSI:** [ ]
  - **DE:** [x]
  - **VAP:** [ ]
  - **CAUTI:** [ ]
  - **CLIP:** [ ]

- **Procedure Associated Module**
  - **SSI**
    - (Circle one setting): In, Out, Both
  - **Post-procedure PNEU**
    - (Circle): In, Out, Both

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NHSN National Healthcare Safety Network

[Image: NHSN logo]
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

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:

**12345**

*Location code: **Outpatient Dialysis**

*Month: **April**

*Year: **2011**

<table>
<thead>
<tr>
<th>Vascular Access Type</th>
<th>Number of Chronic Hemodialysis Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fistula</td>
<td></td>
</tr>
<tr>
<td>Graft</td>
<td></td>
</tr>
<tr>
<td>Tunneled central line</td>
<td></td>
</tr>
<tr>
<td>Nontunneled central line</td>
<td></td>
</tr>
<tr>
<td>Other access device (e.g., hybrid access)</td>
<td></td>
</tr>
<tr>
<td>Total patients</td>
<td>(sum of all patients listed above)</td>
</tr>
</tbody>
</table>
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 Form

<table>
<thead>
<tr>
<th>*required for saving Facility ID #:</th>
<th>Event ID #:</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Patient ID #:</td>
<td>Social Security #:</td>
</tr>
<tr>
<td>Secondary ID #:</td>
<td></td>
</tr>
<tr>
<td>Patient Name, Last:</td>
<td></td>
</tr>
<tr>
<td>*Gender: F M Other</td>
<td>*Date of Birth:</td>
</tr>
<tr>
<td>Ethnicity (Specify):</td>
<td>Race (Specify):</td>
</tr>
<tr>
<td>*Event Type: DE</td>
<td>*Date of Event:</td>
</tr>
<tr>
<td>*Location:</td>
<td></td>
</tr>
</tbody>
</table>

### Risk Factors

<table>
<thead>
<tr>
<th>Vascular accesses: (check all that apply)</th>
<th>Access Placement Date:</th>
<th>Date Unknown:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fistula</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tunneled central line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nontunneled central line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other access device (e.g., hybrid)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Event Details

*Specify Event: (check one or more)

- IV antimicrobial start. Was IV vancomycin started? □ Yes □ No
- Patient with a positive blood culture:
  - * Suspected source of positive blood culture (check one):
    - Vascular access □ A source other than the vascular access □ Contamination □ Uncertain
    - If positive blood culture, specify pathogen on pages 2-3.
  - Pus, redness, or increased swelling at vascular access site
    - * Check the access site(s) with pus, redness, or increased swelling:
      - Fistula □ Graft □ Tunneled central line □ Nontunneled central line □ Other access device

*Problem(s): (check one or more)

- Fever ≥37.8°C (100°F) oral □ Chills or rigors □ Drop in blood pressure
- Wound (NOT related to vascular access) with pus or increased redness
- Cellulitis (skin redness, heat, or pain without open wound)
- Pneumonia or respiratory infection
- Other (specify) ________________________________________

### Outcome:

- Hospitalization □ Yes □ No □ Unknown
- Death □ Yes □ No □ 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 $\leq 21$ 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.
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
### 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 $\geq 21$ 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

<table>
<thead>
<tr>
<th>Case 3</th>
<th>Case 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REPORT:</strong> 1 pus, redness or swelling at VA site dialysis event, includes IV antimicrobial start</td>
<td><strong>REPORT:</strong> 1 pus, redness or increased swelling at vascular access site dialysis event</td>
</tr>
<tr>
<td><strong>WHY?</strong> IV antimicrobials were started because of redness and swelling, they are clearly related</td>
<td><strong>WHY?</strong> Symptom recurrence was within 21 days</td>
</tr>
<tr>
<td>- Patient has redness and swelling at vascular access site</td>
<td>- Patient has redness and swelling at vascular access site</td>
</tr>
<tr>
<td>- As a result, doctor prescribes IV antimicrobials</td>
<td>- Symptoms resolve on their own, then recur 10 days later</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Case 7</th>
<th>Case 8</th>
</tr>
</thead>
</table>
| **REPORT:** Pus, redness, or increased swelling at the VA site Dialysis Event with positive blood culture  
**PBC suspected source:** vascular access | **REPORT:** Pus, redness, or increased swelling at VA site Dialysis Event with positive blood culture  
**PBC suspected source:** vascular access |
| ▪ Patient’s vascular access site has pus, redness and swelling  
▪ Blood culture grows Staph | ▪ Patient’s vascular access site has pus, redness and swelling  
▪ Blood culture grows Staph  
▪ Visibly infected leg wound grows Enterococcus |
| **WHY?** There is objective evidence of infection at vascular access site | **WHY?** Objective evidence of infection at VA site exists. Different organisms in blood & wound: cannot attribute PBC to a ‘source other than vascular access’ |
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.
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Dialysis Event</td>
<td>As needed</td>
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</table>
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


<table>
<thead>
<tr>
<th>Type of access</th>
<th>Event&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Pooled mean</th>
<th>10%</th>
<th>25%</th>
<th>50% (median)</th>
<th>75%</th>
<th>90%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fistula</td>
<td>932</td>
<td>7.7</td>
<td>0.1</td>
<td>2.9</td>
<td>7.9</td>
<td>10.4</td>
<td>11.3</td>
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<tr>
<td>Graft</td>
<td>632</td>
<td>9.2</td>
<td>0</td>
<td>3.6</td>
<td>9.8</td>
<td>13.2</td>
<td>15.1</td>
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<tr>
<td>Perm. central line</td>
<td>1380</td>
<td>15.7</td>
<td>0.3</td>
<td>9.5</td>
<td>15.8</td>
<td>21.2</td>
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<td>Temp. central line</td>
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<td>34.7</td>
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<td></td>
<td></td>
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<tr>
<td>Antibiotic starts</td>
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</tr>
<tr>
<td>Fistula</td>
<td>218</td>
<td>1.8</td>
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<td>0.3</td>
<td>1.4</td>
<td>2.8</td>
<td>3.9</td>
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<tr>
<td>Graft</td>
<td>163</td>
<td>2.4</td>
<td>0</td>
<td>0.6</td>
<td>1.8</td>
<td>3.7</td>
<td>5.5</td>
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<tr>
<td>Perm. central line</td>
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<td>6.4</td>
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<td>4</td>
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<td>0</td>
<td>0</td>
<td>0.3</td>
<td>0.7</td>
<td>1.1</td>
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<tr>
<td>Graft</td>
<td>65</td>
<td>0.9</td>
<td>0</td>
<td>0</td>
<td>0.6</td>
<td>1.6</td>
<td>2.2</td>
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<tr>
<td>Perm. central line</td>
<td>374</td>
<td>4.2</td>
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<td>1.6</td>
<td>3.4</td>
<td>6</td>
<td>9.4</td>
</tr>
<tr>
<td>Temp. central line</td>
<td>32</td>
<td>27.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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<sup>a</sup> Event count.
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