

Making Advances in HAI Prevention in Hemodialysis Centers: the Role of Collaboratives

Priti Patel, MD, MPH

**Ambulatory and Long Term Care Team
Division of Healthcare Quality Promotion
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Outline

- **History & Context**
 - Inpatient efforts
- **Bloodstream Infection (BSI) Prevention & Collaborative Successes**
- **Other Challenges to Healthcare-Associated Infection (HAI) Prevention**
 - Environmental Disinfection
 - Injection Safety
 - Hand Hygiene & Glove Use

Dialysis and Burden of Bloodstream Infections (BSIs)

- **Central line-associated BSIs (CLABSIs)¹**
 - 37,000 estimated in hemodialysis outpatients
 - 41,000 in all inpatients
 - Attributable mortality: 12-25%
 - Cost: \$3,700 - \$28,000 per episode
- **Bloodstream infections in hemodialysis**
 - Hospitalizations for BSI increasing over time²
 - Priority prevention area in Dept of Health and Human Services National Action Plan³



1. CDC. MMWR 2011; 60(08);243-248

2. US Renal Data System. 2012 Annual Data Report. <http://www.usrds.org/adr.aspx>

3. <http://www.hhs.gov/ash/initiatives/hai/esrd.html>

**What is the Preventable Fraction of
Healthcare-Associated Infections?**

Study on the Efficacy of Nosocomial Infection Control (SENIC) Study

- **1971-1976**
- **Suggested 6% of all nosocomial infections could be prevented by minimal infection control efforts, 32% by “well organized and highly effective” infection control programs**

Patient Safety: Medical Errors and Infections

What proportion of healthcare infections are caused by errors...
i.e. are preventable?



The Psychology of Prevention

- **Some may have interpreted these data to mean that most healthcare associated infections are inevitable**
- **How has this influenced the way infection control programs operate?**
 - **Difficult to define success when achievable results unknown**
(what should the goal be?)

Setting a Goal of Zero

**Eliminating catheter-related bloodstream infections
in the intensive care unit**

Berenholtz, S et al. Critical Care Medicine. 32(10):2014-2020, October 2004

Maybe the Preventable Fraction is Much Larger than we Thought?

What proportion of healthcare infections are caused by errors...
i.e. are preventable?



Changing Beliefs Around the Preventable Fraction

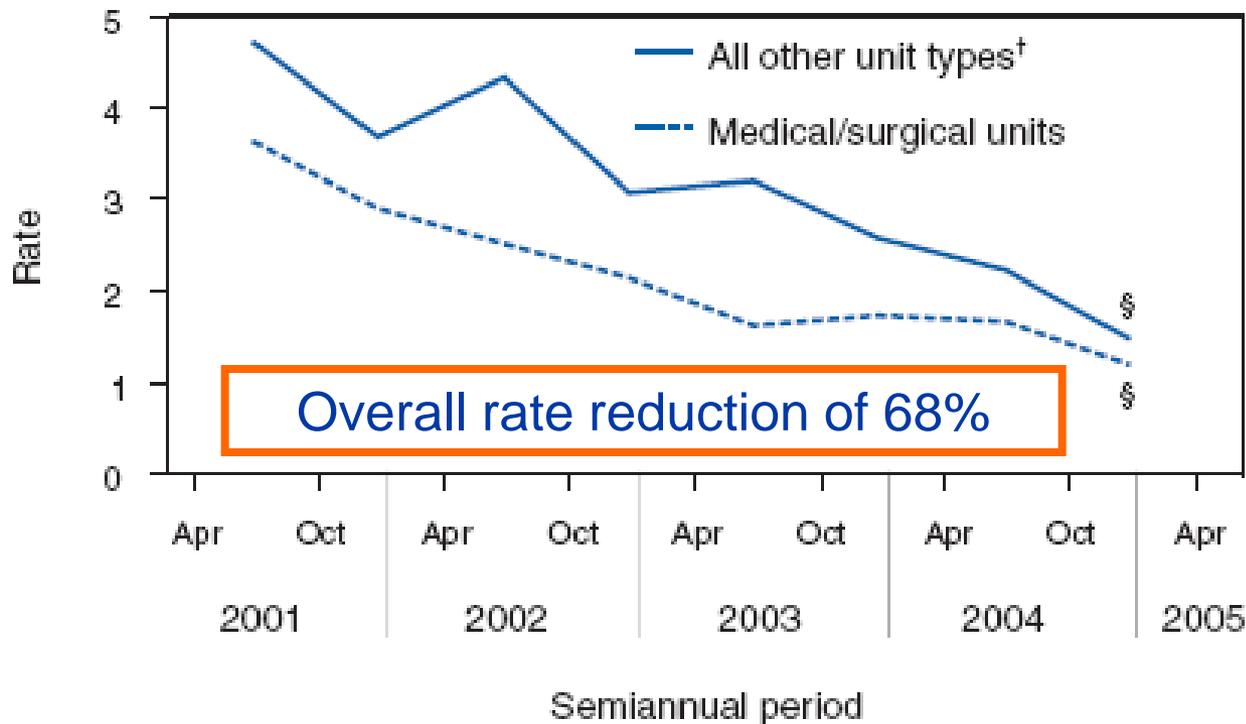
- **What do we know about the preventability of HAIs in dialysis patients?**
- **Do we have pre-conceived ideas?**
 - **Are CLABSIs inevitable in catheter-dependent patients?**
 - **Is hepatitis C virus infection a complication of hemodialysis?**
 - **Are outpatient dialysis centers too resource-strapped to be able to prevent HAIs?**
- **Regional collaboratives are a great way to challenge some of these ideas**

Lessons from Inpatient CLABSI Prevention

- **Regional initiatives in acute care settings showed CLABSIs are preventable with increased adherence to recommended practices:**
 - **Pittsburgh Regional Health Initiative involved 66 ICUs in 32 hospitals**
 - **Michigan Keystone Project involved 103 ICUs in 67 hospitals**
- **Key aspects**
 - **Uniform measurement system**
 - **Evidence-based practices**
 - **Checklists and other implementation tools**
 - **Education**

Pittsburgh Regional Health Initiative (66 ICUs, 32 hospitals)

FIGURE. Central line–associated bloodstream infection rate* in 66 intensive care units (ICUs), by ICU type and semiannual period — southwestern Pennsylvania, April 2001–March 2005



* Pooled mean rate per 1,000 central line days.

† Includes cardiothoracic, coronary, surgical, neurosurgical, trauma, medical, burn, and pediatric ICUs.

§ $p < 0.001$.

Michigan Keystone ICU Project (103 ICUs, 67 hospitals)

Table 3. Rates of Catheter-Related Bloodstream Infection from Baseline (before Implementation of the Study Intervention) to 18 Months of Follow-up.*

| Study Period | No. of ICUs | No. of Bloodstream Infections per 1000 Catheter-Days | | | | |
|-----------------------|-------------|--|-------------------|----------------------|-------------|---------------|
| | | Overall | Teaching Hospital | Nonteaching Hospital | <200 Beds | ≥200 Beds |
| | | <i>median (interquartile range)</i> | | | | |
| Baseline | 55 | 2.7 (0.6–4.8) | 2.7 (1.3–4.7) | 2.6 (0–4.9) | 2.1 (0–3.0) | 2.7 (1.3–4.8) |
| During implementation | 96 | 1.6 (0–4.4)† | 1.7 (0–4.5) | 0 (0–3.5) | 0 (0–5.8) | 1.7 (0–4.3)† |
| After implementation | | | | | | |
| 0–3 mo | 96 | 0 (0–3.0)‡ | 1.3 (0–3.1)† | 0 (0–1.6)† | 0 (0–2.7) | 1.1 (0–3.1)‡ |
| 4–6 mo | 96 | 0 (0–2.7)‡ | 1.1 (0–3.6)† | 0 (0–0)‡ | 0 (0–0)† | 0 (0–3.2)‡ |
| 7–9 mo | 95 | 0 (0–2.1)‡ | 0.8 (0–2.4)‡ | 0 (0–0)‡ | 0 (0–0)† | 0 (0–2.2)‡ |
| 10–12 mo | 90 | 0 (0–1.9)‡ | 0 (0–2.3)‡ | 0 (0–1.5)‡ | 0 (0–0)† | 0.2 (0–2.3)‡ |
| 13–15 mo | 85 | 0 (0–1.6)‡ | 0 (0–2.2)‡ | 0 (0–0)‡ | 0 (0–0)† | 0 (0–2.0)‡ |
| 16–18 mo | 70 | 0 (0–2.4)‡ | 0 (0–2.7)‡ | 0 (0–1.2)† | 0 (0–0)† | 0 (0–2.6)‡ |

* Because the ICUs implemented the study intervention at different times, the total number of ICUs contributing data for each period varies. Of the 103 participating ICUs, 48 did not contribute baseline data. P values were calculated by the two-sample Wilcoxon rank-sum test.

† P≤0.05 for the comparison with the baseline (preimplementation) period.

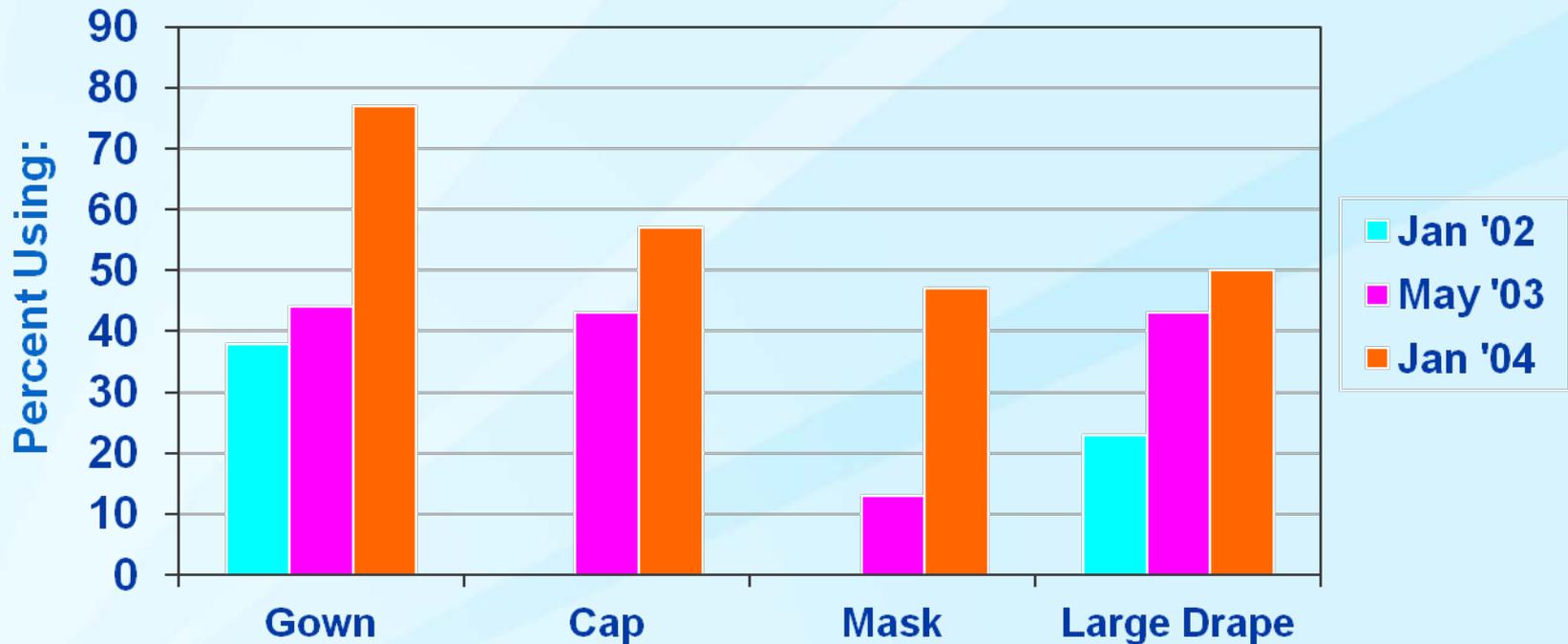
‡ P≤0.002 for the comparison with the baseline (preimplementation) period.

Overall rate reduction of 66%

As a Result

- **These initiatives have dramatically changed the way we view HAIs and our ability to impact HAI rates**
- **Practices used in these collaboratives have become the standard of care in hospitals nationwide**

Observed Barrier Precaution Use During Central Line Insertions, Hospital B



P-value for trend < 0.01 for all categories

Conclusions from Pittsburgh and Michigan Experiences

- **Decreases in central line-associated BSI rates >60% achieved in hospital ICUs of varying types**
- **The prevention practices utilized during these interventions were not novel**
 - **Improving adherence to existing evidence-based practices can prevent BSIs**
 - **Collaboration may be helpful in identifying and overcoming commonly shared barriers to adherence**

Conclusions from Pittsburgh and Michigan Experiences

- **Successful collaborative projects may be an important strategy for influencing global changes in practice that improve quality**
 - **Disarms uncertainties about preventability that can hamper improvement efforts**
 - **Helps identify practical strategies that can be successful across many facilities**

Following CDC Protocols Cuts Dialysis Bloodstream Infections in Half

CDC provides tools to help all U.S. dialysis facilities reduce potentially deadly infections

ARTICLE IN PRESS

AJKD

Original Investigation

Bloodstream Infection Rates in Outpatient Hemodialysis Facilities Participating in a Collaborative Prevention Effort: A Quality Improvement Report

Priti R. Patel, MD, MPH,¹ Sarah H. Yi, PhD,¹ Stephanie Booth, CCHT,² Virginia Bren, MPH, RN, CIC,³ Gemma Downham, MPH, CIC,⁴ Sally Hess, CIC, MPH,⁵ Karen Kelley, RN, BSN, CNN,² Mary Lincoln, BSN, MHA,⁶ Kathy Morrissette, RN, RVT,⁷ Curt Lindberg, DMan,⁸ John A. Jernigan, MD, MS,¹ and Alexander J. Kallen, MD, MPH¹

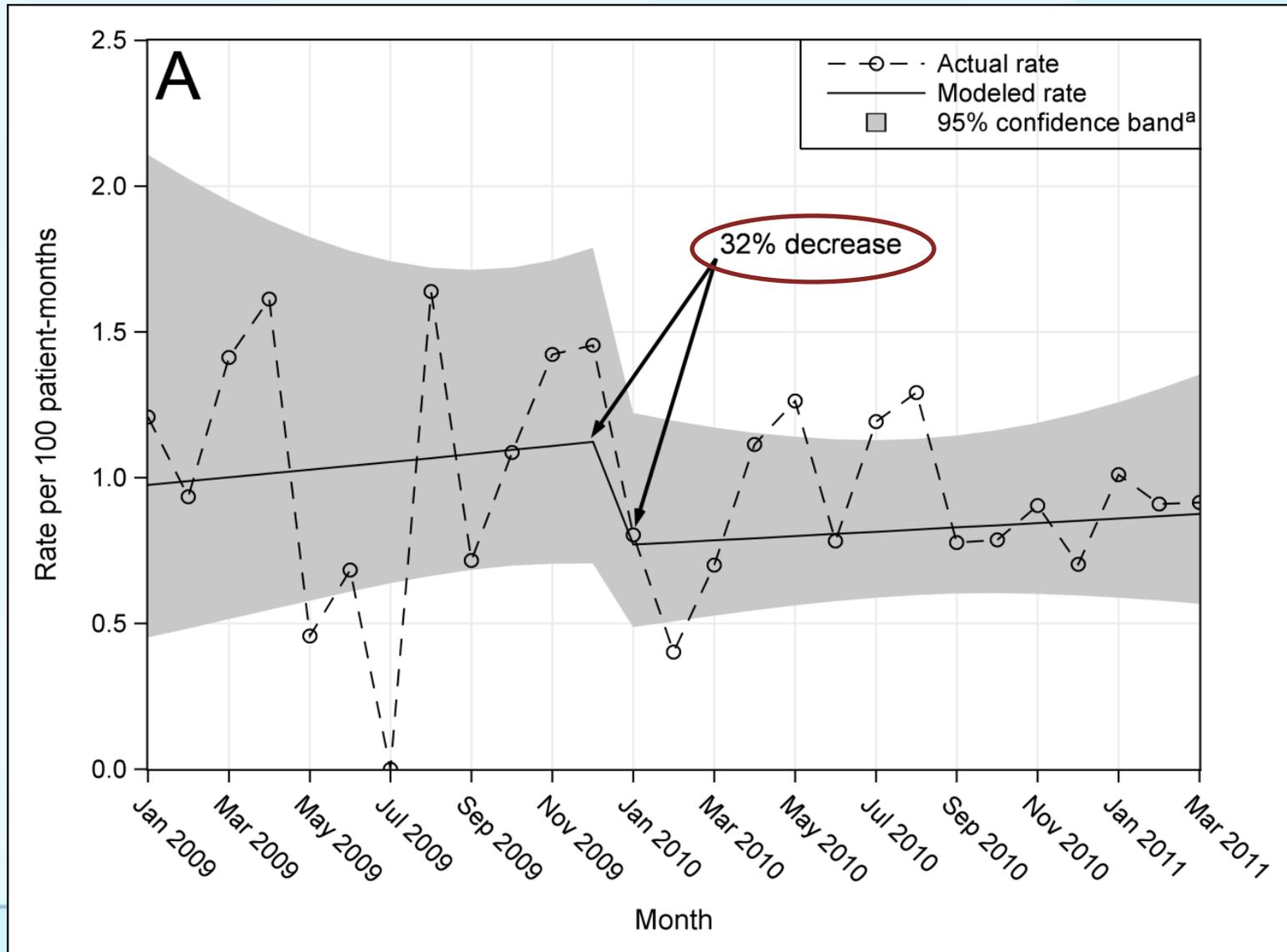
CDC Dialysis BSI Prevention Collaborative

2009 - Present

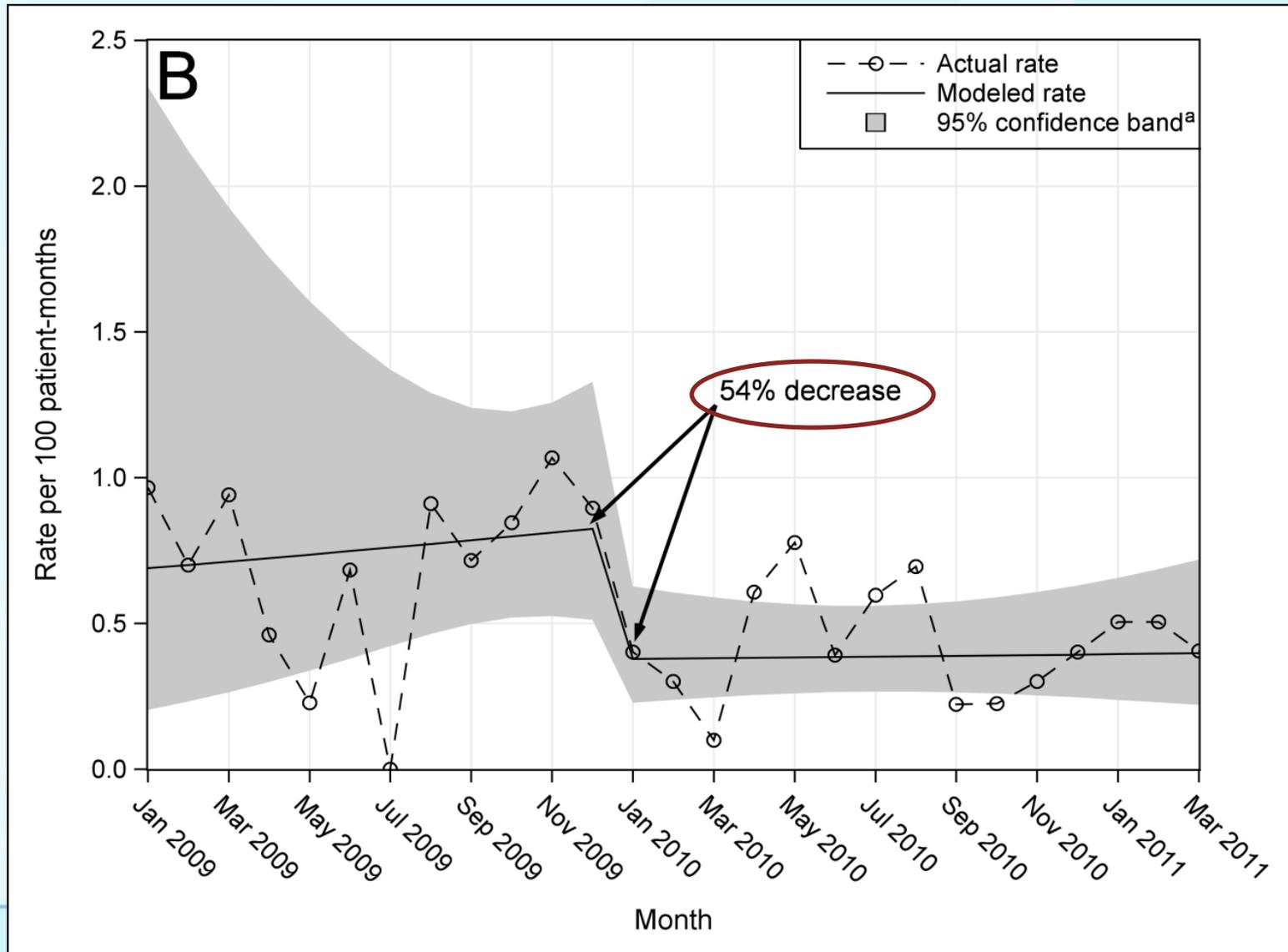


- ❑ **Collaborative approach to BSI prevention**
- ❑ **Goal to demonstrate preventability**
 - Through increased adherence to *existing* recommendations
- ❑ **Measure infection rates using NHSN**
- ❑ **Intervention package**
 - Based on CDC/HICPAC recommendations
 - Focus on catheter maintenance practices

Trends in Bloodstream Infections among 17 Facilities Participating in CDC Collaborative

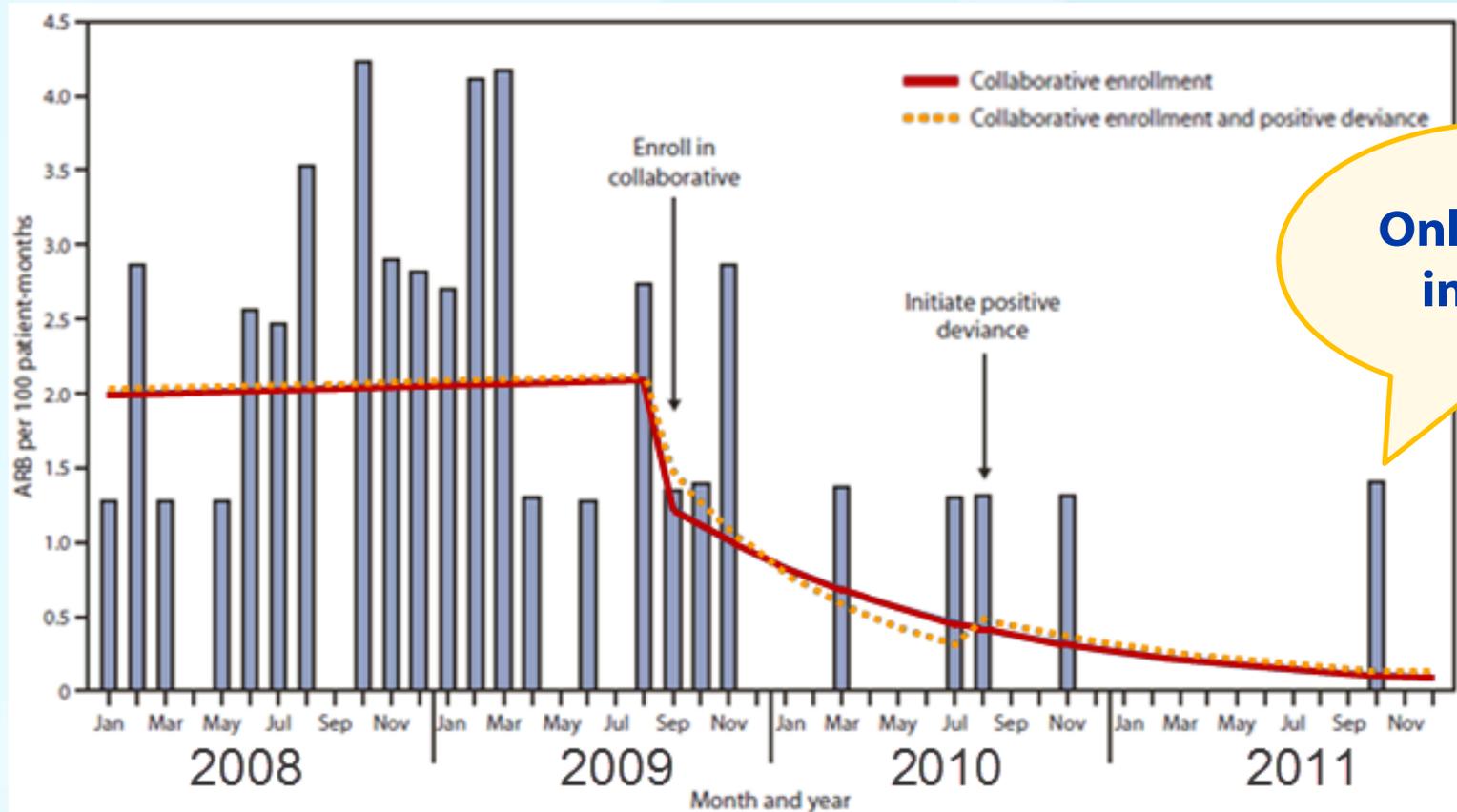


Trends in Access-Related BSIs among 17 Facilities Participating in CDC Collaborative



A Single Collaborative Facility in New Jersey

Reduced Access-Related Bloodstream Infection (ARB) rates from 2.04 → 0.24 per 100 patient-months



Only 1 ARB
in 2011

CDC Approach to BSI Prevention in Dialysis Facilities (i.e., the Core Interventions for Dialysis Bloodstream Infection (BSI) Prevention)



- 1. Surveillance and feedback using NHSN**
Conduct monthly surveillance for BSIs and other dialysis events using CDC's National Healthcare Safety Network (NHSN). Calculate facility rates and compare to rates in other NHSN facilities. Actively share results with front-line clinical staff.
- 2. Hand hygiene observations**
Perform observations of hand hygiene opportunities monthly and share results with clinical staff.
- 3. Catheter/vascular access care observations**
Perform observations of vascular access care and catheter accessing quarterly. Assess staff adherence to aseptic technique when connecting and disconnecting catheters and during dressing changes. Share results with clinical staff.
- 4. Staff education and competency**
Train staff on infection control topics, including access care and aseptic technique. Perform competency evaluation for skills such as catheter care and accessing every 6-12 months and upon hire.
- 5. Patient education/engagement**
Provide standardized education to all patients on infection prevention topics including vascular access care, hand hygiene, risks related to catheter use, recognizing signs of infection, and instructions for access management when away from the dialysis unit.
- 6. Catheter reduction**
Incorporate efforts (e.g., through patient education, vascular access coordinator) to reduce catheters by identifying and addressing barriers to permanent vascular access placement and catheter removal.
- 7. Chlorhexidine for skin antisepsis**
Use an alcohol-based chlorhexidine (>0.5%) solution as the first line skin antiseptic agent for central line insertion and during dressing changes.*
- 8. Catheter hub disinfection**
Scrub catheter hubs with an appropriate antiseptic after cap is removed and before accessing. Perform every time catheter is accessed or disconnected.**
- 9. Antimicrobial ointment**
Apply antibiotic ointment or povidone-iodine ointment to catheter exit sites during dressing change.***

* Povidone-iodine (preferably with alcohol) or 70% alcohol are alternatives for patients with chlorhexidine intolerance.
** If closed needleless connector device is used, disinfect device per manufacturer's instructions.
*** See information on selecting an antimicrobial ointment for hemodialysis catheter exit sites (at left). Use of chlorhexidine-impregnated sponge dressing might be an alternative.

For more information about the CDC Dialysis BSI Prevention Collaborative, please visit <http://www.cdc.gov/dialysis/collaborative/>

Set of 9 Core Interventions

Evidence-based CDC recommendations



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1. Surveillance and feedback using NHSN

- Conduct surveillance for BSIs and other dialysis events using CDC's NHSN
- Calculate facility rates and compare to rates in other facilities using NHSN
- Actively share results with front-line clinical staff



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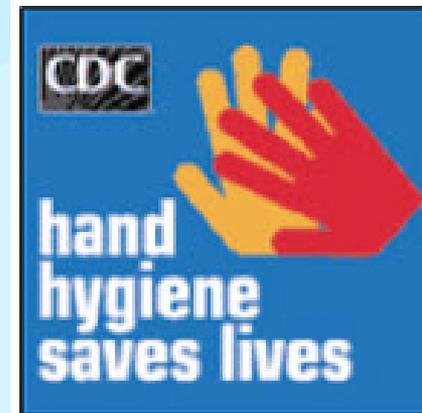
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2. Hand hygiene observations

Perform monthly hand hygiene audits with feedback of results to clinical staff.



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3. Catheter care/ vascular access care observations

Perform observations of
vascular access care and
catheter accessing quarterly.

Assess adherence to aseptic
technique when connecting
and disconnecting catheters
and during dressing changes.

Share results with clinical staff.

Audit Tool: Catheter Connection and Disconnection Observations

CDC Dialysis Collaborative Facility Name: _____ Date: _____ Start time: _____ AM / PM
 Day: M W F Tu Th Sa Shift: 1st 2nd 3rd 4th Observer: _____ Location within unit: _____

Audit Tool: Catheter connection and disconnection observations

(Use a "√" if action performed correctly, a "Φ" if not performed. If not observed, leave blank)

| Procedure observed, C=connect D=disconnect | Discipline | Mask worn properly (if required) | Hand hygiene performed | New clean gloves worn | Catheter removed from blood line aseptically (disconnection only) | Catheter hub scrubbed | Hub antiseptic allowed to dry | Catheter connected to blood lines aseptically (connection only) | New caps attached aseptically (after disconnecting) | Gloves removed | Hand hygiene performed |
|--|------------|----------------------------------|------------------------|-----------------------|---|-----------------------|-------------------------------|---|---|----------------|------------------------|
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Discipline: P=physician, N=nurse, T=technician, S=student, O=other

Duration of observation period = _____ minutes

Number of procedures performed correctly = _____

Total number of procedures observed during audit = _____

ADDITIONAL COMMENTS/OBSERVATIONS:



Making dialysis safer for patients

National Center for Emerging and Zoonotic Infectious Diseases

Division of Healthcare Quality Promotion



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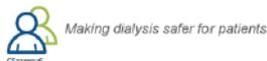
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Staff
education

Checklists: Hemodialysis Catheter Connection and Disconnection

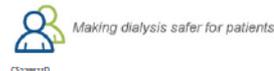
Checklist: Hemodialysis catheter connection

- Wear mask (if required)
- Perform hand hygiene
- Put on new, clean gloves
- Clamp the catheter and remove caps
- Scrub catheter hub with antiseptic
- Allow hub antiseptic to dry
- Connect catheter to blood lines aseptically
- Remove gloves
- Perform hand hygiene



Checklist: Hemodialysis catheter disconnection

- Wear mask (if required)
- Perform hand hygiene
- Put on new, clean gloves
- Clamp the catheter
- Disconnect catheter from blood lines aseptically
- Scrub catheter hub with antiseptic
- Allow hub antiseptic to dry
- Attach new caps aseptically
- Remove gloves
- Perform hand hygiene



Continuing Education Course

Infection Prevention in Dialysis Settings

Infection Prevention in Dialysis Settings

CDC has created a new continuing education course "Infection Prevention in Dialysis Settings" for outpatient hemodialysis healthcare workers, including technicians and nurses.

The 1-hour self-guided training course features a flash-based slide presentation and audio narration. The course reviews the following topic areas:

- Infections that patients can get from dialysis
- Infection control recommendations for outpatient hemodialysis healthcare workers, and
- Educating your patients and their caregivers.



Click here to launch the course: [Launch Course Now*](#)

* JavaScript must be enabled

Download the **[Infection Prevention in Dialysis Settings \(PPT - 12.15 MB\)](#)** 

If you want to receive Continuing Education for completing the course, you must complete a course assessment and evaluation using the Centers for Disease Control and Prevention (CDC) Training and Continuing Education Online (TCEOnline) system. You may access the system at:

www.cdc.gov/TCEOnline.

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5. Patient education/engagement

Provide standardized education to all patients on infection prevention topics including:

- Vascular access care
- Hand hygiene
- Risks related to catheter use
- Recognizing signs of infection
- Instructions for access management when away from the dialysis unit

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5. Patient education/engagement

Provide standardized education to all patients on infection prevention topics including:

- Vascular access care
- Hand hygiene
- Risks related to catheter use
- Recognizing signs of infection
- Instructions for access management when away from the dialysis unit

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Apply antibiotic ointment or povidone-iodine ointment to catheter exit sites during dressing change.***

* Povidone-iodine (preferably with alcohol) or 70% alcohol are alternatives for patients with chlorhexidine intolerance.

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6. Catheter reduction

Pursue efforts (e.g., through patient education, vascular access coordinator) to reduce catheters by identifying and addressing barriers to permanent vascular access placement and catheter removal.

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7. Chlorhexidine for skin antisepsis

Use an alcohol-based chlorhexidine (>0.5%) solution as the first line skin antiseptic agent, for central line insertion and during dressing changes.

Povidone-iodine, preferably with alcohol, or 70% alcohol are alternatives for patients with chlorhexidine intolerance.

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8. Catheter hub disinfection

Scrub catheter hubs with an appropriate antiseptic after the cap is removed and before accessing.

Perform every time catheter is accessed or disconnected.

If closed needleless connector device is used, disinfect per manufacturer's instructions.

Scrub-the-Hub Protocol

Hemodialysis Central Venous Catheter Scrub-the-Hub Protocol

This protocol outlines a suggested approach to preparing catheter hubs prior to accessing the catheter for hemodialysis. It is based on evidence where available and incorporates theoretical rationale when published evidence is unavailable.

Definitions:

Catheter refers to a central venous catheter (CVC) or a central line

Hub refers to the end of the CVC that connects to the blood lines or cap

Cap refers to a device that screws on to and occludes the hub

Limb refers to the catheter portion that extends from the patient's body to the hub

Blood lines refer to the arterial and venous ends of the extracorporeal circuit that connect the patient's catheter to the dialyzer

Catheter Connection and Disconnection Steps:

Connection Steps

1. Perform hand hygiene and don new clean gloves.
2. Clamp the catheter (*Note: Always clamp the catheter before removing the cap. Never leave an uncapped catheter unattended.*)
3. Disinfect the hub with caps removed using an appropriate antiseptic (*see notes*).
 - a. (*Optional*) Prior to cap removal, disinfect the caps and the part of the hub that is accessible and discard the antiseptic pad (i.e., use a separate antiseptic pad for the next step).
 - b. Remove the caps and disinfect the hub with a new antiseptic pad for each hub. Scrub the sides (threads) and end of the hub thoroughly with friction, making sure to remove any residue (e.g., blood).
 - c. Using the same antiseptic pad, apply antiseptic with friction to the catheter, moving from the hub at least several centimeters towards the body. Hold the limb while allowing the antiseptic to dry.
 - d. Use a separate antiseptic pad for each hub/catheter limb. Leave hubs "open" (i.e., uncapped and disconnected) for the shortest time possible.

4. Always handle the catheter hubs aseptically. Once disinfected, do not allow the catheter hubs to touch nonsterile surfaces.
5. Attach sterile syringe, unclamp the catheter, withdraw blood, and flush per facility protocol.
6. Repeat for other limb (this might occur in parallel).
7. Connect the ends of the blood lines to the catheter aseptically.
8. Remove gloves and perform hand hygiene.

Disconnection Steps:

1. Perform hand hygiene and don new clean gloves.
2. Clamp the catheter (*Note: Always clamp the catheter before disconnecting. Never leave an uncapped catheter unattended.*)
3. Disinfect the catheter hub before applying the new cap using an appropriate antiseptic (*see notes*).
 - a. (*Optional*) Disinfect the connection prior to disconnection. If this is done, use a separate antiseptic pad for the subsequent disinfection of the hub.
 - b. Disconnect the blood line from the catheter and disinfect the hub with a new antiseptic pad. Scrub the sides (threads) and end of the hub thoroughly with friction, making sure to remove any residue (e.g., blood).
 - c. Use a separate antiseptic pad for each hub. Leave hubs "open" (i.e., uncapped and disconnected) for the shortest time possible.
4. Always handle the catheter hubs aseptically. Once disinfected, do not allow the catheter hubs to touch nonsterile surfaces. Hold the catheter until the antiseptic has dried.
5. Attach the new sterile caps to the catheter aseptically. Use caution if tape is used to secure caps to the catheter (*see notes*).
6. Ensure that catheter is still clamped.
7. Remove gloves and perform hand hygiene.

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Notes/Discussion:

Antiseptic Use and Selection

As described in the 2011 CDC/Healthcare Infection Control Practices Advisory Committee (HICPAC) Guidelines for the Prevention of Intravascular Catheter-Related Infections, prior to accessing the catheter hub it should be disinfected with an appropriate antiseptic (greater than 0.5% chlorhexidine with alcohol, 70% alcohol, or 10% povidone-iodine). There is not enough evidence to recommend one antiseptic over the others. Generally, antiseptics should be allowed to dry for maximal effect.

If using 70% alcohol, sterile antiseptic pads should be used (sterile pads are labeled sterile and packaging for nonsterile pads often does not state whether the pads are sterile or nonsterile). For practical reasons, pads or similar products might be preferred over other forms of antiseptics (e.g., swabsticks) for disinfecting the catheter as they are malleable and allow for vigorous cleaning of small spaces.

If using an antiseptic that leaves a residue (e.g., chlorhexidine), avoid allowing large amounts of antiseptic to enter the lumen of the catheter to avoid potential toxicities to the patient.

If using chlorhexidine, removing all blood residue is particularly important to maximize the effect of the antiseptic.

Soaking Caps

The role of soaking caps in an antiseptic prior to removing them is not clear. It is not a CDC/HICPAC recommendation. This procedure is described in the 2000 National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) Vascular Access Guidelines but was not included in the 2006 update.

Handling Catheter Hubs

Catheter hubs should always be handled aseptically. Once disinfected, the catheter hubs should not be allowed to touch nonsterile surfaces. This might be best performed by holding them until the antiseptic dries. During this time, the staff member performing the procedure should also ensure that the catheter remains clamped.

When disinfecting catheter hubs, clean, nonsterile gloves can be used if aseptic technique is maintained.

Bloodline Disinfection

When accessing the line, disinfecting the ends of the sterile blood lines is not required if care has been taken not to contaminate the ends of the blood lines (i.e., through careful aseptic technique). Blood lines can become contaminated during connections and disconnections, as well as during the priming process. Contact with contaminated prime waste in prime buckets that have not been properly cleaned and disinfected or through backflow from waste handling ports must be avoided. Disinfecting the bloodlines does not address this issue.

Disconnection and Line Reversals

Catheter hubs should be disinfected again after disconnecting from bloodlines and before replacing a new cap at the end of a treatment. This should be done in a manner similar to that used when disinfecting the hub prior to accessing. Disinfecting the catheter hub and the end of the extracorporeal blood line should also be performed if, during a treatment, a patient must be disconnected and their blood is re-circulated. Anytime a patient's circuit is disconnected this should be done aseptically and the number of times a patient's catheter is disconnected from the blood lines should be minimized to the extent possible.

Securing Caps with Tape

Caution should be used if taping caps on to hubs between treatments. Tape can leave residue on the hubs that might make disinfecting them more difficult.

Use of Masks

Although data supporting the use of masks during catheter accessing/deaccessing to prevent vascular access infections is lacking, this practice is recommended for patients and staff in the 2000 KDOQI guidelines and is included in the Centers for Medicare and Medicaid Services (CMS) End Stage Renal Disease Program Conditions for Coverage Interpretive Guidance.

Personal Protective Equipment (PPE)

Proper PPE should always be worn by staff to avoid exposure to potentially infectious blood and body fluids when connecting/disconnecting catheters.

Aseptic Technique

This includes practices that prevent the contamination of clean/sterile items and surfaces. Once tasks requiring aseptic technique have been started, care must be taken to avoid contamination of gloves and other clean/sterile items that can occur when touching dirty surfaces (e.g., positioning patient, using computer keyboard).

Selected References:

1. National Kidney Foundation. KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for 2006 Updates: Hemodialysis Adequacy, Peritoneal Dialysis Adequacy and Vascular Access. *Am J Kidney Dis* 2006; 48 (suppl 1):S1-S322.
2. National Kidney Foundation. KDOQI Clinical Practice Guidelines for Hemodialysis Adequacy, 2000. *Am J Kidney Dis* 2001; 37 (suppl 1):S7-S64.
3. O'Grady NP, Alexander M, Burns LM, et al. Guideline for the prevention of intravascular catheter-related infections. *Clin Infect Dis* 2011; 52:e162-e193.

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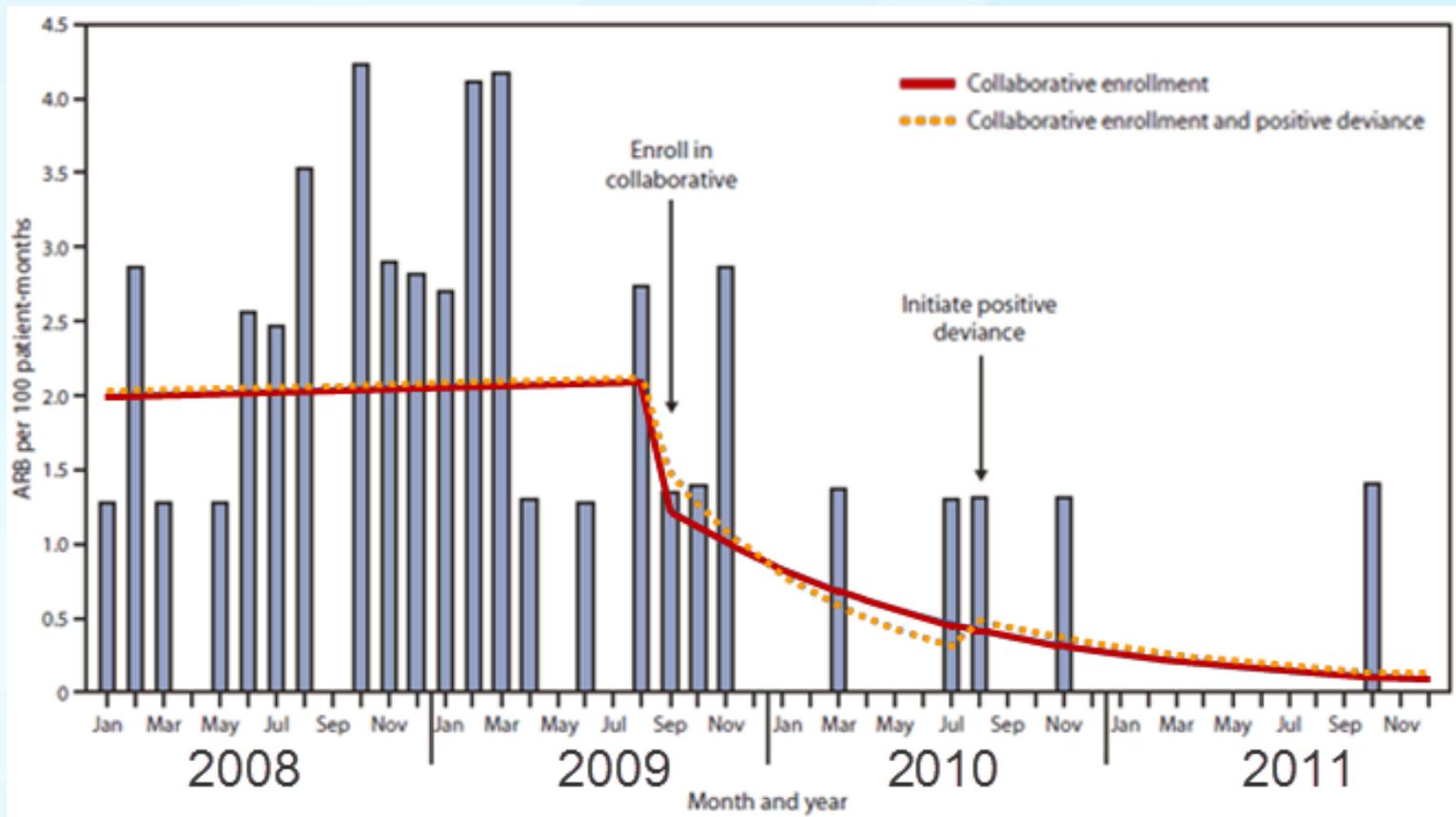
Info on selecting an antimicrobial ointment on CDC website.

Chlorhexidine-impregnated sponge dressing might be an alternative.

**Going From 'What' to 'How':
CDC Can Help Inform What to Do,
Facilities Innovate around How**

A Single Collaborative Facility in New Jersey

Facility uses a process to engage all staff in problem-solving



Collaborative Reports: Strategies, Challenges

- ❑ Curt Lindberg, DMan, MHA; Gemma Downham, MPH, CIC; Prucia Buscell, BA; Erin Jones, RN, BSN; Pamela Peterson, RN, BSN, MBA; Valdis Krebs, MLIR. **Embracing collaboration: A novel strategy for reducing bloodstream infections in outpatient hemodialysis centers.** *American Journal of Infection Control*, Article in Press.
- ❑ Sally Hess, CIC, MPH; W. Kemper Alston, MD, MPH; Margaret Bushey, RN; Jeffrey Rimmer, MD. **A Four Year Experience with a Central Line Access-Related Bloodstream Infection (CL-ARB) Prevention Program in Six Outpatient Hemodialysis (HD) Centers.** Presented at ID Week 2012. San Diego, CA. Saturday, October 20, 2012.
- ❑ Centers for Disease Control and Prevention (CDC). (2012). **Reducing bloodstream infections in an outpatient hemodialysis center.** *Morbidity and Mortality Weekly Report*, 16(61), 169-173.
- ❑ Kallen, A.J., Patel, P.R., Hess, S. (2011). Intolerance of chlorhexidine as a skin antiseptic in patients undergoing hemodialysis. *Infection Control and Hospital Epidemiology*, 32(11), 1144-1146.
- ❑ Lincoln, M. (2011). Preventing catheter-associated bloodstream infections in hemodialysis centers: The facility perspective. *Nephrology Nursing Journal*, 38(5), 411-415.
- ❑ Preventing Bloodstream Infections in Hemodialysis Patients: the Patient Perspective



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A-Z Index [A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#) [N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#) <#>

Dialysis Safety

Patients who undergo dialysis treatment have an increased risk for getting a healthcare-associated infection (HAI). Hemodialysis patients are at a high risk for infection because the process of hemodialysis requires frequent use of catheters or insertion of needles to access the bloodstream. Also, hemodialysis patients have weakened immune systems, which increase their risk for infection, and they require frequent hospitalizations and surgery where they might acquire an infection.

Continuing Education Course Infection Prevention in Dialysis Settings

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Next Steps from CDC Perspective

Prevention Tools

| | Posted | Pending |
|---|--|--|
| General Infection Control | CE Course | Training Video, Print Materials |
| Hand hygiene | Audit Tool | NHSN Reporting Module – July 2013 |
| Catheter connection & disconnection | Audit Tool, Checklist | |
| Scrub-the-hub | Protocol | |
| Catheter exit site care | Audit Tool, Checklist | |
| Arteriovenous fistula/graft cannulation & decannulation | Audit Tool, Checklist | |
| Routine disinfection: environmental surfaces at dialysis station | Checklist, Notes Document | Audit Tool |
| Injection safety | | ?Audit Tool |

NHSN Outpatient Dialysis Center Practices and Policies Survey, 2012 (N=5,666)

| | n (%) of facilities |
|--|---------------------|
| Antiseptic used for catheter exit site care: | |
| Chlorhexidine | 1570 (27.7%) |
| Sodium hypochlorite solution | 2686 (47.4%) |
| Antimicrobial ointment used at catheter exit site | 854 (15.1%) |

The Dialysis Environment & Practice Patterns



Hemodialysis-Associated HCV Outbreaks

| Year | State | # Outbreak-associated infections | Breaches identified or suspected mode of transmission |
|------|-------|----------------------------------|--|
| 2008 | NY | 9 | Multiple breaches in infection control practice (unspecified) |
| 2009 | MD | 8 | Breaches in medication preparation and administration practices Breaches in environmental cleaning and disinfection practices |
| 2009 | NJ | 21 | Breaches in medication preparation and administration practices Breaches in environmental cleaning and disinfection practices |
| 2010 | TX | 2 | Breaches in infection control practice (unspecified) |
| 2011 | GA | 6 | Breaches in medication preparation Failure to maintain separation between clean and contaminated workspaces |
| 2012 | CA | 4 | Specific lapses in infection control not identified at the time of the investigation |

Of 16 healthcare-associated HCV outbreaks during 2008-2012, 6 (38%) were in outpatient hemodialysis centers

Common Themes

- **Patient overlaps in space and time (i.e., transmission from):**
 - One patient to the next at same station
 - One patient to another at adjacent stations
- **Breaches in medication preparation and administration practices**
 - Preparing medications in potentially contaminated areas
 - Mobile medication carts
 - Not wiping injection ports prior to accessing
- **Breaches in environmental cleaning and disinfection practices**
 - Surfaces wiped down with patient still at station
 - Rushed turnover processes

Challenges to

- **Environmental Cleaning & Disinfection**
- **Injection Safety**
- **Hand Hygiene & Glove Use**

Lack of Physical Barriers or Meaningful Separation Between Stations

Where does
one station
end
and another
begin



Lack of Physical Barriers or Meaningful Separation Between Stations

Where does one station end and another begin



Lack of Physical Barriers or Meaningful Separation Between Stations



“If we were really serious about infection control in dialysis centers, we would put up walls between stations”

Challenges to Proper Environmental Disinfection

- **No physical barrier between stations**
- **Frequent blood contamination of surfaces**
- **Staff feel pressured to turnover stations quickly**
- **Multi-tasking**
 - **Easy to miss surfaces, even entire stations**
 - **Recontaminate cleaned surfaces**
- **Shared computer charting stations within treatment station**
- **Difficult to clean surfaces, e.g. keyboards**

Challenges to Injection Safety

- **Lack of separate medication preparation room**
- **Preparing or storing medications in patient treatment area**
 - Or near contaminated items
- **Certain medications handled in a less stringent manner than others**
 - Heparin, saline, benadryl

Challenges to Proper Hand Hygiene (HH) & Glove Use

- **Time, emergency situations**
- **Lack of physical barriers between stations**
- **Countless indications for HH and glove changes**
 - High priority indications for HH can get missed
- **Computer charting stations within treatment station**
- **Rules for clean and dirty (sinks, surfaces) can cause confusion and hinder best practice**
- **Lack of patient engagement and participation**

Closing Thoughts...

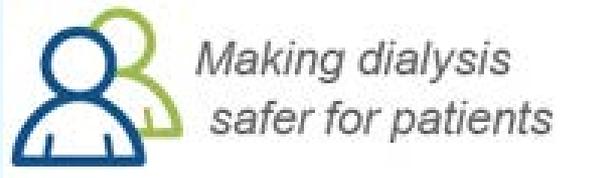
- **Preventable fraction of HAIs larger than we thought--especially for BSI**
- **BSI prevention efforts are still in an early stage, much work to be done**
- **We know a lot about how to prevent HAIs, less about how to get folks to do it**
- **Increasing adherence to known measures is where the action is**
- **Need innovative programs to increase adherence to recommended practices**

A Successful, Multi-Center BSI Prevention Collaborative For Hemodialysis Patients Will Have National Impact

Motivated hemodialysis centers who are interested in working in partnership with others to:

- Identify setting-specific barriers and challenges**
- Identify workable and practical solutions to those barriers**
- Be open to innovation**
- Collect and share data in a uniform fashion**
- Contribute to an effort that will likely have major and enduring impact on the health of hemodialysis patients not only in your center, but across the Nation**

Thanks!



<http://www.cdc.gov/dialysis/>

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: 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.

**National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion**



FUTURE NHSN MODULE

Prevention Process Measures – Hand Hygiene

- July 2013: optional hand hygiene surveillance



Department of Health and Human Services
Centers for Disease Control and Prevention

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- Event
- Procedure
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- Analysis
- Surveys
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- Log Out

Prevention Process Measures Monthly Monitoring for Dialysis

Mandatory fields marked with *

Facility ID*:

Location Code*:

Month*:

Year*:

[Print PDF Form](#)

Prevention Process Measures

Hand Hygiene

Total # Successful Opportunities*:

Total # Opportunities*:

Comments [HELP](#)

Custom Fields [HELP](#)