



# Infection Prevention and Monitoring in the Dialysis Setting

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# Learning Objectives

By the conclusion of the presentation, participants will be able to:

- Locate the Center for Disease Control and Prevention's (CDC's) **Making Dialysis Safer for Patients Coalition** information
  - Identify available tools and resources
- Apply best practice guidelines for prevention of healthcare-associated infections (HAIs) in hemodialysis patients
- Recall Network 7's HAI Quality Improvement Activity (QIA)
- Interpret the Centers for Medicare & Medicaid Services (CMS) End Stage Renal Disease (ESRD) Conditions for Coverage as it pertains to infection prevention and water quality
- Discuss the various National Healthcare Safety Network (NHSN) dialysis reports and how they can be used to improve outcomes

# Making Dialysis Safer for Patients Coalition

- In the United States, there are more than 400,000 people relying on hemodialysis care; these patients are at risk of getting serious infections.
- The CDC has developed a set of [core interventions](#) to prevent dialysis bloodstream infections (BSIs). These interventions are proven to:
  - Reduce the number of infections by half.
  - Be sustainable.
- CDC has also developed a set of [audit tools, checklists, and other resources](#) to help facilitate adoption of these critical core interventions.

# Coalition Partners

- [American Kidney Fund](#) (AKF)
- [American Nephrology Nurses Association](#) (ANNA)
- [American Society of Nephrology](#) (ASN)
- [American Society of Pediatric Nephrology](#) (ASPN)
- [Association for Professionals in Infection Control and Epidemiology](#) (APIC)
- [Centers for Medicare & Medicaid Services](#) (CMS)
- [National Association of Nephrology Technicians/Technologists](#) (NANT)
- [National Kidney Foundation](#) (NKF)
- [National Renal Administrators Association](#) (NRAA)
- [Nephrology Nursing Certification Commission](#) (NNCC)
- [Renal Physicians Association](#) (RPA)
- [Society for Healthcare Epidemiology of America](#) (SHEA)

# HAIs in the ESRD Population

- The incidence of infection in ESRD can be up to 100 times higher than in the general population and confers a 43% higher rate of mortality.
- Violations in infection prevention protocols were the most cited violations in dialysis facilities by the Florida State Survey Agency (SSA) for 2013–2015.

Source: National Action Plan to Prevent Healthcare-Associated Infections

# Key HAI Prevention Strategies

- Adhere to hand hygiene protocols
- Implement standard precautions
- Utilize aseptic technique for dialysis permanent access and catheter care
- Clean and disinfect dialysis station and shared equipment between each patient
- Monitor water to ensure purity for hemodialysis use
- Use antimicrobial agents judiciously
- Provide ongoing patient education

# Potential Cross-Contamination Hazards

- Clamps
- Scissors
- Dialysis machine control knobs
- Door knobs
- Hemostats
- Priming buckets
- Bed/chair
- Countertops
- Stethoscopes
- Blood pressure cuffs
- Waste containers used during the priming of dialyzers
- Blood tubing draped or clipped to waste containers
- Items placed on top of machines, such as dialyzer caps and medication vials

# Antibiotic Stewardship in Hemodialysis

Before first dose administration, **verify:**

- Were cultures ordered and sent?
- What is the indication?
  - Is this diagnosis still likely?
  - What is the planned duration?

On Days 2–3, check to see:

- Are final cultures back?
  - If so, discuss the culture result with sensitivities to the doctor for discussion about least broad spectrum antibiotic available for treatment.
  - If not, continue to follow up with the lab for final results.

Between 20–50% of antibiotic prescriptions are either unnecessary or inappropriate.

**DID YOU:**

- Check the dose and duration of the antibiotic order?
- Verify that there were no medication changes or updated culture results received after medication labels were printed?
- Report the FINAL culture sensitivity to the doctor?

*Fishman N. Am J Med. 2006 Jun; 119 (6 Suppl 1):S53-61*



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# Antibiotic Stewardship in Hemodialysis



## Patient and Caregiver Proper Mask Placement

- Approximately 25–30 percent of the population carries Staphylococcus Aureus.
- “Staph” most commonly colonizes in the openings of the nasal passage.

*Cover your nose and mouth completely for safety!*

For more information or to file a grievance about the care you are receiving at your dialysis facility, please contact Network 7 at 800.826.3773.



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# Network 7

## 2016 HAI QIA

Infection Prevention and Monitoring in the Dialysis Setting

# QIA Goals

- Demonstrate a 5% relative reduction in the pooled mean rate of BSIs in the targeted QIA facilities
- Promote the integration of patient and family engagement concepts that will allow patients to impact their own care and engage in monitoring infection prevention opportunities

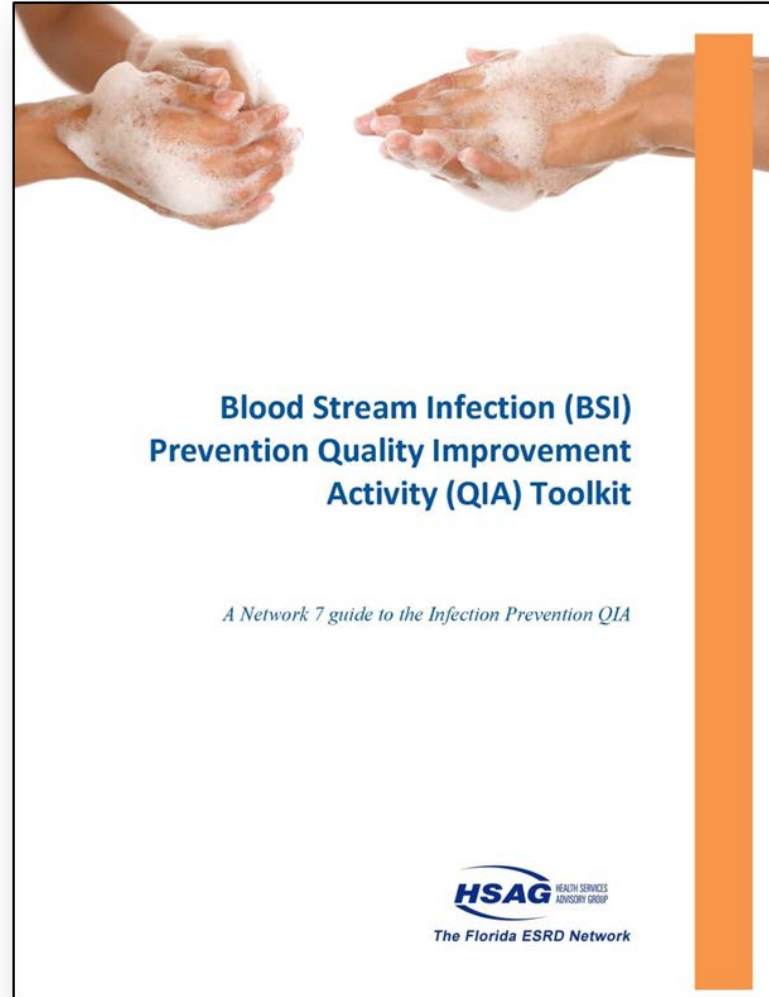
# QIA Dialysis Facility Inclusion Criteria

- Facilities with BSI rates from the first and second quarter of 2015 that were above the Network average of 0.71
  - The baseline focus group aggregate BSI rate is 1.50
  - The focus group aggregate BSI rate goal is 1.43
- 2015 HAI QIA facilities that did not achieve improvement in BSI rates and/or sustainment
- Facilities that received citations from the SSA for infection prevention procedures in 2015

# QIA Interventions

- Implementation of the Plan-Do-Study-Act (PDSA) improvement model
- Education of staff
- Application of CDC BSI prevention tools and audits
- Engagement of patients as partners in infection prevention through:
  - Patient education
  - Patient pledge
  - Patient-completed audits
- Addition of further interventions, as identified by facility

# 2016 HAI QIA Toolkit



# QIA Interventions: Staff Education

## April 2016:

- All QIA facility patient care staff completed the one hour self-guided training course titled, *Infection Prevention in the Dialysis Setting*, available on the CDC website:  
[www.cdc.gov/dialysis/clinician/CE/infection-prevent-outpatient-hemo.html](http://www.cdc.gov/dialysis/clinician/CE/infection-prevent-outpatient-hemo.html)
- All QIA facility National Healthcare Safety Network (NHSN) users completed annual online NHSN Dialysis Event Surveillance Training:  
<http://nhsn.cdc.gov/nhsntraining/courses/C18>
- All facilities review the CDC Recommended Interventions for Dialysis BSI Prevention:  
[www.cdc.gov/dialysis/prevention-tools/core-interventions.html](http://www.cdc.gov/dialysis/prevention-tools/core-interventions.html)
- Staff signed the Patient Infection Prevention Pledge when education was complete

# QIA Interventions: CDC Tools and Resources

## May–October 2016:

- QIA facilities complete monthly CDC audits:
  - ≥ 13 hand hygiene observations
  - ≥ 7 catheter connection/disconnection observations
  - ≥ 7 fistula/graft cannulation observations
- Locate the audit tools here:  
[www.cdc.gov/dialysis/prevention-tools/index.html](http://www.cdc.gov/dialysis/prevention-tools/index.html)
- Best Practices Video: Covers hand hygiene, catheter connection/disconnection, and fistula/graft cannulation:  
[www.cdc.gov/dialysis/prevention-tools/training-video.html](http://www.cdc.gov/dialysis/prevention-tools/training-video.html)



# QIA Interventions: Engaging Patients as Partners

## Patient Education

- *Clean Hands Can Save Lives*
  - Hand washing
  - Staff hand washing protocol
- *Washing Your Vascular Access & Knowing the Signs and Symptoms of Infection*
  - Washing the dialysis access prior to treatment
  - Signs and symptoms of infection

# QIA Interventions: Engaging Patients as Partners (cont.)

- Patients sign *Patient Infection Prevention Pledge* when education is complete
- For May–October 2016, encourage five hand hygiene audits to be completed by a patient, per month
  - Record with other hand hygiene audits on the Network monthly report

# 2016 QIA Results to Date

- 63 Dialysis Facilities
- Baseline:
  - February 2016: 1.5 per one hundred patient-months

March	April	May	June	July	August	September
1.265	1.221	1.091	0.993	0.844	0.728	0.751

# ESRD Network 7 Website

## HAI LAN and Infection Prevention Resources

- ESRD Networks home page  
[www.hsag.com/ESRD](http://www.hsag.com/ESRD)
- NW 7 HAI Learning and Action Network (LAN) page  
[www.hsag.com/NW7HAILAN](http://www.hsag.com/NW7HAILAN)

# QIA Best Practices

- Include all staff members in monthly audit completion to improve infection control practices
- Conduct targeted auditing during turnover to identify the need to adjust patient schedules to allow for proper infection control techniques
- Identify staff in need of additional education on cannulation infection control procedures
- Conduct infection control-specific staff meeting and in-services to focus staff on following protocols

# QIA Best Practices

- Remind physicians and nurse practitioners to practice hand hygiene between patients when rounding
- Identify and correct improper mask placement during catheter care
- Include patients in hand hygiene audits to encourage more patient participation and improve staff-to-patient communication regarding infection control protocols
- Engage patients through use of Network education materials to support infection prevention interventions by staff

# Water Use in Hemodialysis

Infection Prevention and Monitoring in the Dialysis Setting

# Water Use in Hemodialysis: Process

- During hemodialysis, blood flows out of the body and by one side of a semi-permeable membrane.
- Dialysate, the fluid in a dialysis machine, flows by the opposite side of the membrane.
  - Undesired waste in the blood flows into the dialysate, while bicarbonate (a needed solute that helps in pH balance) flows from the dialysate into the blood.
- Clean blood is then returned to your body.
  - Removing the harmful waste and extra salt and fluids helps control blood pressure, pH balance, and plasma volume, similar to the results of a functioning kidney.



# Water Use in Hemodialysis: Water Treatment

- For the health and safety of hemodialysis patients, it is vital to ensure that the water that is used to make dialysate is safe and clean.
- Hemodialysis requires special water-treatment processes to prevent adverse patient outcomes of dialysis therapy resulting from improper formulation of dialysate with water containing high levels of certain chemical or biological contaminants.

# Water Quality Basics

- Follow water system monitoring procedures to ensure water system safety
- Maintain complete and accurate records
  - This is a requirement
- Provide staff education about how to recognize and appropriately react to water system failures
  - Assures patient safety
- Analyze and trend all issues to reduce or eliminate possibly of reoccurrence

**Note:** The Medical Director is ultimately responsible for water treatment operation and should be informed and consulted on all water quality-related issues. Notifications should be documented.

# Water Quality Documentation

- All water systems checks must be documented.
- All routine and non-routine maintenance must be recorded.
- All documentation must be signed, dated and timed.
- There should be no time gaps in documentation.
- All written documentation must be written in black ink.
- White out and/or erasers are not permitted.
- Culture and Limulus Amebocyte Lysate Assay (LAL) results must be documented and reviewed in a timely manner.
- The Medical Director must review and sign all water culture and LAL records monthly.

# Association for the Advancement of Medical Instruments (AAMI) Standards

The AAMI standards address:

- Chemical and microbiologic standards for the water used to prepare dialysate, substitution fluid, or to reprocess hemodialyzers for renal replacement therapy
- Equipment and processes used to purify water for:
  - The preparation of concentrates and dialysate and the reprocessing of dialyzers for multiple use
  - The devices used to store and distribute this water

# Guidelines for Environmental Infection Control in Healthcare Facilities-Dialysis Water Quality and Dialysate

- I. Adhere to current AAMI standards for quality assurance performance of devices and equipment used to treat, store, and distribute water in hemodialysis centers (both acute and maintenance [chronic] settings) and for the preparation of concentrates and dialysate.
- II. Conduct microbiological testing specific to water in dialysis settings.
  1. Perform bacteriologic assays of water and dialysis fluids at least once a month and during outbreaks using standard quantitative methods.
    - a) Assay for heterotrophic, mesophilic bacteria (for example, Pseudomonas or Staph A)
    - b) Do not use nutrient-rich media (for example, blood agar or chocolate agar).
  2. In conjunction with microbiological testing, perform endotoxin testing on product water used to reprocess dialyzers for multiple use.
  3. Ensure that water does not exceed the limits for microbial counts and endotoxin concentrations.

# Guidelines for Environmental Infection Control in Healthcare Facilities-Dialysis Water Quality and Dialysate

- III. Disinfect water distribution systems in dialysis settings on a regular schedule. Monthly disinfection is required.
- IV. Whenever practical, design and engineer water systems in dialysis settings to avoid incorporating joints, dead-end pipes, and unused branches and taps that can harbor bacteria.
- V. When storage tanks are used in dialysis systems, they should be routinely drained, disinfected with an EPA-registered product, and fitted with an ultrafilter or pyrogenic filter (membrane filter with a pore size sufficient to remove small particles and molecules >1 kilodalton) installed in the water line distal to the storage tank.

# LAL

- Monthly testing
- Results not to exceed 0.00–0.99 Endotoxin units per ml (EU/ml)
- Action level is 1.00 – 1.99 units per ml (EU/ml)

# Water Cultures/Dialysate

- Monthly testing
- Acceptable levels 0–49 colony forming units
- Plan of correction must be implemented if colony count is above 50 cfu
- Patient safety is at risk if contamination level is above 200 cfu



# Overview of NHSN Dialysis Reports

Infection Prevention and Monitoring in the Dialysis Setting

# NHSN Data Accuracy

- ESRD Quality Incentive Program (QIP) clinical measure
- Criteria for NHSN data submission not the same as CROWNWeb
- Review Dialysis Event Protocol
- Utilize NHSN output options reports to ensure accurate reporting
- Network conducts quarterly NHSN data quality checks
- CMS ESRD QIP deadline for third quarter 2016 is December 31, 2016

# NHSN Healthcare Personnel Safety Component

## The Personnel Safety Component:

- Is included in the ESRD QIP—Payment Year (PY) 2018 Reporting Measure
- Requires that all facilities must report Healthcare Personnel Influenza Vaccination summary data to NHSN
- Began in October 2015 and ran through March 2016, covering the entire influenza season
- Provides that NHSN Summary Reports will be available by May 15, 2016

# NHSN Data Quality Resources

- CMS Requirements
- National Quality Forum (NQF)
- Data Validation Guidance
- Clinical Document Architecture (CDA)
- HIPAA Privacy Rule

## NHSN Manuals

- Dialysis Event Surveillance Manual [PDF - 1.65 MB]
- Healthcare Personnel Safety Component Manual [PDF - 1.96 MB]
- Biovigilance Component Protocol [PDF - 326 KB]

## Analysis Resources to Create Reports

- [How to Create and Read an NHSN Report for CMS ERSD QIP](#) [PDF - 190 KB] June 2014
- [How to Create and Read an NHSN Report for Access Related Bloodstream Infections](#) [PDF - 132 KB]
- [How to Create and Read an NHSN Report for Bloodstream Infections](#) [PDF - 128 KB]
- [3 Steps to Review NHSN Dialysis Event Surveillance Data](#) [PDF - 486 KB] April 2014
- [Data Quality Checklist for Group Users](#) [PDF - 322 KB] July 2014

## Data Quality Evaluation

- [NHSN Dialysis Event Surveillance & Reporting Data Quality Evaluation – Project Implementation Guide](#) [PDF - 504 KB] April 2014
- [Appendix 1 - 4](#) [PDF - 883 KB] February 2014

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- [Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011](#)
- [Resources for Patients and Healthcare Providers](#)
- [Hand Hygiene in Healthcare Settings](#)

## Español

**Note:** Please see the English version of the Protocol for the most up-to-date information.

## Protocol

- [Protocolo de eventos de diálisis de la NHSN](#) [PDF - 300KB] febrero de 2012

# Dialysis Event Protocol

Find a PDF of the CDC's Dialysis Event Protocol here:

[www.cdc.gov/nhsn/pdfs/pscmanual/8pscdialysiseventcurrent.pdf](http://www.cdc.gov/nhsn/pdfs/pscmanual/8pscdialysiseventcurrent.pdf)

# NHSN Line Listing Report

CCN	Summary Year/Month	Report No Dialysis Events (0 events)	Report No IV Antimicrobial Starts (0 events)	Report No Positive Blood Cultures (0 events)	Report No Pus, Redness, Swelling (0 events)	Number of Patients: AV Fistula	Number of Buttonhole Patients	Number of Patients: AV Graft	Number of Patients: Other Access Device	Number of Patients: Tunneled Central Line	Number of Patients: Nontunneled Central Line	Patient-months	Number of Patients: Dialyzers Reused	Number of Patients: Fistulas and Grafts	Number of Patients: All Central Lines	
100006	2016M01	Y	Y	Y	Y	3	0	0	0	3	0	6		3	3	50%
100006	2016M02	Y	Y	Y	Y	3	0	0	0	4	0	7		3	4	57%
100006	2016M03	Y	Y	Y	Y	2	0	0	0	2	0	4	0	2	2	50%
100022	2016M01	N	N	Y	Y	13	0	0	0	15	0	28		13	15	54%
100022	2016M02	N	N	N	N	13	0	0	0	16	0	29	0	13	16	55%
100022	2016M03	N	N	N	N	9	0	0	0	19	0	28	0	9	19	68%
102300	2016M01	N	N	Y	Y	67	1	48	1	54	0	170		115	54	32%
102300	2016M02	N	N	Y	Y	69	2	46	1	57	0	173		115	57	33%
102300	2016M03	N	N	N	Y	72	1	44	1	58	0	175		116	58	33%
102303	2016M01	N	N	Y	Y	40	0	8	0	31	0	79	0	48	31	39%
102303	2016M02	N	N	N	Y	41	0	9	0	28	0	78	0	50	28	36%
102303	2016M03	N	N	N	N	44	0	7	0	27	0	78	0	51	27	35%
102306	2016M01	Y	Y	Y	Y	0		1	0	5	0	6		1	5	83%
102306	2016M02	Y	Y	Y	Y	0		1	0	5	0	6		1	5	83%
102306	2016M03	Y	Y	Y	Y	0		1	0	5	0	6	0	1	5	83%

# NHSN QIP Report

Facility Org ID	CMS Certification Number	Summary Year/Month	DE on Reporting Plan	Dialysis Event Numerator Reported	Dialysis Event Denominator Reported	Criteria Met this Month
24309	102699	2016M01	Y	N	Y	N
24309	102699	2016M02	Y	N	N	N
24309	102699	2016M03	Y	N	N	N

# 21 Day Rule Suspect Report

Facility Org ID	CMS Certificat ion Number	First Event ID	Second Event ID	First Event Date	Second Event Date	# of Days Between Dialysis Events of Same Type	Dialysis Event Type
27550	102538	15523239	15543010	2/18/2016	3/8/2016	19	ABX
27062	102674	15517410	15532647	1/30/2016	2/9/2016	10	ABX
27670	102697	15544630	15555203	3/29/2016	4/2/2016	4	ABX
27212	102717	15531340	15550534	2/29/2016	3/5/2016	5	ABX
26286	102721	15535286	15550272	2/24/2016	3/9/2016	14	PRS
26286	102721	15535286	15550272	2/24/2016	3/9/2016	14	ABX
26990	102777	15526677	15537161	1/28/2016	2/16/2016	19	ABX



# Pop “Quiz”

Infection Prevention and Monitoring in the Dialysis Setting

# Question — Dialysis Events Reporting

Which of the following intravenous (IV) antimicrobial starts should you report in NHSN?

- a) Only ones related to a possible vascular access infection
- b) Only IV Vancomycin starts
- c) All starts of IV antibiotics or antifungals administered in an outpatient setting regardless of the reason
- d) All starts of IV antibiotics or antifungals administered in the facility and/or during patient's hospital admission

# Answer — Dialysis Events Reporting

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# Question — Dialysis Events Reporting

Which of the following positive blood cultures should you report in NHSN?

- a) All positive blood cultures collected in the facility and in the hospital
- b) All positive blood cultures collected as an outpatient
- c) Positive blood cultures collected on the day of or the day following hospital admission
- d) Only positive blood cultures that are thought to be related to hemodialysis

# Answer — Dialysis Events Reporting

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# Question — Denominator Reporting

How do you count a patient with multiple accesses?

- a) The patient is counted multiple times for each access type
- b) The patient is counted once and the vascular access that was in-use for dialysis is reported
- c) The patient is counted once and the vascular access with the highest risk of infection is reported

# Answer — Denominator Reporting

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# Question — Denominator Reporting

Which days of the month are used to count patients for the monthly denominator or patient census?

- a) The last two working days of the month
- b) The first two working days of the month
- c) The entire month



# Answer — Denominator Reporting

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# Question — 21 Day Rule: Scenario

Patient had positive blood cultures on March 1, 15, and 24. How many dialysis events would you report to NHSN?

- a) One event on March 1
- b) Two events on March 1 and March 24
- c) All three events
- d) Two events on March 1 and March 15

# Answer — 21 Day Rule: Scenario

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- a) One event on March 1
- b) Two events on March 1 and March 24**
- c) All three events
- d) Two events on March 1 and March 15

# Questions



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# Thank You!

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