PREVENT HAIs Healthcare-Associated Infections

National Opportunity To Improve Infection Control in ESRD (NOTICE)

Phase Two Final Report

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Prepared by:

Health Research & Educational Trust

University of Michigan Kidney Epidemiology and Cost Center

Renal Network of the Upper Midwest, Inc. (Network 11)

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Introduction

Infection is the second leading cause of death for patients on dialysis; thus, reducing risk factors for infection in dialysis facilities is imperative. The National Opportunity to Improve Infection Control in End Stage Renal Disease (ESRD) (NOTICE) is an initiative of the Agency for Healthcare Research and Quality (AHRQ), in collaboration with the Centers for Disease Control and Prevention (CDC) and Centers for Medicare & Medicaid Services (CMS), conducted by the Health Research & Educational Trust (HRET), as well as the University of Michigan Kidney Epidemiology and Cost Center (UM-KECC) and the Renal Network of the Upper Midwest (Network 11) in order to reduce vascular access infections and improve safety culture in dialysis facilities.

Overview of Project Goals

This project comprised two phases; phase one focused on material development and evaluation while phase two focused on pilot project implementation.

The first phase of the NOTICE project was funded by AHRQ and had several specific goals:

- To develop an evidence-based infection control worksheet that could be used by facility staff and potentially CMS surveyors to assess the extent to which recommended infection control practices were adhered to;
- To evaluate this worksheet in a diverse set of dialysis facilities to assess how feasible it was to use and how helpful it might be for the audiences it was targeting; and
- To develop a process for helping facility staff to understand infection control practices and how to improve them while creating systems and a culture that sustains these improvements.

Phase two also was funded by AHRQ and focused on pilot testing materials developed in phase one in a set of ESRD facilities as well as disseminating findings of the program through publication and conference presentations. The main objective was to facilitate reductions in healthcare-associated infections (HAIs) in ESRD patients through the implementation of a comprehensive unit-based safety program (CUSP) change package designed to improve the quality of care for these ESRD patients.

Specifically, the project aimed to:

- Test whether the change package is effective in decreasing the incidence of bacterial infection;
- Assess whether and to what extent the change package enhances clinician knowledge regarding best practices in infection control; and
- Assess whether the change package improves facility infection control practices.

Collectively, these activities from both project phases directly contribute to the overall goal of reducing infections that occur within dialysis facilities. While the focus of the intervention was on vascular access infections, many of the recommended interventions were intended to also reduce other infections and safety risks in order to improve patients' experience and care.

Structure of Report

Because the two phases of this project are inextricably linked, this report provides a summary of phase one activities before focusing primarily on phase two activities. More in-depth information about phase one can be found in the Phase One Final Report. This Phase Two Final Report first discusses material development and then implementation of those materials. Finally, the report concludes with an analysis of the project findings and a discussion of the impact of the project.

Phase One Summary

Phase one of the NOTICE Initiative took place from September 2010 through September 2012. During that phase of the project, the following tasks were completed:

- Development of a literature review to assess infection control risks and infection control practices. This literature review was performed to ensure that the Infection Control Worksheet (ICWS) would reflect current knowledge of dialysis-related infections, in particular, vascular access infection causes and prevention.

- Development of an evidence-based checklist. Beginning in March 2011, the Phase One project team worked in conjunction with AHRQ, CMS, and CDC to develop the Infection Control Worksheets and Infection Control Checklists (ICWS/ICCL). Checklists were developed for use by facility staff seeking to improve their infection prevention practices. To ensure alignment with CDC guidelines and CMS oversight, the checklists also were developed to reflect the potential needs of surveyors. To accommodate both the facilities and surveyors, checklist versions for surveyors and facilities were developed. Both focus on the same set of infection prevention practices, but they have different structures to facilitate their use by distinct target audiences. In addition to these two sets of checklists, four informational sheets also were designed to inform facilities about the importance of infection control practices. The final version of the ICWS/ICCL is available in Appendix A.

- Testing of the checklist. Ideally, the checklists should be usable by the target audiences and have evidence that their results reflect other measures of infection prevention derived from other data sources. To assess these possibilities, the checklists were tested in a set of 34 volunteer facilities selected for their variability. A team of infection control evaluators (ICEs) implemented the checklists in these facilities, and all of the ICE site visits took place between October 24, 2011, and January 26, 2012. Summary reports for each of the visits, including the comments from the ICEs, were sent to each facility and its ESRD Network by February 9, 2012.

- Results from this test were then examined to assess the utility of the checklists for their intended purposes.

- Sharing of findings. Because infection prevention is an important priority for dialysis facilities, this project included resources to raise awareness of the checklist and its utility for facilities. Dissemination activities included Webinars, presentations at trade meetings, and papers and posters submitted for presentation at professional meetings.

- Development of an infection prevention change package or toolkit. This work, technically part of phase one of the contract, involved developing a change package that addresses behaviors that

directly impact vascular access risks and also the systems and culture within the facility that are likely to impact whether infection prevention practices are consistently followed.

Phase Two Summary

Phase two of the NOTICE Initiative took place from September 2012 through September 2014. During that phase of the project, the following tasks were completed:

- Development and refinement of educational tools. The change package developed in phase one was further refined. An additional video focused on patient engagement in infection prevention efforts was developed. An audit tool was developed to aid in monitoring implementation of the process improvement activities by facilities.

- Implementation of NOTICE intervention. The NOTICE intervention was implemented from January 2013 to April 2014. During this intervention, staff from facilities in two regions, Networks 6 and 11, participated in educational content and coaching calls; implemented checklists, culture changes, process changes, and process audits; and collected infection, culture, and process data.

- Dissemination of findings. The project team drafted two manuscripts, presented five poster presentations, and presented two oral presentations—one in person and one via Webinar—on the findings of the NOTICE project. Developed materials were promoted via Twitter, Network newsletters, HRET newsletters, APIC newsletters, and the CDC Dialysis Collaborative.

Tools and Materials

The NOTICE project team developed tools and materials in phases one and two for three main purposes: education, implementation, and data collection.

Educational Tools

CHARGE Change Package

The change package developed in phase one and refined in phase two served as the main educational component of NOTICE. This collection of PowerPoint presentations, facilitator notes, and accompanying tools was originally developed during summer and fall 2012 as eight original modules:

1. NOTICE Overview
2. Data Measurement
3. Data Collection
4. Patient Engagement
5. Care Provider Part One
6. Care Provider Part Two
7. Culture of Safety Part One
8. Culture of Safety Part Two

Each of these modules was developed to be presented as a 30- to 60-minute session focused on reducing vascular access infections (VAIs) through the CHARGE acronym:

- Culture of safety
- Hand hygiene
- Access site preparation
- Reduce and remove catheters
- Great connection and disconnection
- Evaluation

For final release on the AHRQ Web site, an additional module called Using Checklists and Audits To Improve Care in Hemodialysis Facilities was added, and modules were consolidated by topic areas. The final modules refined in phase two for release on AHRQ's Web site are titled:

- Culture of Safety in Hemodialysis Facilities—An Adaptation of "Introduction to CUSP" for Dialysis Facilities
- Patient and Family Engagement in Hemodialysis Facilities
- Clinical Care of the Hemodialysis Patient
- Using Checklists and Audits To Improve Care in Hemodialysis Facilities

Development and Review

A committee of project team members determined change package topics. AHRQ and a review committee of stakeholders then vetted the topics. Materials were shared with the stakeholder committee prior to four review calls. On each call, stakeholders provided feedback about additional content to include, structure, and appropriateness of delivery method for the audiences. Table 1 shows the date and topics of each call.

Table 1. Review Committee Calls

Date	Call Title	Topics
9/24/12	Review Committee Call One	Orientation Call, General Themes
10/9/12	Review Committee Call Two	Clinical Care
12/3/12	Review Committee Call Three	Culture of Safety, Data Measurement
12/17/12	Review Committee Call Four	Culture of Safety, Clinical Care
1/28/13	Review Committee Call Five	Patient and Family Engagement, Leveraging Data

Videos

Four video vignettes—two focused on proper clinical practice and two exhibiting different cultures of safety—were developed in fall 2012. A fifth video was developed in summer 2014. Each vignette is approximately five minutes long and has also been chunked into shorter, targeted segments. A committee of project team members determined content. The original four videos were filmed in Michigan at a participating dialysis facility. The fifth video is motion graphics and live action; the live

action was filmed in Washington, DC. While the videos were originally not intended to be used with the change package by facilities, suggestions for incorporating them were added to the change package facilitator notes to promote use and increase video reach. Three of the five videos are currently available on AHRQ's Web page (http://www.ahrq.gov/professionals/quality-patient-safety/patient-safety-resources/resources/esrd/index.html); the other two will be available after project completion.

Implementation Assessments

Readiness Assessment

A readiness assessment (Appendix B) was created to understand the quality improvement activities each of the participating facilities was already implementing. Each question related to a component of the CHARGE acronym. The assessment was modified from a readiness assessment already used in the On the CUSP: Stop Central Line Acquired Bloodstream Infections and On the CUSP: Stop Catheter Associated Urinary Tract Infections projects.

Exit Assessment

The readiness assessment was modified to create an exit assessment with parallel structure. This assessment (Appendix C) helped the team understand which quality improvement activities each of the participating facilities implemented during NOTICE and the activities they planned to continue after NOTICE. Each of the questions relates to a component of the CHARGE acronym and asks whether an action was implemented fully before NOTICE, fully during NOTICE, or not fully during NOTICE, and whether implementation will continue after NOTICE.

Data Collection Tools

Audit Tool

NOTICE facilities were required to participate in a monthly audit of process-related procedures. The audit included hand hygiene throughout treatment, initiation of dialysis treatment on patients with central venous catheter access (CVC or catheter), termination of dialysis treatment on patients with CVC, exit-site care of CVCs, arteriovenous (AV) access initiation, and AV access termination procedures. The audit was completed by a facility nurse, staff member, or patient who observed multiple days, shifts, and staff members each month in order to capture a variety of observations. The audit was unannounced, and the auditor did not influence staff practices while observing. Each month, the auditor was required to observe 10 hand hygiene moments, and 5 initiation and 5 termination procedures for both fistula/graft and catheter access types. Hand hygiene moments were defined as any time hand hygiene should be performed, such as initiating a procedure, touching a patient, or touching a dialysis machine (denoted as HH1, HH2, etc. depending on sequence during procedure). In addition, five catheter exit-site care procedures were observed. Data from the audits were submitted through HRET's Comprehensive Data System. This tool is included as Appendix D.

The audit was used to assist facilities in evaluating processes and procedures that could be associated with infection in order to identify areas where improvement could be made. The information collected was summarized and returned to facilities in the facility feedback reports to aid in quality improvement activities. Please see attached Process Audit Tool and Process Measures Instructions in Appendix E.

Culture of Safety Assessment

A 12-question culture of safety assessment (Appendix F) was developed for the project. In development, the project team determined that brevity was important to facility staff who would be completing the assessments. To that aim, the team created the 2-page assessment comprising 11 questions selected

from the Hospital Survey on Patient Safety Culture (HSOPS) and 1 question about patient-provider relations. Dialysis-specific demographic and work status questions were used instead of the demographic questions from HSOPS.

Data Sources

CMS Claims

The UM-KECC ESRD Database includes administrative and billing records for all Medicare ESRD beneficiaries. These data are used to produce the facility-level Dialysis Facility Reports (DFRs) and, through a data-reuse agreement with CMS, are available to the NOTICE team for analysis. The DFR data include infection rates, deaths due to infection, hospitalizations due to septicemia, large dialysis organization (LDO) affiliation, urban/rural status, and other facility characteristics.

The Medicare claims-based infection rate is defined as: Hemodialysis access-related infections per 100 hemodialysis patient months based on ICD-9 code 996.62 (Infection or inflammatory reaction due to vascular device, implant, or graft) reported on Medicare inpatient and outpatient claims. A patient can only contribute one infection to a facility during a calendar month. The rate is calculated by summing the patient-months with an access-related infection and dividing by the number of eligible hemodialysis patient-months. The number is then converted to a rate per 100 patient-months.

National Healthcare Safety Network (NHSN)

Background

In phase two of the NOTICE initiative, 55 facilities provided relatively complete NHSN data on infection rates during the period from October 2012 through April 2014. Data on infection rates for each facility were obtained through the NHSN as well as through CMS claims data. The NHSN data include monthly patient count data and dialysis event data (e.g., vascular access infection, bacteremia) from which infection rates could be calculated per 100 patients each month.

Measures Collected

Two infection-related outcomes were developed and considered from the NHSN data sources. Results of analyses assessing relationships between ICWS information and these outcomes are presented in the appendix of this report. The infection rates are measured in terms of number of events per 100 patient-hemodialysis months. The specific outcomes are defined as follows:

- NHSN VAI Rate: Vascular access infection rate as reported through the NHSN. The event is defined as either a local access site infection (pus, redness, or swelling of the vascular access site and bloodstream infection is not present) or an access-related bloodstream infection (positive blood culture with the suspected source identified as the vascular access site or uncertain). The rate is calculated by summing the number of hemodialysis patients in a facility with a vascular access infection event reported in NHSN during the month and dividing by the number of hemodialysis patients. The number is then converted to a rate per 100 hemodialysis patient-months. A patient can contribute more than one event per month per NHSN reporting instructions, which specify that 21 or more days must exist between two dialysis events. If fewer than 21 days exist, the second event is not considered new and should not be reported.

- NHSN Positive Blood Culture Rate: The event is defined as any positive blood culture irrespective of cause as reported through the NHSN. The rate is calculated by summing the number of hemodialysis patients in a facility with a bacteremia event reported in NHSN during the month

and dividing by the number of hemodialysis patients. The number is then converted to a rate per 100 hemodialysis patient-months. A patient can contribute more than one event per month as per the NHSN reporting instructions mentioned above.

Comprehensive Data System

The HRET Comprehensive Data System (CDS) is a secure, Web-based data collection system. Users must have a connection to the Internet and a browser that supports SSL (secure socket layer) encryption. All NOTICE facilities were given unique login IDs for CDS. Prior to use in NOTICE, HRET partners used CDS in On the CUSP: Stop CAUTI (catheter-associated urinary tract infections) and the Hospital Engagement Network projects. Evaluations of content calls, readiness assessments, exit assessments, and audit data were collected through CDS. Quarterly feedback reports were generated by UM-KECC and distributed via CDS.

Implementation

Recruitment

Sampling

UM-KECC assessed infection rates based on claims data for dialysis facilities in Networks 6 and 11 (see ESRD Network Selection below), facility type (LDO or other), and a minimum patient count for participation. KECC provided Networks 6 and 11 with a spreadsheet listing facilities in each participating Network (6 and 11) and the following information:

- Medicare provider number;
- provider name;
- dialysis organization name (if applicable);
- 2011 Medicare claims ICD-9 access-related infection rate from 2012 DFR;
- infection tertile (based on Medicare claims infection rate): low (0–1.44), medium (1.45–2.58) and high (>2.58);
- size tertile: small (20–61 patients), medium (62–105 patients), large (> 105 patients);
- dialysis organization affiliation (yes, no); and
- a random number, added for the purpose of random facility selection. Facilities with fewer than 20 patients in 2011 were excluded.

Following the UM-KECC stratification process, Networks 6 and 11 invited dialysis facilities to participate until the facility sample was recruited for 30 dialysis facilities per Network, for a total of 60 dialysis facilities in phase two of the NOTICE project.

Table 2 describes the recruitment strategy.

Table 2. Recruitment Stratification

Infection category	Dialysis Organization	Number to recruit for Network 6	Number to recruit for Network 11
Low	DO	9	8
Low	Non-DO	1	2
Medium	DO	9	8
Medium	Non-DO	1	2
High	DO	9	8
High	Non-DO	1	2
	Total	**30**	**30**

Methods

ESRD Network Selection

The following two ESRD Networks were selected to participate in phase two of the NOTICE project based on pre-existing relationships:

- The Southeastern Kidney Council (Network 6), which represents North Carolina, South Carolina, and Georgia.
- The Renal Network of the Upper Midwest (Network 11), which represents Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.

Dialysis Facility Recruitment Outreach Activities

Using the information from UM-KECC, each Network recruited 10 dialysis facilities from each tier (low, medium, and high infection-rate facilities). Outreach was conducted via personal telephone calls with dialysis facility management. For dialysis facilities affiliated with LDOs and regional chains, Networks contacted management from the corporate organization to gain support prior to contacting the individual facilities. Networks maintained a directory of the specific contact information for each facility.

Dialysis Facility Recruitment Resources

Once a facility agreed to participate, Networks shared the informational recruitment flier (Appendix G), commitment letter (Appendix H), and CDS User Manual (Appendix I) with them. Network staff provided technical assistance to the dialysis facilities to ensure that facilities understood all processes involved. An informational Webinar was held to provide an overview of how to register and submit data into CDS. HRET generated regular reports that showed which facilities had registered in CDS. These lists were distributed to Networks 6 and 11, which then provided additional assistance to facilities not registered.

Nonparticipation

If a facility declined the opportunity to participate in the NOTICE project, Network staff made an additional contact to encourage participation. During this call, barriers to participation were discussed and offers of technical assistance were made. If dialysis facilities were still unable to participate, a substitute facility was selected.

Substitutions were made based on the original tier system for infection rate, facility provider type, and size. Four facilities of the original 60 contacts (7%) chose not to participate for reasons of low dialysis facility staffing and other operational concerns at the dialysis facility.

Of the original 60 participating dialysis facilities, 54 (90%) submitted data through the project's conclusion. The six dialysis facilities (10%) unable to complete the project withdrew because of changes in administration or reductions in dialysis facility staff. Once the project was underway, the facilities that withdrew were not replaced due to the difficulty of training new facilities while the project was in progress.

Quality Improvement Activities

Kickoff Meeting

The project was launched with a Webinar presented on February 6, 2013. Fifty-four facilities participated on the call. The Webinar was recorded and the link distributed to all project facilities following the call. The following topics were included in this kickoff Webinar:

- Impact of HAIs in the hemodialysis patient population
- Overall purpose of the NOTICE project
- Description of the NOTICE activities
- Introduction to the CHARGE acronym as a way to remember the six strategies for reducing infections

Readiness Assessment

Following the kickoff Webinar, each facility was asked to complete a readiness assessment. The assessment addressed facility knowledge and practices on topics aligned with the CHARGE strategies. Specifically, the following topics were assessed:

- Presence of a culture of safety
- Regular education on proper techniques for hand hygiene
- Regular education on proper technique for vascular access preparation and cleansing
- Monitoring of appropriate catheter reduction
- Implementation of guidelines for vascular access connection and disconnection technique
- Regular collection of vascular access infection data and monitoring of adherence to procedures

Each facility completed the readiness assessment in CDS. No facility-specific responses were released. Fifty-seven of 60 (95%) of dialysis facilities responded to the assessment. Results of the readiness assessment showed the following:

- 46/57 (81%) of facilities had already implemented some infection control procedures outside of the NOTICE project.
- 48/57 (82%) of facilities knew their vascular access infection rate.
- 29/57 (51%) had educated their staff on the science of safety.

- 39/57 (68%) had regularly scheduled huddles to discuss harmful events.

While the majority of facilities had implemented infection control processes, opportunities remained for improvement in specific areas.

Content Calls

A series of six bimonthly content calls were conducted between February and May 2013 (Table 3). Each call was recorded and the link forwarded to all facilities participating in NOTICE. Those facilities not in attendance were specifically asked to watch the recording and report to the Network when they had completed that task. Representatives from all facilities viewed the Webinars either live or recorded. The content calls covered a variety of topics related to the project.

Table 3. Content Calls

Date	Topic	Attendance
2/13/2013	Data Management	54
3/6/2013	Culture of Safety, Part One	64
3/27/2013	Clinical Care, Part One	56
4/17/2013	Clinical Care, Part Two	47
5/8/2013	Culture of Safety, Part Two	74
5/29/2013	Leveraging Data	49

Participants evaluated each Webinar. Overall, the evaluations were positive, with a majority of respondents rating the presentations as “excellent” or “good” (Table 4). In addition, 83.3 percent of respondents stated they would make some kind of change to their practice because of the sessions (Figure 1). Participants also rated content of each Webinar individually (Figure 2).

Table 4. Content Call Evaluation Responses

Question	Excellent	Good	Fair	Poor
Rate the amount of useful information and ideas presented	49.6%	44.4%	5.7%	0.2%
Rate the learning environment and circumstances	53.7%	39.6%	6.4%	0.3%
Rate this activity for the usefulness to your dialysis facility of the information and ideas presented	47.2%	43.8%	8.2%	0.8%
Rate the chance that the information and ideas presented will improve your effectiveness and results	44.6%	44.6%	9.9%	1.0%

Figure 1. NOTICE Participant Evaluation Ratings for Overall Program Educational Content

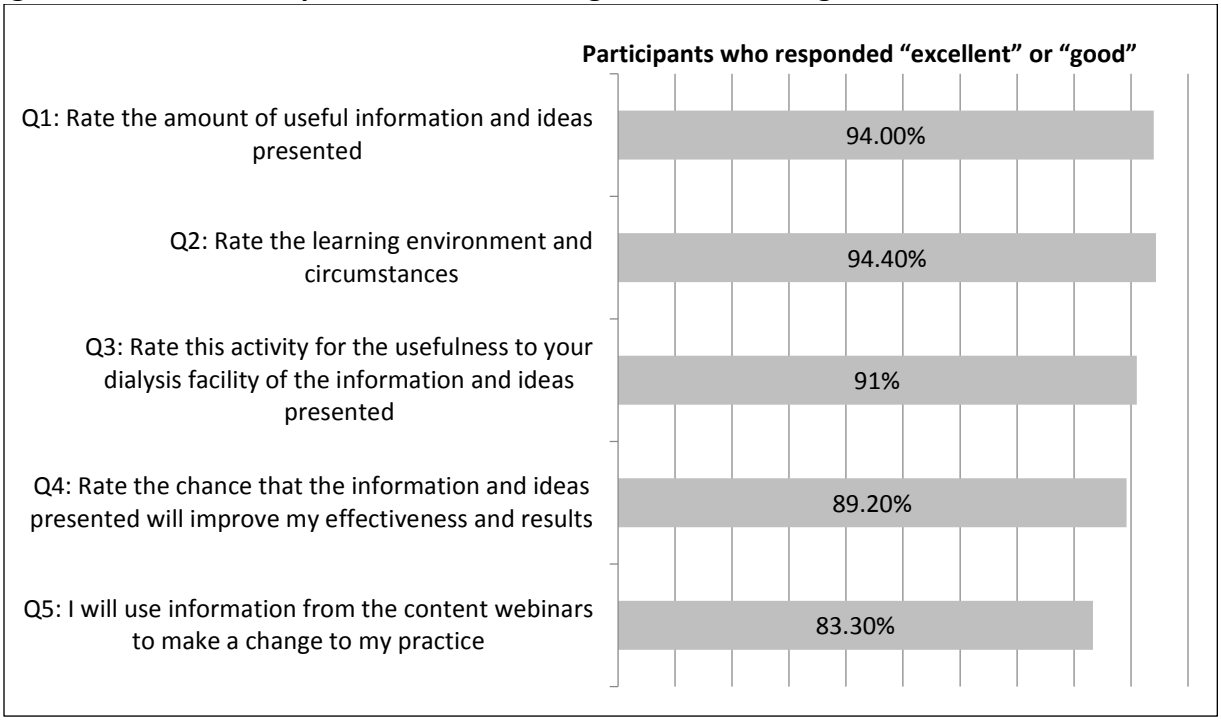
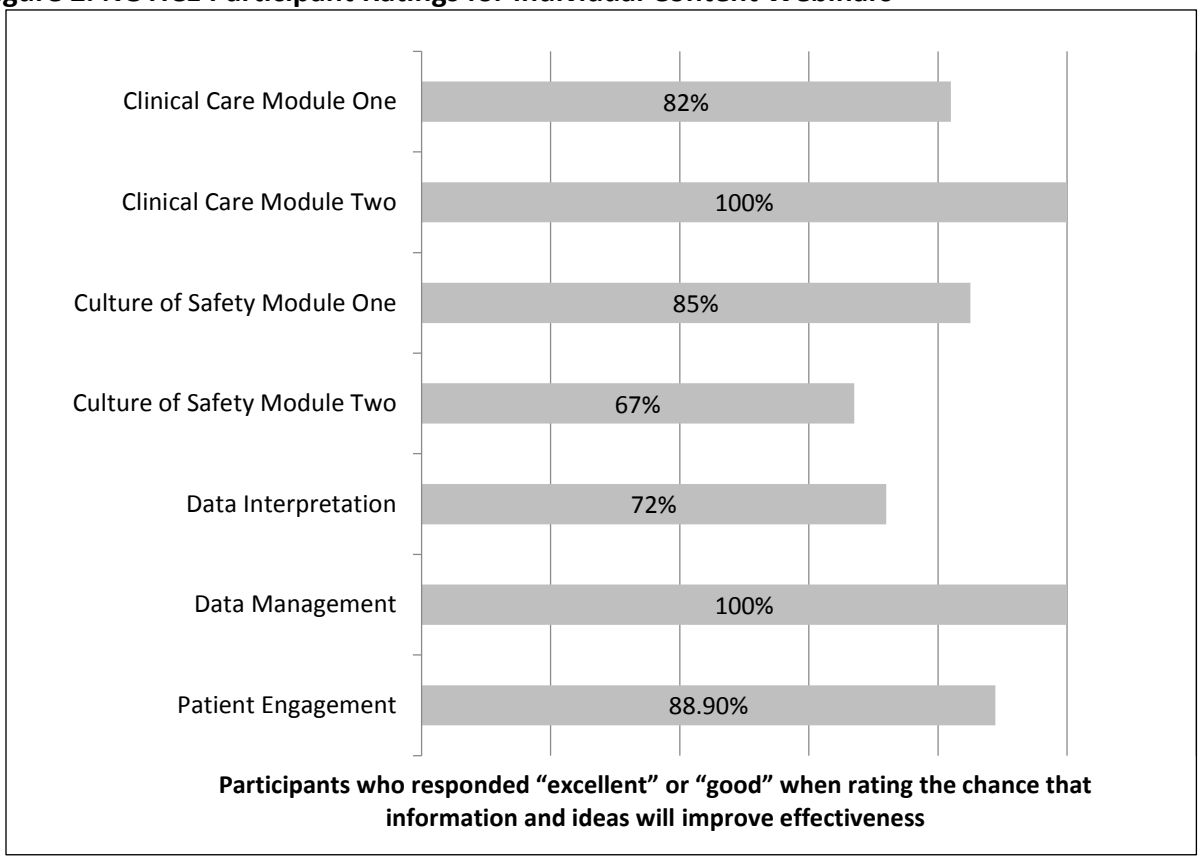


Figure 2. NOTICE Participant Ratings for Individual Content Webinars



Coaching Calls

Twelve coaching calls were conducted monthly from March 2013 to March 2014 (Table 5). These calls included presenting data when available and discussing clinical issues and culture of safety. Initially, Networks 6 and 11 staff conducted the calls, but following feedback from the facilities, outside speakers were invited to participate. Evaluations from the sessions were generally positive, with the highest ratings for those calls with either facility or patient participation.

Participating facilities were invited prior to calls to discuss barriers, strategies, successes, and failures. Having these facilities participate directly helped to encourage interaction among all of the participants. Several facilities presented unique strategies for addressing HAIs. This topic sparked discussion among those on the call. Several patients who had contracted HAIs were invited to participate on calls and talk about the impact of their experiences with infections. Hearing the patients' stories was very well received by the group.

Table 5. Coaching Call Attendance

Date	Topic	Attendance
3/13/2013	Building a team Understanding and implementing CUSP	54
4/10/2013	Data reports Team building and CUSP	55
5/13/2013	Data reports Processes and education	38
6/12/2013	Data reports Processes and education	33
7/10/2013	Data review Barriers	27
8/7/2013	Data review Added polling questions to increase participation	24
10/9/2013	Data review Discussion Polling questions	18
11/13/2013	Data review Discussion Patient presentation	21
12/11/2013	Data review Facility best-practice presentation Patient presentation	27
1/8/2014	Data review Patient presentation	34
2/12/2014	Data review Facility best-practice presentation	30
3/12/2014	Final data presentation Facility best-practice presentation	22

Feedback Reports

UM-KECC provided participating NOTICE facilities with a facility-specific quarterly feedback report in June 2013, October 2013, January 2014, and July 2014. The three-page feedback reports were uploaded to CDS for facility review and included data for process audit, NHSN infection, and culture of safety. The purpose of the reports was to give NOTICE facilities a quarterly snapshot of how they were performing in these areas over the course of the study compared with other facilities in their network and across the project. A sample feedback report can be found in Appendix J.

Process Audit Results

Process audit data was summarized in three figures that reported: percentage of specific hand hygiene opportunities performed correctly, percentage of specific catheter-related procedures performed correctly, and percentage of specific AV access-related procedures performed correctly. More information about each figure is given below. Examples of the figures can be seen in the sample feedback report in Appendix J.

Percentage of Specific Hand Hygiene Opportunities Performed Correctly

The first figure in Appendix J reports hand hygiene summaries for the facility, compared with its Network and with all NOTICE facilities as reported in CDS from the monthly process measures audit. As part of the process measures audit, NOTICE facility auditors observed 10 hand hygiene opportunities monthly. The hand hygiene measure is calculated as the percentage of successful specific hand hygiene items out of the total hand hygiene items observed during the month. It does not include hand hygiene items from the catheter and AV access portions of the monthly process measures audit. The measure was calculated for each month during the study. Average values for the facility's Network and for all NOTICE facilities are shown for comparison in this figure.

Percentage of Specific Catheter-Related Procedures Performed Correctly

The second figure in Appendix J reports a summary of catheter-related procedures correctly performed as reported in CDS from the monthly process measures audit. As part of the process measures audit, NOTICE facility auditors observed procedures for: five catheter initiations, five catheter terminations, and five instances of care for catheter exit sites and recorded the specific practices observed. The measure is calculated as the percentage of successful specific catheter initiation, termination, and exit-site care items out of the total number of items observed during the month. Hand hygiene items that are part of catheter initiation, termination, and exit-site care procedures are included. The measure is calculated for each month during the study. Average values for the facility's Network and for all NOTICE facilities are shown for comparison.

Percentage of Specific AV Access-Related Procedures Performed Correctly

The third figure in Appendix J reports a summary of AV access-related procedures as reported in CDS from the monthly process measures audit. As part of the process measures audit, NOTICE facility auditors observed five AV access initiation and five AV access termination procedures and recorded the specific practices observed. The measure is calculated as the percentage of successful specific AV access initiation and termination items out of the total AV access initiation and termination items observed during the month. Hand hygiene items that are part of the initiation and termination procedures are included. The measure is calculated for each month during the study. Average values for the facility's Network and for all NOTICE facilities are shown for comparison.

NHSN Infection Rates

The fourth and fifth figures in Appendix J report a summary of NHSN infection rates for the facility, compared with the facility's Network and with all NOTICE facilities as reported in CDS and NHSN. The two infection rates (vascular access infection and bacteremia) are reported in separate figures.

Figure 3: Vascular Access Infection Rates

A vascular access infection event as reported through the NHSN is defined as either a local access site infection (pus, redness, or swelling of the vascular access site and bloodstream infection is not present) or an access-related bloodstream infection (positive blood culture with the suspected source identified as the vascular access site or uncertain). The rate is calculated by summing the number of hemodialysis patients in a facility with a vascular access infection event reported in NHSN during the month and dividing by the number of hemodialysis patients. The number is then converted to a rate per 100 hemodialysis patient-months. A patient can contribute more than one event per month but not more than one every 21 days.

Figure 3. Vascular Access Infection Rates From NHSN

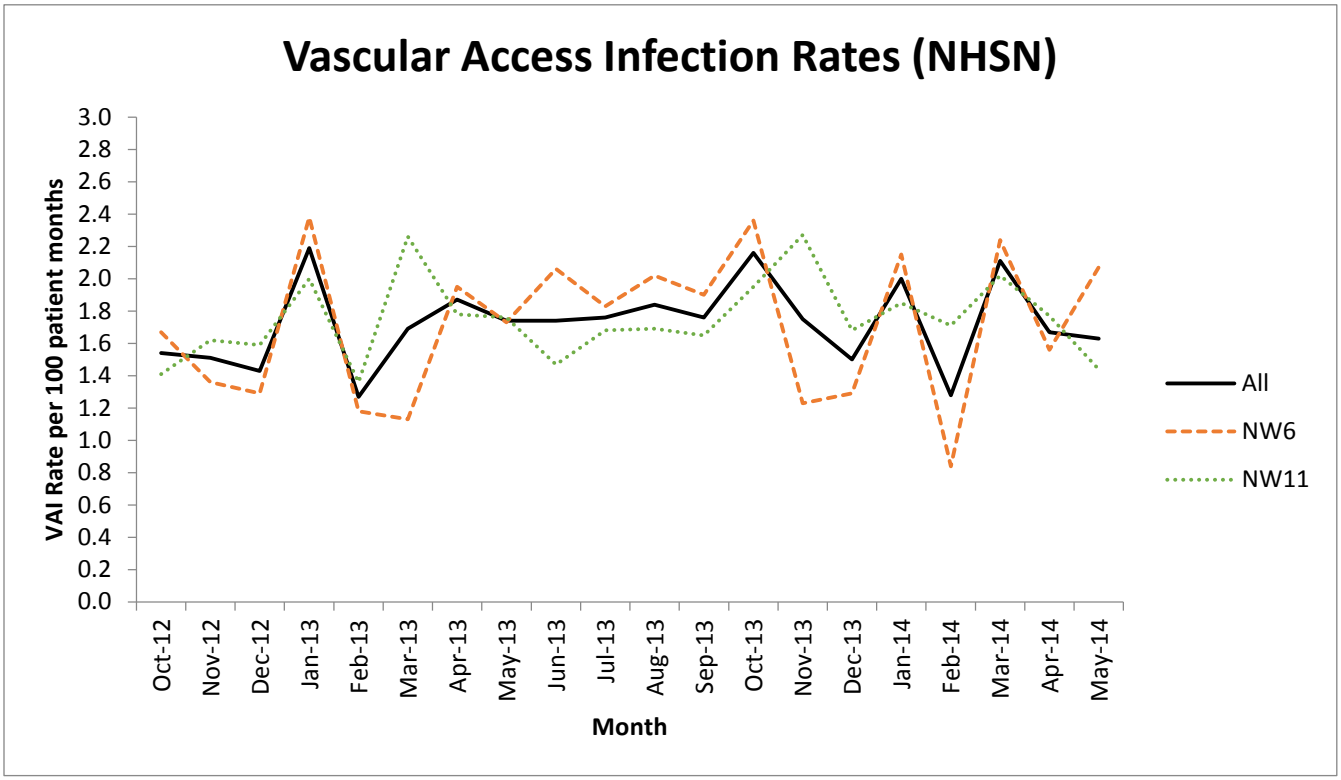
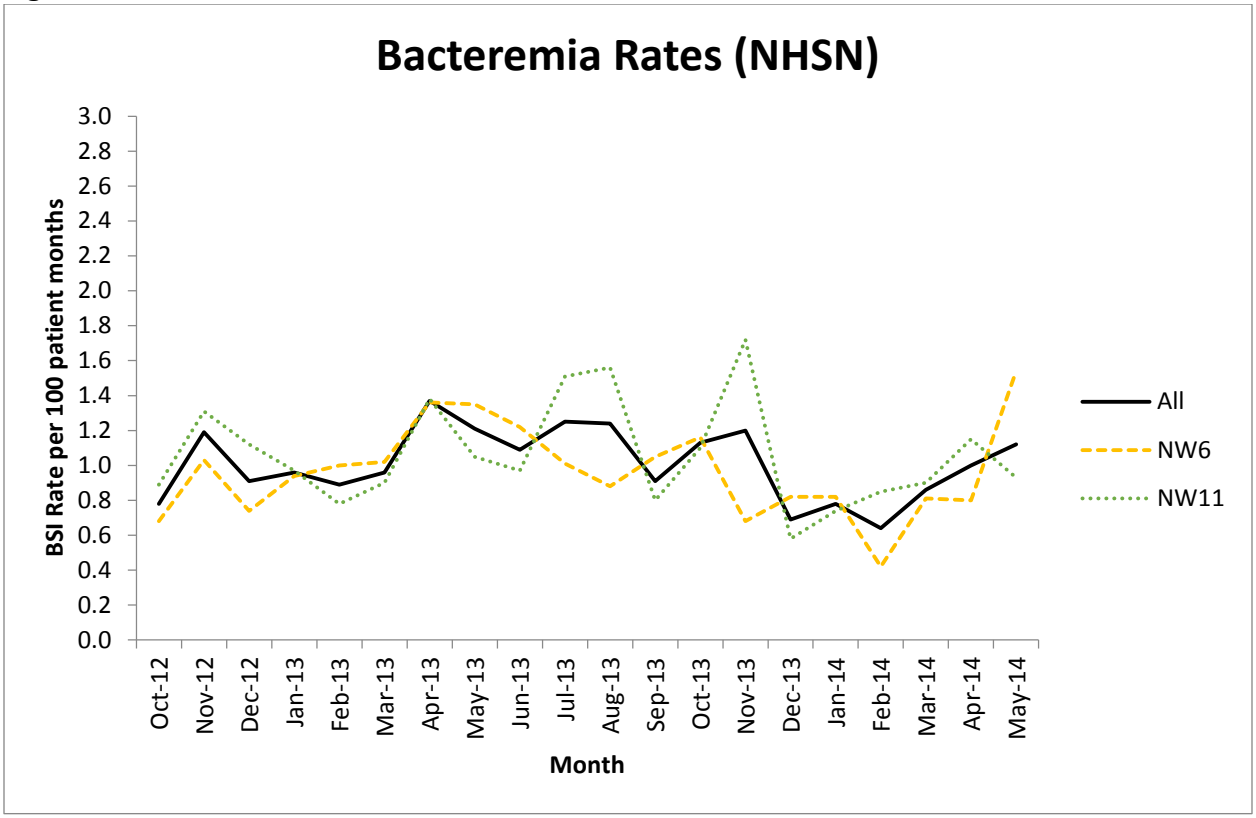


Figure 4: Bacteremia Rates

A bacteremia event is defined as any positive blood culture, irrespective of cause, as reported through the NHSN. The rate is calculated by summing the number of hemodialysis patients in a facility with a bacteremia event reported in NHSN during the month and dividing by the number of hemodialysis patients. The number is then converted to a rate per 100 hemodialysis patient-months. A patient can contribute more than one event per month but not more than one every 21 days.

The measures are calculated for each month during the study. Average values for facilities in the facilities' Network and for all NOTICE facilities are shown for comparison.

Figure 4. Bacteremia Rates From NHSN



Culture of Safety Assessment Results

Facility staff were asked to complete the Culture of Safety Assessment at the beginning, midpoint, and end of the project. Bar figures showing the distribution of responses 1–5 for each question for baseline, midpoint and end of the study are shown. In addition, a table listing the percentage of responses that were "strongly agree/always" (5) for each question for baseline, midpoint and end of study is shown for the most recent assessment, along with comparison to the facility's network and the overall NOTICE project. The last page of the report shows the average value for each question for the facility for baseline, midpoint and end of study. Average values for the most recent assessment for facilities in their Network and for all NOTICE facilities are shown for comparison.

Exit Assessment

Exit assessments were administered via CDS to facilities in April 2014. The submission rate was much lower than achieved for other data in the NOTICE project. This may be attributed to the late addition of an exit assessment and its administration after the rest of the project was completed. Thirty-seven facilities submitted exit assessments, which were then compared against the readiness assessments to gauge change in preventive behaviors during the project. Like the readiness assessment, the exit assessment focused on:

- Presence of a culture of safety
- Regular education on proper techniques for hand hygiene
- Regular education on proper technique for vascular access preparation and cleansing

- Monitoring of appropriate catheter reduction
- Implementation of guidelines for vascular access connection and disconnection technique
- Regular collection of vascular access infection data and monitoring of adherence to procedures

Assessing Quality Improvement

The 55 NOTICE facilities submitted monthly audit data based on observations of facility staff during administration of dialysis for 14 months. During that time, overall performance changed little, and compliance on a majority of recorded practices remained consistently above 80 percent for the duration of the project (Figure 5). However, seven specific practices improved dramatically over the course of the project, including scrubbing the catheter hub at initiation and termination of dialysis, using a clean field for catheter exit site care, applying antibiotic ointment, washing the AV access, performing proper hand hygiene during dialysis for AV, and wearing clean gloves (Figures 6–11). These practices were not routinely implemented at the start of the project, showed marked improvement, and still show room for improvement in some facilities. Also, hand hygiene improved generally as recorded in 10 observations per month.

Process Audit Results

Figure 5. Overall Process Audit Results

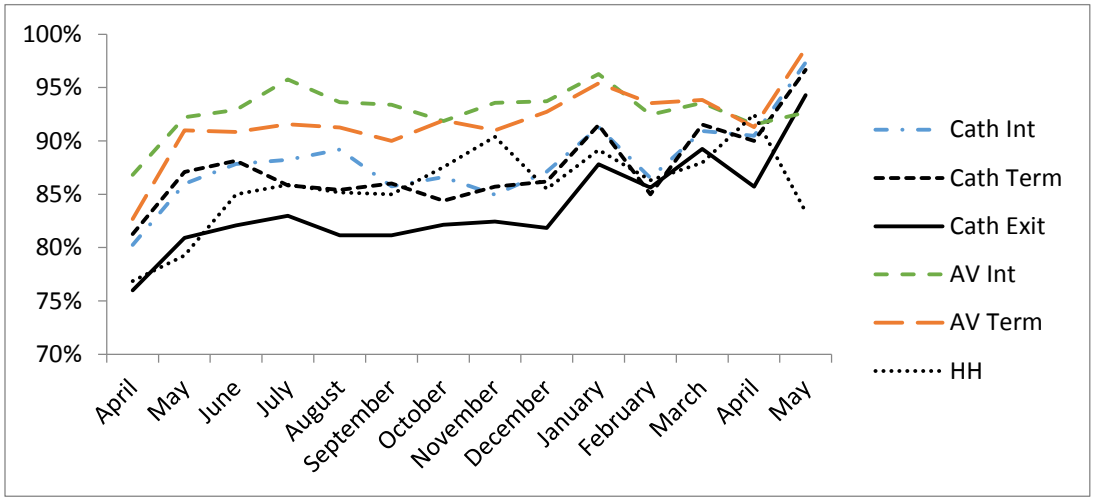


Figure 6. Catheter Initiation Audit Results

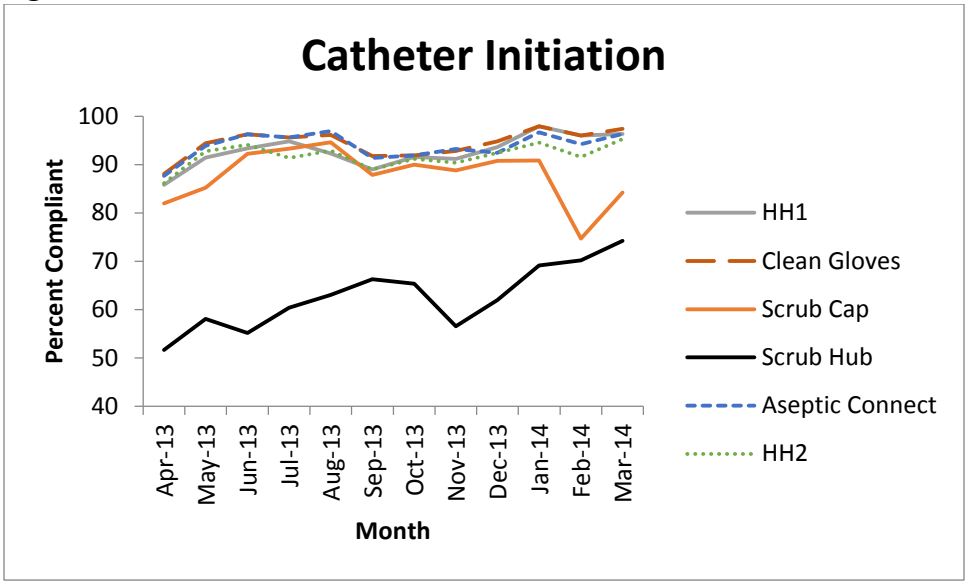


Figure 7. Catheter Termination Audit Results

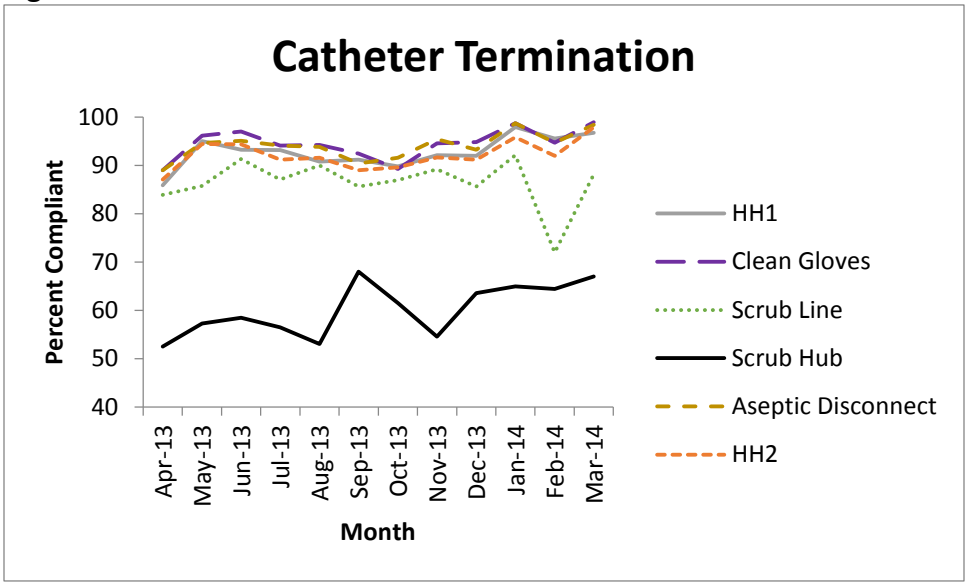


Figure 8. Catheter Exit Site Care Audit Results

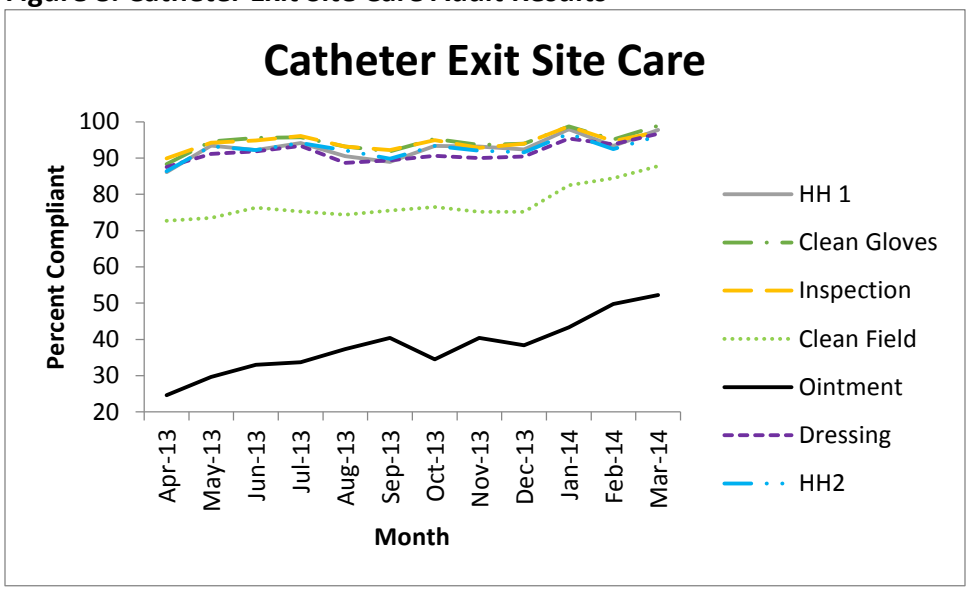


Figure 9. AV Access Initiation Audit Results

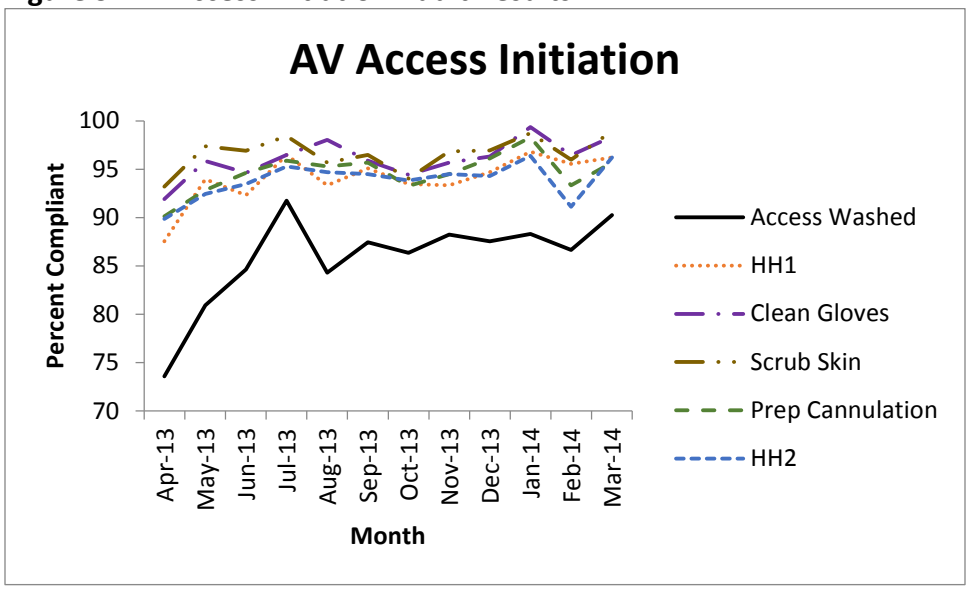


Figure 10. AV Access Termination Audit Results

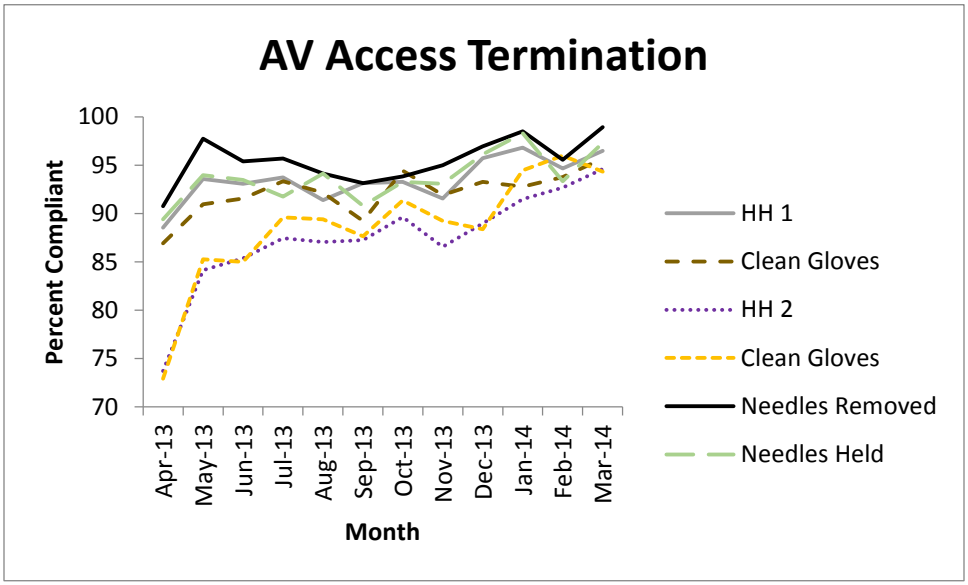
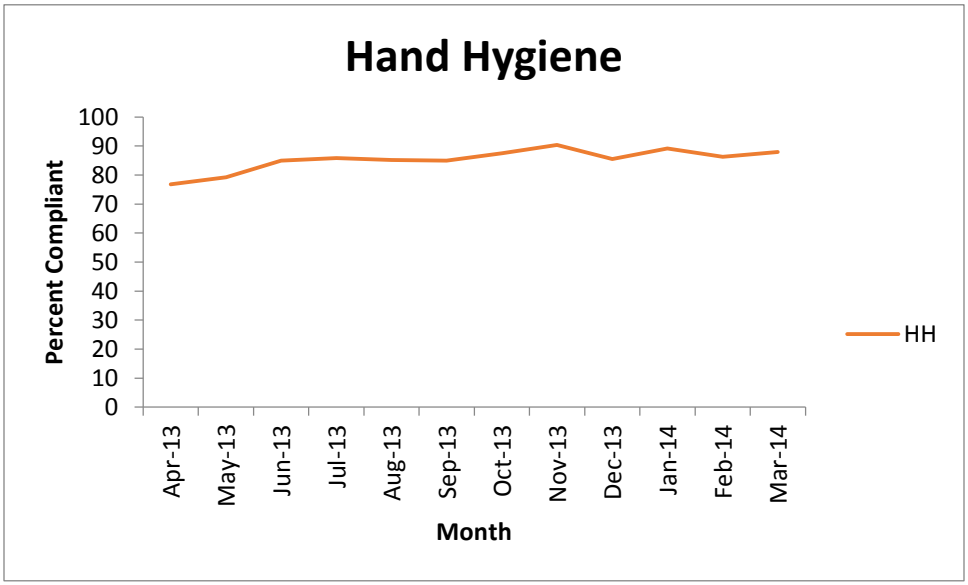


Figure 11. Hand Hygiene Audit Results



Culture of Safety Assessment Results

The three Culture of Safety assessments given at baseline, midpoint, and end of the study were compiled and summarized to assess if NOTICE facilities made improvement over the course of the study. We received 576, 583, and 549 responses for the beginning, midpoint, and end of study assessments, respectively. Facility items (questions 1–6) were 4.0, 4.1, and 4.0 out of a five-point scale on average at baseline, midpoint, and end of study, respectively. Supervisor items (questions 10 and 11) were 4.2, 4.3, and 4.3 on average at baseline, midpoint, and end of study, respectively. Culture items (questions 8–10) were 4.2, 4.3, and 4.3 at baseline, midpoint, and end of study, respectively. Responses to the initial assessment were quite positive or "topped out" at baseline; thus, there was very little to no observed

improvement in the scores over the course of the three assessments. For full culture of safety analyses results, including results from individual questions, please refer to Tables 6 and 7.

Table 6. NOTICE Culture of Safety Assessment Results

NOTICE Facilities	Baseline	Midpoint	End of Study
Number of facilities	53	54	43
Number of responses	576	583	549
Facility Items			
When a lot of work needs to be done quickly, we work together as a team to get the work done	4.2	4.2	4.2
In this unit, people treat each other with respect	3.9	3.9	3.9
We are actively changing protocols/policies to reduce VAIs	4.1	4.1	4.2
Mistakes have led to positive changes here	3.9	3.9	4
After we make changes to improve patient safety, we evaluate their effectiveness	4	4	4
Management in this facility provides a work climate that promotes VAI prevention	4.2	4.3	4.2
Supervisor			
My supervisor/manager gives positive feedback when he/she sees a job done according to established patient safety procedures	2.6	2.5	2.6
My supervisor/manager seriously considers staff suggestions for reducing VAIs	4	4.1	4.2
Communication	4.3	4.3	4.3
Staff will freely speak up if they see something that may increase risk of VAI	4.2	4.2	4.2
In this unit, we discuss ways to prevent errors from happening again	4.1	4.1	4.2
We actively include patients and family members in trying to reduce VAIs	4.2	4.2	4.2

Table 7. Facility Level Average Percent Positive Responses for All Culture Assessment Questions

	N	1	2	3	4	5	6	7	8	9	10	11	12
Baseline	53	45.9	29.6	33.7	23.7	24.9	36.3	6.6	33.0	45.9	43.9	39.1	39.9
Midpoint	54	42.4	29.2	33.0	24.4	28.5	35.5	4.4	37.1	49.4	44.3	39.5	41.0
End of Study	43	41.3	27.5	37.4	28.4	29.3	38.0	5.6	41.2	48.9	47.3	41.7	43.8
P value: Baseline to End of Study	-	0.29	0.84	0.08	0.04	0.02	0.10	0.94	0.00	0.03	0.02	0.20	0.26

Readiness and Exit Assessment Results

Readiness Assessment

Sixty-one dialysis staff members participated in the readiness assessment; results showed that 84 percent of them knew their facility's VAI rate, and 33 (62%) indicated that VAIs were reported immediately (monthly) to facility leaders. More than half of responders also said that they have participated in other infection reduction initiatives (59%), including the CVC reduction tool, 5 diamond safety program, NHSN, policies and procedures, monthly education, the presence of a unit access infection coordinator, and patient/staff education.

The second part of the readiness assessment asked staff about implementation of the six items in the CHARGE acronym: Culture of Safety, Hand Hygiene, Access Site Prep and Cleansing, Reduce/Remove Catheters, Great Connection/Disconnection, and Evaluation of Team. Responders had a choice of not implemented and no plans to do so outside of NOTICE project, currently planning to implement outside of NOTICE project, and fully implemented outside of NOTICE project. On average, 79 percent of responses were fully implemented outside of the NOTICE project for questions in all six areas. A few questions had a lower percentage for full implementation: Educating staff on the science of safety and regular internal huddles to discuss culture of safety were at 52 percent and 62 percent, respectively. Please see Table 8 for entire readiness assessment results.

Exit Assessment

Thirty-seven dialysis staff members responded to the exit assessment, which included the same questions from the CHARGE acronym. For the exit assessment, answer choices were: fully implemented before the NOTICE project, implemented as a result of the NOTICE project, and not implemented and no plans to do so. Similar to the readiness assessment, on average, 79 percent of responses were fully implemented before the NOTICE project for questions in all six areas. Questions with a lower percentage for full implementation were the same as the readiness assessment: Educating staff on the science of safety and regular internal huddles to discuss culture of safety were at 54 percent and 57 percent, respectively. Please see Table 9 for the entire exit assessment results.

Table 8. Readiness Assessment Results

Readiness Assessment Item	Not Implemented and No Plans To Do So Outside of NOTICE Project	Currently Planning for Implementation Outside of NOTICE Project	Fully Implemented Outside of NOTICE Project
	N, %	N, %	N, %
Culture of Safety			
Senior leader engagement in patient safety	4, 7%	8, 13%	49, 80%
Systematic analysis and proactive learning from harmful events or events with potential for harm as raised by frontline staff	1, 2%	9, 15%	51, 84%
Setting regular (e.g., daily, monthly, quarterly) goals based on analysis of facility harmful events	5, 8%	13, 21%	43, 70%
Educating staff on the "Science of Safety"	4, 7%	25, 41%	32, 52%

Table 8. Readiness Assessment Results (continued)

Readiness Assessment Item	Not Implemented and No Plans To Do So Outside of NOTICE Project	Currently Planning for Implementation Outside of NOTICE Project	Fully Implemented Outside of NOTICE Project
	N, %	N, %	N, %
Regular (e.g., monthly, quarterly) internal huddles to discuss culture of safety and safety improvements	3, 5%	20, 33%	38, 62%
Hand Hygiene			
Use of guidelines on proper techniques for hand hygiene	0, 0%	2, 3%	59, 97%
Regular in-service training for appropriate health care personnel on techniques and procedures for hand hygiene	2, 3%	4, 7%	55, 90%
Documenting and monitoring proper hand hygiene	1, 2%	10, 16%	50, 82%
Access Site Prep and Cleansing			
Use of guidelines on proper techniques for access site preparation	0, 0%	5, 8%	56, 92%
Regular in-service training for appropriate health care personnel on techniques and procedures for access site preparation	1, 2%	9, 15%	51, 84%
Documenting and monitoring proper access site preparation	2, 3%	17, 28%	42, 69%
Reduce/Remove Catheters			
Use of guidelines on proper techniques for reducing and removing catheters	1, 2%	10, 16%	50, 82%
Regular in-service training for appropriate health care personnel on techniques and procedures for reducing and removing catheters	3, 5%	15, 25%	43, 70%
Documenting and monitoring appropriate catheter usage	1, 2%	9, 15%	51, 84%
Great Connection/Disconnection			
Use of guidelines on proper connection and disconnection techniques	1, 2%	7, 11%	53, 87%
Regular in-service training for appropriate health care personnel on proper connection and disconnection techniques	2, 3%	10, 16%	49, 80%
Documenting and monitoring proper connection and disconnection technique	1, 2%	15, 25%	45, 74%

Table 8. Readiness Assessment Results (continued)

Readiness Assessment Item	Not Implemented and No Plans To Do So Outside of NOTICE Project	Currently Planning for Implementation Outside of NOTICE Project	Fully Implemented Outside of NOTICE Project
	N, %	N, %	N, %
Evaluation of Team			
Regularly collecting and reviewing VAI rates	0, 0%	12, 20%	49, 80%
Documenting and monitoring of infection control practices	1, 2%	10, 16%	50, 82%

Table 9. Exit Assessment Results

Exit Assessment Item	Fully Implemented Before the NOTICE Project	Implemented as a Result of the NOTICE Project	Not Implemented and no Plans To Do So
	N, %	N, %	N, %
Culture of Safety			
Senior leaders are engaged in patient safety	34, 92%	3, 8%	0, 0%
Frontline staff raises the need for systematic analysis and proactive learning from harmful events or events with potential for harm	22, 59%	15, 41%	0, 0%
Regular (e.g., daily, monthly, quarterly) goals are set based on analysis of facility harmful events	30, 81%	7, 19%	0, 0%
Staff are educated on the "Science of Safety"	20, 54%	16, 43%	1, 3%
Regular (e.g., monthly, quarterly) internal huddles are used to discuss culture of safety and safety improvements	21, 57%	14, 38%	2, 5%
Hand Hygiene			
Consistent use of guidelines on proper techniques for hand hygiene	29, 78%	8, 22%	0, 0%
Regular in-service training for facility personnel on techniques and procedures for hand hygiene	28, 76%	9, 24%	0, 0%
Monitoring and documentation of proper hand hygiene	25, 68%	12, 32%	0, 0%
Access Site Prep and Cleansing			
Consistent use of guidelines on proper techniques for access site preparation	27, 73%	10, 27%	0, 0%
Regular in-service training for facility personnel on techniques and procedures for access site preparation	31, 84%	6, 16%	0, 0%

Table 9. Exit Assessment Results (continued)

Exit Assessment Item	Fully Implemented Before the NOTICE Project	Implemented as a Result of the NOTICE Project	Not Implemented and no Plans To Do So
	N, %	N, %	N, %
Monitoring and documentation of proper access site preparation	30, 81%	7, 19%	0, 0%
Reduce/Remove Catheters			
Consistent use of guidelines on proper techniques for reducing and removing catheters	32, 86%	4, 11%	1, 3%
Regular in-service training for facility personnel on techniques and procedures for reducing and removing catheters	33, 89%	2, 5%	2, 5%
Monitoring and documentation of appropriate catheter use	33, 89%	4, 11%	0, 0%
Great Connection/Disconnection			
Consistent use of guidelines on proper connection and disconnection techniques	33, 89%	4, 11%	0, 0%
Regular in-service training for facility personnel on proper connection and disconnection techniques	34, 92%	3, 8%	0, 0%
Monitoring and documentation of proper connection and disconnection technique	31, 84%	6, 16%	0, 0%
Evaluation of Team			
Regular collection and review of VAI and bloodstream infection (BSI) rates	31, 84%	6, 16%	0, 0%
Monitoring and documentation of infection control practices	33, 89%	4, 11%	0, 0%

Closer examination of the readiness and exit assessment results from only the 37 facilities that responded to both assessments highlights some discrepancies in reporting. For example, 81 percent of facilities reported that item 2 had been “Fully Implemented Before the NOTICE Project” in the readiness assessment while only 59 percent of those same facilities had the same response at the time of the exit assessment. This indicates some inaccuracy or miscommunication about the level to which this item was fully implemented and when, and may reflect differing perspectives of the staff completing the assessment. Table 10 compares the exit and readiness assessment results.

Table 10. Comparison of Exit and Readiness Assessment Results

Assessment Item	Exit in Place Before the NOTICE Project	Exit in Place Before the NOTICE Project	Exit in Place As a Result of the NOTICE Project	Exit in Place as a Result of the NOTICE Project	Exit Not in Place and No Plans To Do So	Exit Not in Place and No Plans To Do So	Readiness in Place Before the NOTICE Project	Readiness in Place Before the NOTICE Project	Readiness in Place as a Result of the NOTICE Project	Readiness in Place as a Result of the NOTICE Project	Readiness Not in Place and No Plans To Do So	Readiness Not in Place and No Plans To Do So
	N	%	N	%	N	%	N	%	N	%	N	%
Culture of Safety												
Senior leaders are engaged in patient safety	34	92%	3	8%	0	0%	31	84%	5	14%	1	3%
Frontline staff raises the need for systematic analysis and proactive learning from harmful events or events with potential for harm	22	59%	15	41%	0	0%	30	81%	6	16%	1	3%
Regular (e.g., daily, monthly, quarterly) goals are set based on analysis of facility harmful events	30	81%	7	19%	0	0%	25	68%	10	27%	2	5%
Staff are educated on the "Science of Safety"	20	54%	16	43%	1	3%	15	41%	19	51%	3	8%
Regular (e.g., monthly, quarterly) internal huddles are used to discuss culture of safety and safety improvements	21	57%	14	38%	2	5%	21	57%	13	35%	3	8%
Hand Hygiene												
Consistent use of guidelines on proper techniques for hand hygiene	29	78%	8	22%	0	0%	35	95%	2	5%	0	0%

Table 10. Comparison of Exit and Readiness Assessment Results (continued)

Assessment Item	Exit in Place Before the NOTICE Project	Exit in Place Before the NOTICE Project	Exit in Place As a Result of the NOTICE Project	Exit in Place as a Result of the NOTICE Project	Exit Not in Place and No Plans To Do So	Exit Not in Place and No Plans To Do So	Readiness in Place Before the NOTICE Project	Readiness in Place Before the NOTICE Project	Readiness in Place as a Result of the NOTICE Project	Readiness in Place as a Result of the NOTICE Project	Readiness Not in Place and No Plans To Do So	Readiness Not in Place and No Plans To Do So
	N	%	N	%	N	%	N	%	N	%	N	%
Regular in-service training for facility personnel on techniques and procedures for hand hygiene	28	76%	9	24%	0	0%	34	92%	2	5%	1	3%
Monitoring and documentation of proper hand hygiene	25	68%	12	32%	0	0%	29	78%	7	19%	1	3%
Access Site Prep and Cleansing												
Consistent use of guidelines on proper techniques for access site preparation	27	73%	10	27%	0	0%	33	89%	4	11%	0	0%
Regular in-service training for facility personnel on techniques and procedures for access site preparation	31	84%	6	16%	0	0%	32	86%	4	11%	1	3%
Monitoring and documentation of proper access site preparation	30	81%	7	19%	0	0%	25	68%	10	27%	2	5%
Reduce/Remove Catheters												
Consistent use of guidelines on proper techniques for reducing and removing catheters	32	86%	4	11%	1	3%	30	81%	6	16%	1	3%

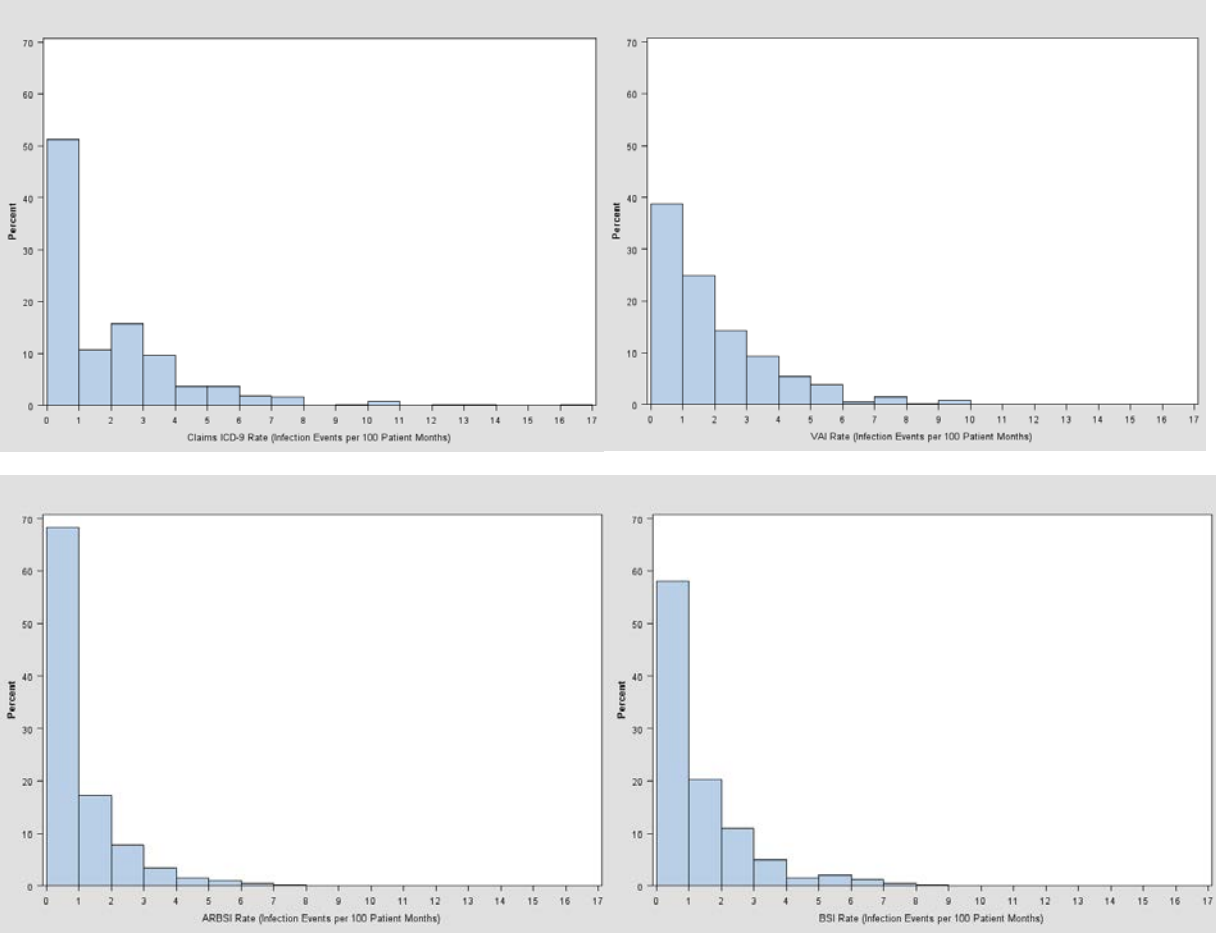
Table 10. Comparison of Exit and Readiness Assessment Results (continued)

Assessment Item	Exit in Place Before the NOTICE Project	Exit in Place Before the NOTICE Project	Exit in Place As a Result of the NOTICE Project	Exit in Place as a Result of the NOTICE Project	Exit Not in Place and No Plans To Do So	Exit Not in Place and No Plans To Do So	Readiness in Place Before the NOTICE Project	Readiness in Place Before the NOTICE Project	Readiness in Place as a Result of the NOTICE Project	Readiness in Place as a Result of the NOTICE Project	Readiness Not in Place and No Plans To Do So	Readiness Not in Place and No Plans To Do So
	N	%	N	%	N	%	N	%	N	%	N	%
Regular in-service training for facility personnel on techniques and procedures for reducing and removing catheters	33	89%	2	5%	2	5%	26	70%	9	24%	2	5%
Monitoring and documentation of appropriate catheter use	33	89%	4	11%	0	0%	30	81%	6	16%	1	3%
Great Connection/ Disconnection												
Consistent use of guidelines on proper connection and disconnection techniques	33	89%	4	11%	0	0%	33	89%	4	11%	0	0%
Regular in-service training for facility personnel on proper connection and disconnection techniques	34	92%	3	8%	0	0%	31	84%	5	14%	1	3%
Monitoring and documentation of proper connection and disconnection technique	31	84%	6	16%	0	0%	28	76%	8	22%	1	3%
Evaluation of Team												
Regular collection and review of VAI and bloodstream infection (BSI) rates	31	84%	6	16%	0	0%	29	78%	8	22%	0	0%
Monitoring and documentation of infection control practices	33	89%	4	11%	0	0%	31	84%	5	14%	1	3%

NHSN Data and Medicare Claims Data

Histograms of infection rates reported in Medicare claims for NOTICE facilities, VAI rates, BSI rates, and access-related bloodstream infection (ARBSI) rates reported in NHSN showed that the distributions of all rates were right-skewed (Figure 12). Spearman correlation was applied for analyzing the relationships between infection rates reported in Medicare claims and in NHSN.

Figure 12. Histograms of infection rates reported in Medicare claims for NOTICE facilities, VAI rates, BSI rates, and ARBSI rates reported in NHSN



Correlations are assessed both on the monthly and yearly basis (Table 11a and Table 11b). In monthly correlation, VAI rates showed a weak but statistically significant association with infection rates reported in Medicare claims for NOTICE facilities. ARBSI rates also showed a weak but significant association with Medicare claims infection rates, while BSI rates were not significantly related. In yearly correlation compared with monthly correlation, VAI rates showed a stronger and statistically significant association with infection rates reported in Medicare claims. ARBSI rates and BSI rates also showed a stronger association, although the correlation between ARBSI rates and Medicare claims infection rates is not statistically significant. These results are not surprising given that the operational definition of reportable VAI events is similar to that of the ICD-9 code used to identify infection events in claims. VAI, ARBSI, and BSI rates were highly correlated to each other.

Table 11a. Spearman Correlation of Infection Rates Reported in Medicare Claims Versus NHSN—Monthly

Monthly Correlation

		NHSN ARBSI rate	NHSN VAI rate	NHSN BSI rate
Claims ICD-9 Rate	**coefficient**	0.1057	0.20222	0.04599
	p-value	0.0408	<.0001	0.3744
	N	375	375	375
NHSN ARBSI rate	**coefficient**		0.56915	0.82371
	p-value		<.0001	<.0001
	N		384	384
NHSN VAI rate	**coefficient**			0.44372
	p-value			<.0001
	N			384

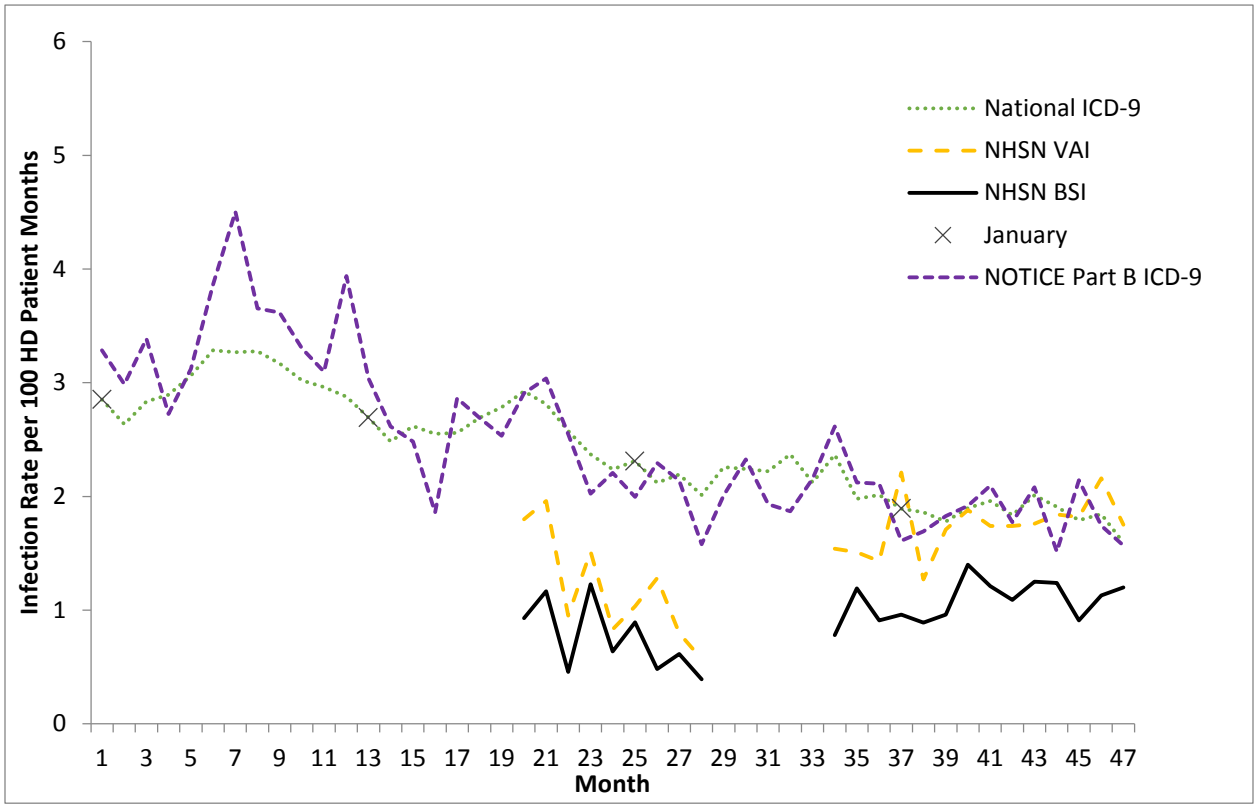
Table 11b. Spearman Correlation of Infection Rates Reported in Medicare Claims Versus NHSN—Yearly

Yearly Correlations

		NHSN ARBSI rate	NHSN VAI rate	NHSN BSI rate
Claims ICD-9 Rate	**coefficient**	0.255	0.4202	0.2996
	p-value	0.0627	<.0001	0.0278
	N	54	54	54
NHSN ARBSI rate	**coefficient**			
	p-value			
	N			
NHSN VAI rate	**coefficient**			
	p-value			
	N			

Figure 13 shows the national trend in ICD-9-reported infection rates along with trends in NHSN-reported VAI rates in both phase one and phase two of the NOTICE initiative. National trends are based on reported ICD-9 codes for over 5,000 dialysis facilities from 2010 through 2013. Trends in claims-based infection rates are also shown for NOTICE Part 2 facilities over this same 4-year time period. NHSN-reported VAI and ARBSI rates are also shown for NOTICE facilities only where data were available.

Figure 13. ICD-9 National Trends Compared With NOTICE Data



Poisson regression analysis (Table 12) was performed to compare the infection experience between NOTICE facilities and facilities that were not part of the NOTICE study. To account for potential confounding, we first stratified facilities using the following criteria.

1. Network (2 categories): 6, 11

2. LDO affiliation (3 categories): defined as Large LDO (62.5%), Small LDO (17.3%), and Non-LDO (20.3%)

3. HD patient count in 2013(2 categories): above or below 70 HD patients in 2013

4. HD patient infection rate per 100 patient month in 2013 (tertile): 0 - 0.96154, 0.96154- 1.86722, 1.86722 and above

5. Median income (Data obtained from the 2006-2010 census by facility zip code) (tertile): $0-$40394.65, $40394.65-$54294.14, $54294.14 and above

Then, for each NOTICE facility, depending on availability, we matched three similar non-NOTICE facilities in the same strata. Our final analysis using the Poisson regression was based on data from 206 facilities (56 in NOTICE, 150 not in NOTICE). We fitted a Poisson regression model using SAS Proc Glimmix with a log link function and both facility and strata as random effects to account for within-facility and within-strata correlation. On the log scale, the rate of infection is modeled as a linear function of month, where the intercept and slope may depend on whether or not it is a NOTICE facility. From Table 12, we see that at baseline, NOTICE facilities are not significantly different from non-NOTICE facilities within the same

strata (p-value: 0.89). In addition, the slope of infection over time is not different between NOTICE and non-NOTICE facilities (p-value: 0.49). We also note that there is a slight but statistically significant decreasing trend in infection rate over time (p-value: <0.0001).

Table 12. Poisson Regression of Monthly Infection Events Reported in Medicare Claims Versus NOTICE Indicator (Whether or Not in NOTICE), Month (15 Followup Months 10/2012-12/2013), and Interaction Term of NOTICE Indicator and Month, With Natural Logarithm of HD Patient Months as Offset

Effect	Estimate	STD	Pr > |t|
Intercept	-3.9779	0.1106	.
NOTICE Indicator	-0.0122	0.09129	0.8937
Month	-0.03339	0.005228	<.0001
NOTICE Indicator *Month	0.00679	0.009783	0.4877

Buttonhole Access Infection Rates

BSI, ARBSI, and VAI rates in buttonhole compared with non-buttonhole fistulas were calculated using NHSN data. There were a lot of infection event records (~30%) missing buttonhole data, so these were assumed to be non-buttonhole fistulas. On average at NOTICE facilities, 11 percent of fistulas were buttonhole fistulas. There was substantial variation in the percentage of buttonhole fistulas across facilities, probably due to differing preferences among vascular surgeons in fistula methods. There was also a lot of variation in buttonhole infection rates over the study period, January 2013–April 2014, due primarily to low frequencies of buttonhole fistulas. Based on NHSN data, over the entire study period, buttonhole fistulas had higher rates of ARBSI and BSI compared to non-buttonhole fistulas (1.03 and 1.51 compared to 0.61 and 0.90, respectively). On the other hand, VAI rates were higher in non-buttonhole fistulas compared to buttonhole fistulas (2.23 vs. 1.83). ARBSI and BSI rates were compared in buttonhole and non-buttonhole fistulas using t-tests and were borderline statistically significantly different with p-values of 0.055 and 0.045, respectively. VAI rates were not significantly different (p-value=0.30). Figures 14–17 below report ARBSI, BSI, and VAI rates by month for buttonhole compared to non-buttonhole fistulas.

Figure 14. BSI Rates by Fistula Access Type

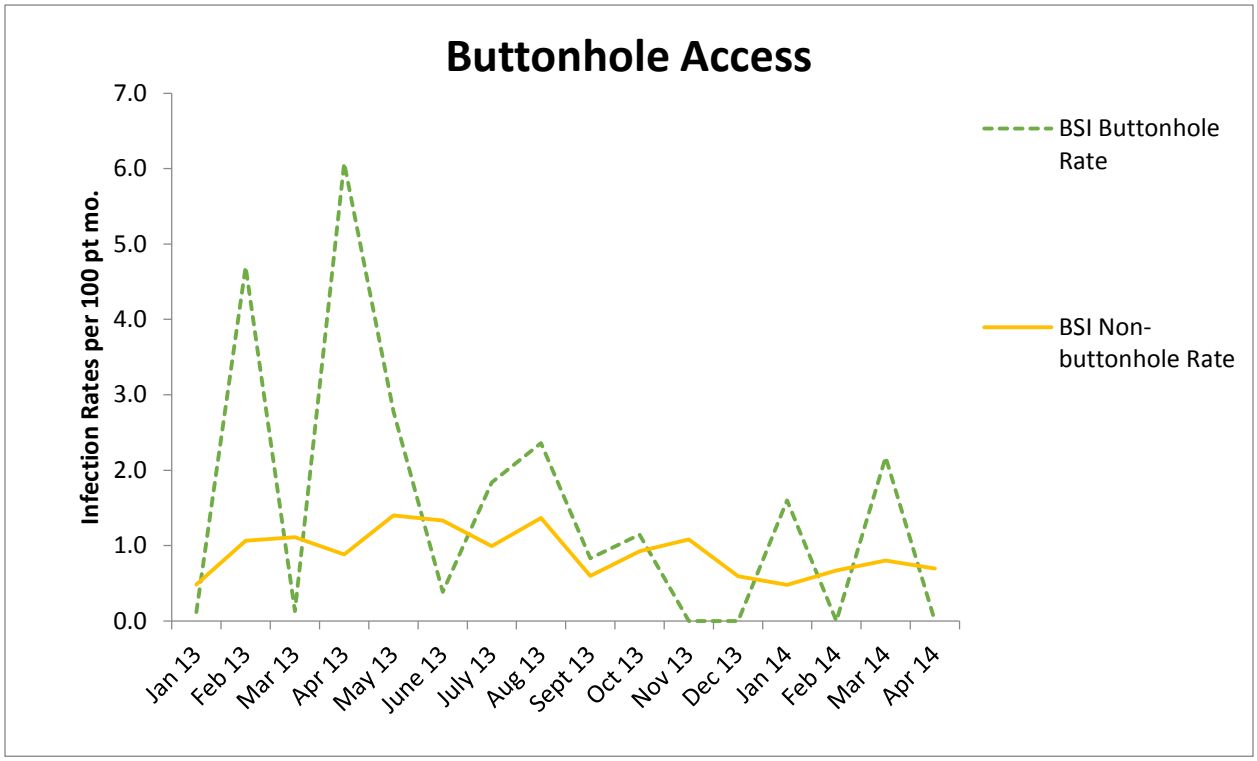


Figure 15. VAI Rates by Fistula Access Type

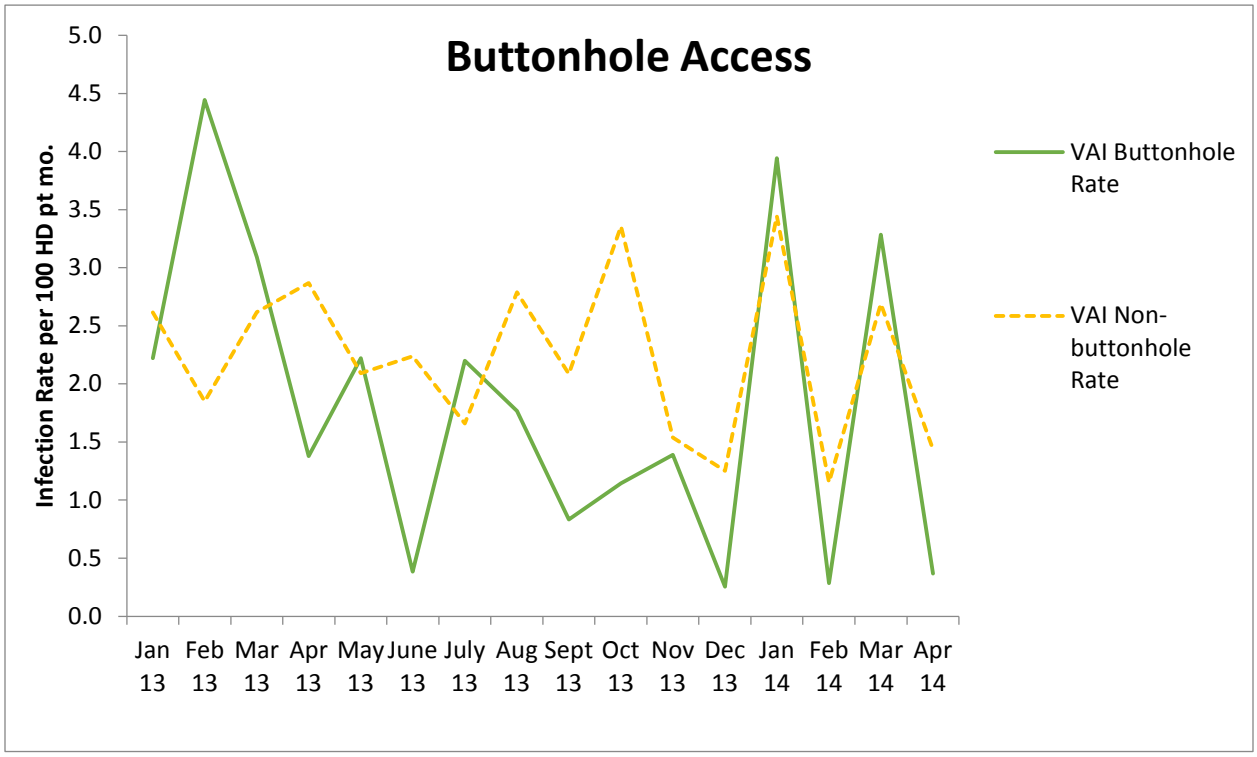


Figure 16. ARBSI Rates by Fistula Access Type

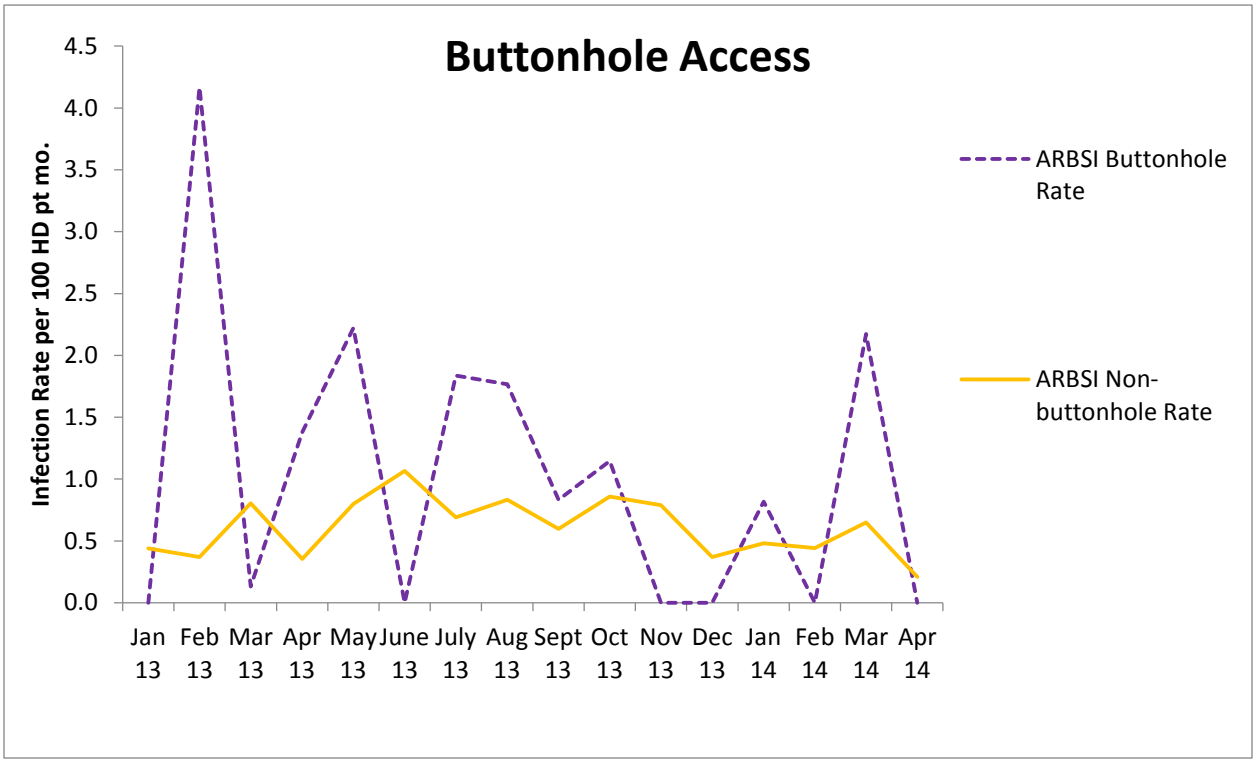
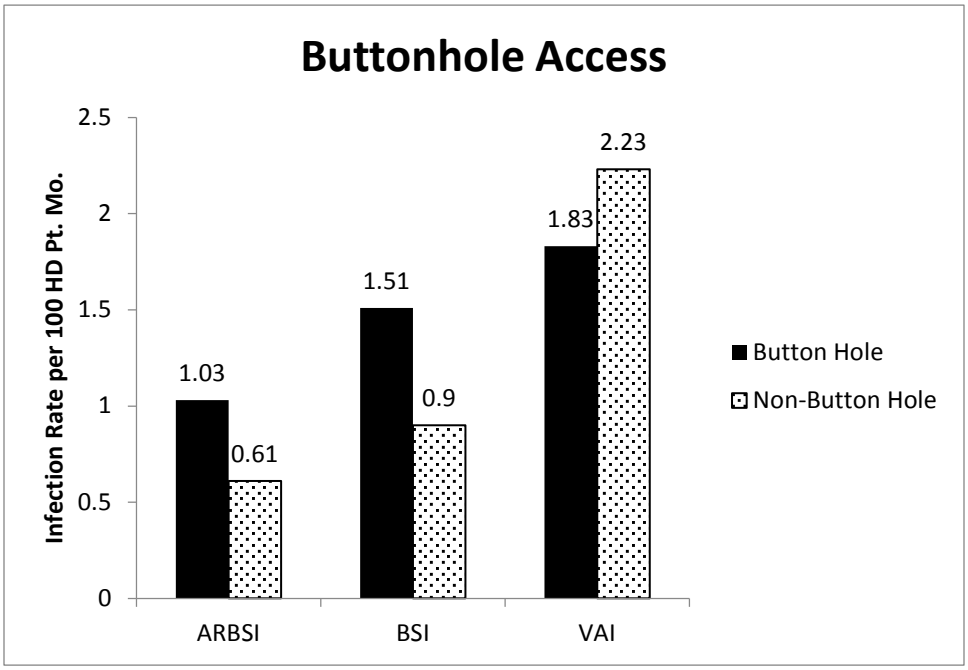


Figure 17. Overall Infection Rates by Fistula Access Type



Associations Between Processes and Infection Rates

This analysis focused on seven audit items not routinely implemented at baseline that showed at least a 10 percent increase in uptake over time. Monthly BSI rates were based on data submitted using CDC

NHSN. With monthly repeated measures within facility, log of facility size as offset and log link, over-dispersed Poisson regression models were used to relate changes in BSI rates at participating facilities to each of the seven audit items results. Models were adjusted for calendar time and monthly percentage of patients with CVCs.

For all patients, BSI rates were stable over the study period at approximately 1.02 infections per 100 patient-months. Of the seven audit items, five had statistically significant associations with infection rates. Scrubbing the CVC hub at initiation and termination of dialysis was associated with decreases in infection rates. Surprisingly, both washing the AV access site at the initiation of dialysis and hand hygiene at termination of dialysis were associated with increased infections. On the other hand, there is fairly strong evidence that scrubbing the CVC hub both at initiation and termination of dialysis is associated with a modest decrease in the BSI rates. Table 13 summarizes the results of these comparisons where the estimated effect of each variable is given as the percentage change in infection rates corresponding to a 20 percent increase in implementation.

Table 13. Estimated Effect of Checklist Variables on Infection Rates

Audit Checklist	Description	Change per 20% Increase	p-value
Catheter Initiation	Scrub Hub	-7.6%	**0.003**
Catheter Termination	Scrub Hub	-8.6%	**0.001**
Catheter Exit Site Care	Clean Field	2.2%	0.468
Catheter Exit Site Care	Ointment	-6.2%	**0.037**
AV Initiation	Access Washed	13.7%	**0.005**
AV Termination	Hand Hygiene 2	9.1%	0.075
AV Termination	Clean Gloves	1.0%	0.845

Because overall infection rates included infection events in both catheter and AV patients while audit results for particular items included observations of only one or the other vascular access type, further investigation examined vascular access-specific infection rates. As shown in Figures 18 and 19, infection rates among catheter patients alone were considerably higher than those among AV patients. Restricting the analysis of each audit item to patients with the appropriate vascular access type produced the results reported in Table 14. Of the seven audit items of interest, only scrubbing the catheter hub at initiation and termination of dialysis were shown to be significantly associated with infection rates. Proper scrubbing in both cases was associated with decreased infection rates.

Figure 18. VAI Rates by Access Type

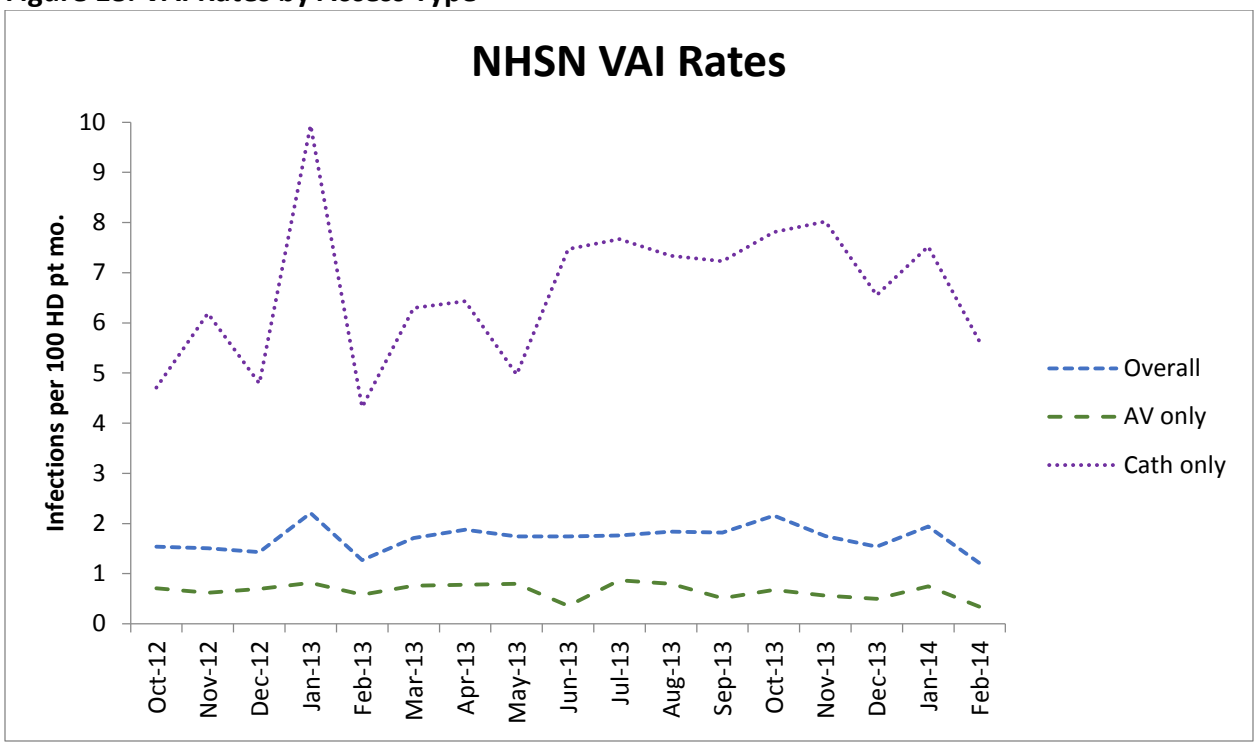


Figure 19. BSI Rates by Access Type

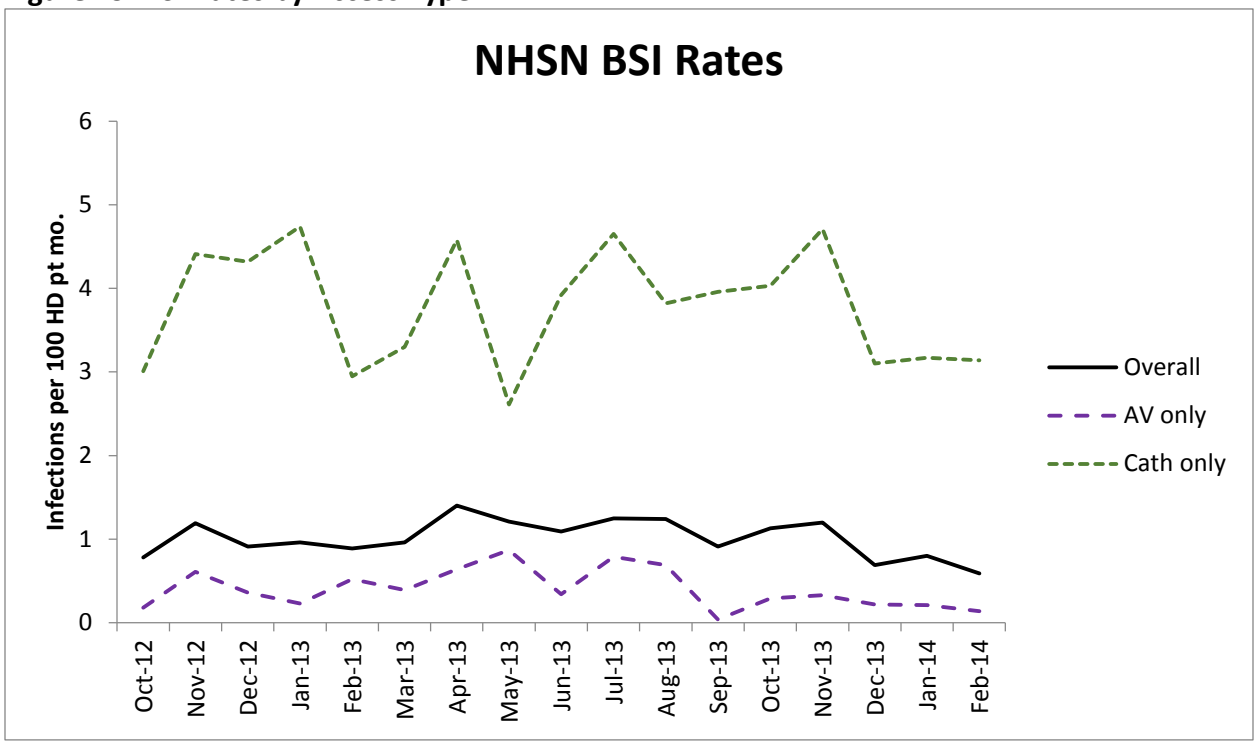


Table 14. Predictors of Infection Rates: Access Specific

Audit Checklist	Description	Change per 20% Increase	p-value
Cath Init	Scrub Hub	-6.3%	**0.035**
Cath Term	Scrub Hub	-7.9%	**0.007**
Cath Exit	Clean Field	-4.5%	0.159
Cath Exit	Ointment	-6.1%	0.067
AV Init	Access Washed	3.0%	0.715
AV Term	HH 2	8.7%	0.312
AV Term	Clean Gloves	-6.7%	0.393

Limitations

The analyses above suggest some interesting interpretations of the data from this initiative; there are, however, some data and study design limitations to note. The facilities were stratified prior to recruitment for participation, but the final facilities included in the initiative were not randomly selected. This would have some implications for generalizability of the results. Also, there were no control facilities available in the study and so, in the analyses above, time trends are being used to assess the effects of the interventions. Of course, such comparisons are confounded with any temporal effects and may therefore be inappropriate. In the present case, there is no overall improvement noted over time, and this seems to be in keeping with the overall trends in infection rates seen in the general population based on ICD-9 codes and CMS claims data. Some additional information can be obtained using the ICD-9 codes and matching the NOTICE facilities with others not in the study but with the same baseline characteristics that were used in defining strata.

This study was also relatively small in scope and included participation of only 60 dialysis facilities from two Networks. A feature of the study is that almost all of the data collected is by self-report of the dialysis facilities. Thus, we have no internal check of the validity of the data being collected. On the other hand, one primary purpose of the project is to increase awareness of infection control issues among participating centers, and the internal assessments are useful from this perspective. As reported above, the comparison between the self-reported NHSN data and the data collected by examination of the CMS claims data suggests that these sources are measuring quite different variables with a rather low correlation at the facility level.

Impact of NOTICE on ESRD Community

Dissemination Activities

Dissemination activities, a core deliverable of the NOTICE project, focused on sharing materials developed and findings through a multitude of venues. Specifically, the video vignettes, change package, and other educational materials were shared on the NOTICE and AHRQ web sites. Video vignettes also were posted on YouTube. Tweets were sent via HRET's Twitter account directing followers to view and use the materials posted on AHRQ's Web site.

Original dissemination deliverables included presentations at the AHRQ Annual Meeting of the AHRQ HAI investigators in 2013 and 2014 and two ESRD-related meetings per year of the contract—CMS Quality Net Conference and one other of the project team's choice. These expectations changed when funding for the specified meetings was eliminated. A revised dissemination plan resulted; NOTICE project staff aimed to present or attend at least three ESRD-related meetings per year replacing the two meetings that were canceled.

Project partners submitted findings for inclusion in conferences and scholarly journals as well as posters, oral presentations, videos, and articles. The specific dissemination list is as follows:

- Oral Presentation:
    - Messana J. Dialysis (NOTICE Project). Oral presentation at: Association for Professionals in Infection Control and Epidemiology. June 8–10, 2013. Fort Lauderdale, FL.
- Poster Presentations:
    - Deane J, Carlson D, Smith K, Ward K, Tyburski D. National Opportunity to Improve Infection Control in ESRD. Poster session presented at: ESRD Network Forum Quality Conference. September 2013.
    - Deane J, Carlson D, Smith K, Ward K, Tyburski D. National Opportunity to Improve Infection Control in ESRD. Poster session presented at: National Renal Administrators Association Annual Meeting. September 2013.
    - Deane J, Carlson D, Smith K, Ward K, Tyburski D. National Opportunity to Improve Infection Control in ESRD. Poster session presented at: Network 11 Annual Meeting. October 2013.
    - Roys E, Scholz N, Parrotte C, Kalbfleisch J, Saran R, Chenoweth C, Messana J. Poster session presented at: NOTICE Initiative Post- vs. Pre- Infection Control Evaluation (ICE) Results. American Society of Nephrology. November 2013.
    - Messana J. Poster session presented at: National Opportunity to Improve Infection Control in ESRD. American Nephrology Nurses Association. April 2014.
- Staff Attendance:
    - Network 11 Annual Meeting, October 2012
    - National Kidney Foundation Spring Clinical Meetings, April 2014
- Journal Submissions:
    - Submission to American Nephrology Nurses Association Journal: Culture of Safety in Hemodialysis Centers - Comparison of Perceptions. Davis K, Harris K, Bartholomew E, & Kenward K.
    - Submission to American Journal of Kidney Diseases: Variation in Infection Prevention Practices in Dialysis Facilities - Results from the NOTICE Project. Chenoweth C, Hines S, Saran R, Kalbfleisch J, Spencer T, Frank K, Carlson D, Deane J, Roys E, Scholz N, Parrotte C, & Messana J.

NOTICE Checklist and Change Package Use in the Community

The importance of sustainability and spread cannot be understated in quality improvement. To that end, the NOTICE project not only aimed to spread knowledge of the project and its outcomes but also spread use of materials developed. Materials developed for the NOTICE project have already begun to spread to other areas of the dialysis community. Because of the collaborative work of AHRQ, CDC, CMS, HRET, UM KECC, and the Networks developing the checklists and worksheets in phase one, materials from all three Federal agencies are closely aligned. Since completion of the NOTICE materials, CDC has gone on to produce its own checklists that are currently being used in dialysis facilities. These checklists completely align with the original NOTICE materials. Additionally, CMS further refined the worksheets developed in phase one. This refined version is currently in use by State surveyors.

The NOTICE team has worked to make the materials accessible to thought leaders in the field. The two NOTICE video vignettes on proper initiation were used to demonstrate proper technique at the CMS Survey and Certification ESRD Facility Surveyors Trainings in fall 2013 and 2014. Materials and links to AHRQ's Web site were shared via an Association for Professionals in Infection Control and Epidemiology (APIC) weekly newsletter in summer 2014. APIC has offered to share more information once the final change package is posted to AHRQ's Web site. The NOTICE team presented to the CDC BSI Collaborative Group in summer 2014, focusing on project outcomes, ideas for collaboration, and project materials available for use.

Lessons Learned

The lessons learned from the NOTICE project are many and vary in topic and significance. In general, the project outcomes were positive, and the partners worked together in a collegial and professional manner, building on the diverse set of talents and skills brought to the table. One of the most positive outcomes noted was the level and scope of engagement by the various stakeholders in the project. High participation rates and good cooperation from the dialysis units were further reinforced by positive feedback from them about participation in the project. Cooperation occurred across the spectrum of types of dialysis centers, which was attributed to the advance work done by the project team to engage a variety of owners early on. Considering this type of initiative was new to many in the dialysis field, this level of engagement was a significant success. One of the opportunities for improvement identified in the area of engagement was the level of participation on the coaching calls. It has been the project team's experience that active engagement on coaching calls is not an accident. The use of icebreakers on calls, small group activities in advance with a plan for interaction on the calls should be used to stimulate active involvement by participants. Additionally, more frequent participation by subject matter experts, actual dialysis center stories, and patient stories should be used to encourage more active coaching call participation.

HRET has learned from its experience in previous clinically focused projects (On the CUSP: Stop CLABSI [central line-associated bloodstream infections] and CAUTI) that improvement occurs on at least two parallel paths: the clinical path and the cultural change path. Use of the CUSP methodology for this project continued to reinforce the importance of this strategy. Aligning evidence-based infection prevention strategies with a focus on culture change leads to improved outcomes and better chances at sustainability once the project has ended. It is important to note that many of the tools that exist now to improve outcomes within the dialysis setting did not exist prior to this project. This project brought much-needed attention and resources to the dialysis centers in the form of an extensive literature search, education, data collection and analysis, coaching calls, and, in some cases, infection prevention resources further enhancing the culture change within the organizations.

Data and the ability to measure improvement in both processes and outcomes are important to any improvement effort. Education on the importance of this aspect of the project as well as the actual data collection, analysis, and dissemination of results, were strengths identified by the dialysis units and the partners. HRET built the Comprehensive Data System (CDS) to be a user-friendly, flexible tool to assist in tracking improvement in the Hospital Engagement Network (HEN). Building on the success of the CDS, the NOTICE project utilized the tool and staff resources to collect process and outcome measures.

During the project, Network 11 worked extensively with NHSN and the dialysis units to improve the data collection process, becoming a national resource in this important area. This expertise, combined with the experience the HRET staff has working with the NHSN conferring-rights process and the CDS, decreased the data collection burden for project participants. Statistical analysis was provided by KECC and informed partners and participants along the way, allowing modifications as needed.

Communication is an area that can always be improved; this project was no different. Development of a more robust Web site early on, much like those that exist for larger projects such as On the CUSP: Stop CLABSI and CAUTI or the HEN, would have better served the needs of both internal and external stakeholders. The successful development of a Web site as well as other communication vehicles in a project such as NOTICE would benefit from early involvement with AHRQ's Office of Communications and Knowledge Transfer (OCKT). Such involvement would expedite development by making sure the vision of all partners was aligned and development stayed on an agreeable course. Early involvement of OCKT would ensure that timelines could be developed to accommodate their schedules.

Videos are another beneficial communication vehicle important to the spread and sustainability of collaboratives such as NOTICE. Lessons learned regarding the production of videos include the need for clearly defined goals and objectives and more upfront time for production built into the project timeline. It is also important to allow ample time for review at each phase, ideally no less than 2 weeks between receipt and response.

Patient and family engagement in all health care improvement work is important and should be planned and built into the project from the beginning. The same opportunity for improvement is noted for NOTICE. Patients and their families are in the ideal position to evaluate the culture of safety and provide feedback to those caring for them. Many patients encountered in dialysis centers are there repeatedly and for extended periods of time, unlike the acute care setting where patients may be admitted and discharged more quickly. This continued exposure to the dialysis setting creates knowledgeable patients and families who can be made active partners in the safety and quality of their care. Every opportunity should be taken to include these valuable stakeholders in collaboratives targeted at improving quality and safety.

Finally, the use of simulation and simulation centers should be considered for future collaboratives involving dialysis centers as well as other clinically focused quality and patient safety improvement projects. The use of simulation for teaching and teach-back has been used historically in the health care setting and is becoming more common in the quality and safety arena. Consideration should be given to this valuable tool in the development of these types of projects.

Collaborations work best with a strong, clear unified goal. In phase one of this project, hidden issues behind the scenes with different partners stood as barriers to clean, positive collaboration. The strength of some of the partnerships became clear as the group worked to mitigate different motivations and driving forces that were tearing apart the cohesiveness of the project team. Ultimately, the diversity of partners helped create materials with a wider spread and a unified stance between agencies on infection prevention in dialysis.

That being said, there was no clear improvement shown from the change package, and the results leave the team with more questions to answer. For future projects, time must be built in to enact change and modify the approach when improvement is not being seen. With a 14-month intervention period, by the time it is obvious change is not occurring, it is often too late to successfully intervene.

HSOPS questions were used since they are the current gold standard to measure culture in clinical environments; however, as seen in the HSOPS Comparative Study, scores change very little even across a few years. With scores that may already be falsely elevated, projects need ways that are more sensitive for measuring change in culture of safety. The positive of culture assessments may be that conversations happen because the tool is used rather than any data collected from the tool; however, projects need a better way to measure this.

Appendix A. Infection Control Checklists

PREVENT HAIs Healthcare-Associated Infections

National Opportunity To Improve Infection Control in ESRD (NOTICE)

Infection Control Checklists

AHRQ Publication No. 14-0033-EF
April 2014

AHRQ Agency for Healthcare Research and Quality
Advancing Excellence in Health Care ● www.ahrq.gov

Infection Control Checklists

This document contains two types of checklists addressing direct-care activities that are high risk for transmission of infections in the dialysis setting.

(1) ICE (Infection Control Evaluator) checklists, for use by facility audit staff, on the following topics:
- Access of Central Venous Catheter for Initiation of Dialysis
- Central Venous Catheter Exit Site Care
- Access of AV Fistula or Graft for Initiation of Dialysis
- Parenteral Medication Preparation and Administration
- Access of Central Venous Catheter for Termination of Dialysis
- Access of AV Fistula or Graft for Termination of Dialysis and Post-Dialysis Access Care
- Cleaning and Disinfection of the Dialysis Station
- Dialysis Supply Management and Contamination Prevention

(2) Procedural checklists, for use by direct-care staff at the dialysis station, on the following topics:
- Access of Central Venous Catheter for Initiation of Dialysis
- Central Venous Catheter Exit Site Care
- Access of Arterial Venous Fistula or Graft for Initiation of Dialysis
- Parenteral Medication Storage, Preparation, and Administration
- Access of Central Venous Catheter for Termination of Dialysis
- Access of Arterial Venous Fistula or Graft for Termination of Dialysis and Post-Dialysis Access Care Cleaning and Disinfection of the Dialysis Station

In the appendix are information sheets on the following four topics:
- Hand Hygiene
- Infection Control and Prevention
- Recommended Infection Prevention Components of Quality Assessment and Performance Improvement
- Injection Safety/Safe Medication Handling

ICE (Infection Control Evaluator) Checklists

ICE Checklist #1a: Access of Central Venous Catheter (CVC) for Initiation of Dialysis

Checklist #1a

Certification Number:_____

Observation 1: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Observation 2: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Assemble supplies for patient at dialysis chair (no common tray/cart brought to dialysis station) Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Don clean gloves, gown, impermeable mask/eye protection or face shield Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Place clean field under CVC ports Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Scrub exterior of CVC hubs, with caps in place, with antiseptic (alcohol or povidone iodine or chlorhexidine) Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Remove port caps; wipe threads and top of uncapped hub with antiseptic, using friction, removing any residue/blood Note: If using "needleless" catheter system and connector device caps are not removed, scrub the injection port of the connector device Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Connect sterile syringes aseptically to each port to remove indwelling solutions and/or flush with sterile saline; initiate treatment; remove gloves Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Observation 1 notes:
Observation 2 notes:

ICE Checklist #1b: Central Venous Catheter (CVC) Exit Site Care

Checklist #1b

Certification Number:_____

Observation 1: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Observation 2: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Assemble supplies for patient at dialysis chair (no common tray/cart at station) Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Don clean gloves, gown, mask, and eye protection; remove old dressing and discard; remove gloves Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Don clean gloves; cleanse area around CVC exit site with chlorhexidine unless there is a contraindication; allow to dry before applying dressing Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Apply antimicrobial ointment to exit site unless there is a contraindication (e.g. patient hypersensitivity, bio-incompatibility with catheter material, or chlorhexidine-impregnated sponge dressing is used) Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Apply sterile dressing to CVC exit site; remove gloves Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Observation 1 notes:
Observation 2 notes:

Checklist #1c

ICE Checklist #1c: Access of AV Fistula* or Graft for Initiation of Dialysis

Certification Number:_____

Observation 1: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Observation 2: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Assemble supplies for patient at dialysis chair (no common tray/cart at station) Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Wash skin over access site with soap and water or antibacterial scrub **Exception:** Patient washed own access site after entering facility as verified by ICE observation or interview Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Locate/palpate cannulation sites; sites not touched again after skin antisepsis (at step 7) without repeating skin antisepsis Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Don clean gloves; if not already wearing, don gown and impermeable mask/eye protection or face shield Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Scrub skin over cannulation sites with antiseptic; allow antiseptic to dry before cannulating; do not touch sites again after skin antisepsis without repeating skin antisepsis Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Insert cannulation needles; tape in place; initiate treatment; remove gloves Obs 1: Met ☐ Not Met ☐ Obs 2 Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Observation 1 notes:
Observation 2 notes:

*Checklist not intended for observation of buttonhole cannulation technique

Checklist #2

ICE Checklist #2: Parenteral Medication Preparation and Administration

Certification Number:_____

Observation 1: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Observation 2: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Hand hygiene before preparing medications Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Medications prepared in a clean area, on a clean surface, away from dialysis stations **Exception:** Drawing saline syringes at dialysis station from patient's own clean saline bag, using aseptic technique Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Assemble supplies: sterile syringes, 70% alcohol swabs or other antiseptic, medication vials Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Single-dose vials used for one patient only and discarded (punctured only one time) Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Multiple-dose vials only entered with a new, empty sterile syringe and needle and discarded within 28 days unless manufacturer specifies a different (shorter or longer) date for that opened vial (see Information Sheet #4) Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Open one vial of each medication at a time; wipe stopper with alcohol or other antiseptic; withdraw medication into sterile syringe. May prepare meds for multiple patients at one time, but must administer to one patient at a time, leaving remainder of drawn meds in clean preparation area Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Label syringes that are predrawn and not immediately administered with patient name, medication, dose, time drawn; take only individual patient's medications to dialysis station Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Don clean gloves; wipe injection port (or patient's skin if subcutaneous or intramuscular injection) with antiseptic (e.g., chlorhexidine, povidone iodine, iodophor, or 70% alcohol); inject medication Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Discard syringe into Sharps container at point of use; remove gloves **Exception:** If using a needleless system with no attached needle, disposal in Sharps not necessary Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Observation 1 notes:
Observation 2 notes:

ICE Checklist #3a: Access of Central Venous Catheter (CVC) for Termination of Dialysis

Checklist #3a

Certification Number:_____

Observation 1: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Observation 2: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Assemble supplies; don gloves, gown, impermeable mask/eye protection or face shield Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Place clean field under CVC ports Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Re-infuse extracorporeal circuit; remove gloves Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Don clean gloves; scrub exterior of CVC hub with antiseptic Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Disconnect blood lines aseptically Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Scrub CVC hubs with antiseptic to remove any residue/blood; apply sterile port caps aseptically after post-treatment protocol Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Discard unused supplies; remove gloves Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Observation 1 notes:
Observation 2 notes:

ICE Checklist #3b: Access of AV Fistula* or Graft for Termination of Dialysis and Post-Dialysis Access Care

Checklist #3b

Certification Number:_____

Observation 1: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Observation 2: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Assemble supplies; don gloves, gown, and impermeable mask/eye protection or face shield Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Re-infuse extracorporeal circuit; disconnect bloodlines aseptically; remove gloves Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Don clean gloves; remove needles aseptically ; discard needles in Sharps container at point of use; remove gloves; hold needle sites with clean gauze using clean gloved hands (patient and staff) or disinfected clamps Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
When hemostasis is achieved, replace any blood-soiled bandage(s) on needle sites; ensure bandage on each needle site is clean; dry site before discharge Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Discard unused supplies; remove gloves Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Observation 1 notes:
Observation 2 notes:

*** Checklist not intended for observation of buttonhole cannulation technique**

Checklist #4

ICE Checklist #4: Cleaning and Disinfection of the Dialysis Station

Certification Number: _____

Observation 1: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Observation 2: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

***Note:** In other health care settings, patients vacate treatment area before cleaning and disinfection. Patient should be vacated from station before cleaning/disinfection of the machine/station unless contraindicated by patient condition. Clinical judgment must be exercised to determine appropriate practice for each patient, ensuring that the patient is fully stabilized prior to discharge.*

Was the dialysis station vacated prior to cleaning/disinfection? Obs 1: Y☐ N☐ Obs 2: Y☐ N☐

Machine: Don gown, gloves, impermeable mask/eye protection or face shield; remove all bloodlines and disposable equipment and discard in biohazardous waste; reprocess dialyzer, with all ports capped; transport dialyzer and bloodlines in a manner that prevents contamination of other surfaces; remove gloves Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Don clean gloves; obtain EPA-registered disinfectant; use tuberculocidal disinfectant if blood is visible Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Wipe all machine top, front, and side surfaces and dialysate hoses wet with disinfectant per manufacturer directions for use; if blood is visible, do second application of tuberculocidal disinfectant per manufacturer directions for use Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Empty prime waste receptacle; wipe all internal and external surfaces wet with disinfectant per manufacturer directions for use Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Chair: Vacated, fully reclined, all disposable supplies removed and discarded; with new disinfectant, wipe all external front-facing and side chair surfaces wet with disinfectant per manufacturer directions for use, including down sides of seat cushion and side tables Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Nondisposable items: Blood pressure cuff, TV controls, call button, data entry station, and counters around station are cleaned and wiped wet with disinfectant Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
If clamps are used, clean of visible blood and dirt and disinfect Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Discard cloth/wipe; remove gloves Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Hand hygiene Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Observation 1 notes:
Observation 2 notes:

Checklist #5

ICE Checklist #5: Dialysis Supply Management and Contamination Prevention

Certification Number:_____

Observation 1: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Observation 2: Shift #_____ Staff Type_____ Isolation Y☐ N☐ Visible From Nursing Station Y☐ N☐

Supplies are stored and kept in designated clean areas, with sufficient distance from dialysis stations to prevent contamination from potentially infectious materials/substances Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Supplies for next patient are not brought to station before prior patient's treatment is terminated and applicable equipment (machine, chair) cleaned/disinfected Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Carts or trays containing supplies are not taken to or moved between dialysis stations Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Staff do not keep patient care supplies in pockets or on their person Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Nondisposable equipment (e.g., thermometer, pH/conductivity meter, access flow device, O2 saturation meter, blood glucose meter) brought to the dialysis station is cleaned and disinfected before being returned to a common area or taken to another dialysis station Disinfection = all surfaces wiped with EPA-registered disinfectant per manufacturer's directions for use Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Multiple-dose medication vials are not taken to the dialysis station Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Disposable supplies taken to the dialysis station (whether they are/are not used on the patient) are discarded Obs 1: Met ☐ Not Met ☐ Obs 2: Met ☐ Not Met ☐
Observation 1 notes:
Observation 2 notes:

Procedural Checklists

Access of Central Venous Catheter (CVC) for Initiation of Dialysis Procedural Checklist #1a

- ☐ Hand hygiene
- ☐ Assemble supplies for patient at dialysis chair (no common tray/cart brought to dialysis station)
- ☐ Hand hygiene
- ☐ Don clean gloves, gown, and impermeable mask/eye protection or face shield
- ☐ Place clean field under CVC ports
- ☐ Scrub exterior of CVC hubs, with caps in place, with antiseptic
- ☐ Remove port caps; wipe threads and top of uncapped hub with antiseptic, using friction, removing any residue/blood

  Note: If using "needleless" catheter system and connector device caps are not removed, scrub injection port of connector device
- ☐ Connect sterile syringes aseptically to each port to remove in-dwelling solutions and/or flush with sterile saline; initiate treatment; remove gloves
- ☐ Hand hygiene

Note: If troubleshooting or manipulation of catheter or dialysis lines must occur during the dialysis treatment, then perform hand hygiene, don gloves and personal protective equipment, and disinfect CVC hub procedure as above with each manipulation.

Central Venous Catheter (CVC) Exit Site Care Procedural Checklist #1b

- ☐ Hand hygiene
- ☐ Assemble supplies for patient at dialysis chair (no common tray/cart at station)
- ☐ Don clean gloves, gown, mask, and eye protection; remove old dressing and discard; remove gloves
- ☐ Hand hygiene
- ☐ Don clean gloves and cleanse area around CVC exit site with chlorhexidine unless there is a contraindication; allow to dry before applying dressing
- ☐ Apply antimicrobial ointment to exit site unless there is a contraindication or chlorhexidine-impregnated sponge dressing is used
- ☐ Apply sterile dressing to CVC exit site; remove gloves
- ☐ Hand hygiene

Access of Arterial Venous Fistula or Graft for Initiation of Dialysis Procedural Checklist #1c

- ☐ Hand hygiene
- ☐ Assemble supplies for patient at dialysis chair (no common tray/cart at station)
- ☐ Wash skin over access site with soap and water or antibacterial scrub

  Exception: Patient washed own access site after entering facility as verified by auditor observation or interview
- ☐ Locate/palpate cannulation sites; sites not touched again after skin antisepsis without repeating skin antisepsis
- ☐ Hand hygiene
- ☐ Don clean gloves; if not already worn, don gown, impermeable mask, and eye protection or face shield
- ☐ Scrub skin over cannulation sites with antiseptic; allow antiseptic to dry before cannulating; do not touch sites after skin antisepsis without repeating skin antisepsis
- ☐ Insert cannulation needles; tape in place; initiate treatment; remove gloves
- ☐ Hand hygiene

Note: This checklist is not intended for observation of buttonhole cannulation technique.

Parenteral Medication Storage, Preparation, and Administration Procedural Checklist #2

- ☐ Assemble supplies in clean area with clean surface away from dialysis station
- ☐ Hand hygiene
- ☐ Open one vial of each medication at a time
- ☐ Wipe stopper with alcohol or other antiseptic
- ☐ Withdraw medication into sterile syringe and label syringe

  Note: May prepare for multiple patients at one time, but must administer to one patient at a time, leaving remainder of drawn meds in clean preparation area
- ☐ Take only individual patient's medications to dialysis station
- ☐ Hand hygiene
- ☐ Don clean gloves, wipe injection port with antiseptic
- ☐ Inject medication
- ☐ Discard syringe into Sharps container
- ☐ Remove gloves
- ☐ Hand hygiene

Note: This checklist is intended to address the infection control aspects of medication preparation and injection, and does not include requirements for verification of accuracy of medication administration (i.e. order verification, patient identification, documentation) or injection technique.

Access of Central Venous Catheter (CVC) for Termination of Dialysis Procedural Checklist #3a

- ☐ Hand hygiene
- ☐ Assemble supplies; don gloves, gown, and impermeable mask/eye protection or face shield
- ☐ Place clean field under CVC ports
- ☐ Reinfuse extracorporeal circuit; remove gloves
- ☐ Hand hygiene
- ☐ Don clean gloves; scrub exterior of CVC hub with antiseptic
- ☐ Disconnect blood lines aseptically
- ☐ Scrub CVC hubs with antiseptic to remove any residue/blood; apply sterile port caps aseptically after post treatment protocol
- ☐ Discard unused supplies; remove gloves
- ☐ Hand hygiene

Access of Arterial Venous Fistula or Graft for Termination of Dialysis and Post-Dialysis Access Care Procedural Checklist #3b

- ☐ Hand hygiene
- ☐ Assemble supplies; don gloves, gown, and impermeable mask/eye protection or face shield
- ☐ Reinfuse extracorporeal circuit; disconnect bloodlines aseptically; remove gloves
- ☐ Hand hygiene
- ☐ Don clean gloves; remove needles aseptically; discard needles in Sharps container at point of use; remove gloves

  Note: Hold needle sites with clean gauze using clean gloved hands (patient and staff) or disinfected clamps
- ☐ When hemostasis is achieved, replace any blood-soiled bandage(s) on needle sites; ensure bandage on each needle site is clean and dry site prior to discharge
- ☐ Discard unused supplies; remove gloves
- ☐ Hand hygiene

Note: This checklist is not intended for observation of buttonhole cannulation technique.

Cleaning and Disinfection of the Dialysis Station Procedural Checklist #4

- ☐ Don gown, gloves, and impermeable mask/eye protection or face shield
- ☐ Remove all bloodlines and disposable equipment and discard in biohazardous waste; reprocess dialyzer, with all ports capped; transport dialyzer, bloodlines, etc. in a manner that prevents contamination of other surfaces; remove gloves
- ☐ Hand hygiene
- ☐ Don clean gloves; obtain EPA-registered disinfectant; use tuberculocidal disinfectant if blood is visible
- ☐ Wipe machine top, front, and side surfaces and dialysate hoses wet with disinfectant per manufacturer directions for use; if blood is visible, do second application of tuberculocidal disinfectant
- ☐ Empty prime waste receptacle: wipe all internal and external surfaces wet with disinfectant per manufacturer directions for use
- ☐ When chair is vacated, remove and discard all disposable supplies
- ☐ Fully recline chair and clean with disinfectant; wipe all external front-facing and side chair surfaces wet with disinfectant per manufacturer directions for use, including down sides of seat cushion and side tables
- ☐ Wipe all nondisposable items with disinfectant, including blood pressure cuff, TV controls, call button, data entry station, and counters around station
- ☐ If clamps are used, clean off visible blood and dirt and disinfect
- ☐ Discard cloth/wipe; remove gloves
- ☐ Hand hygiene

Note: Allow disinfectant contact time per manufacturer's recommendations for all checklist items. In other health care settings, patients vacate treatment area before cleaning and disinfection. This practice should be considered for dialysis facilities.

Appendix—Information Sheets

Hand Hygiene

Hand hygiene is the primary measure to reduce infections in the dialysis center. Adherence to accepted guidelines for hand hygiene has been shown to decrease the incidence of infections and prevent transmission of antimicrobial-resistant organisms and bloodborne pathogens.[1,2] The World Health Organization has encouraged all health care facilities to adopt their 2009 guidelines, including the "My 5 Moments for Hand Hygiene" approach. According to this strategy, opportunities for hand hygiene can be stratified into five major activities.

5 Moments for Hand Hygiene in Health Care:

1. Before touching a patient
2. Before clean/aseptic procedure
3. After body fluid exposure
4. After touching a patient
5. After touching patient surroundings

Acceptable Methods of Hand Hygiene:

Soap and water

Technique: Wet hands with water, apply to hands an amount of soap recommended by the manufacturer, and rub hands together vigorously for at least 15 seconds, covering all surfaces of hands and fingers. Rinse hands with water and dry thoroughly with disposable towel. Use towel to turn off faucet. Avoid using hot water, because repeated exposure to hot water may increase the risk of dermatitis.

When to use:

A. When hands are visibly dirty or soiled with blood or other body fluids.

B. After contact with a patient with known *Clostridium difficile* infection.

Alcohol-based hand rub

Technique: Apply an amount of hand rub recommended by the manufacturer to palm of one hand and rub hands together. Cover all surfaces of hands and fingers until hands are dry.

When to use: This is the preferred means for routine hand hygiene in all clinical situations listed below.

Indications for Hand Hygiene Specific to Dialysis Centers:

A. Before and after touching the patient
B. Before handling an invasive device or performing any vascular access procedure
C. After contact with body fluids, dialysate, mucous membranes, non-intact skin, or wound dressings
D. If moving from a contaminated body site to another body site during care of the same patient, e.g., care of a wound followed by manipulation of a dialysis catheter
E. After contact with environmental surfaces and objects (including medical equipment, dialysis machine) in the dialysis station
F. Before handling medication or preparing food
G. After removal of gloves

References

1. WHO Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge Clean Care is Safer Care. http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf. Accessed January 3, 2014.

2. Centers for Disease Control and Prevention. Guidelines for hand hygiene in health-care settings. MMWR 2002;51(RR 16) 1-45.

Infection Control and Prevention

A. Providing a sanitary environment

- All treatment-related areas, equipment and surfaces are kept free of blood, mold, and accumulation of dirt, dust and other potentially infectious materials.
  - Treatment-related areas include any areas accessible to patients or public and areas where dialysis supplies, equipment, and medications are stored, prepared, or processed.
  - There is a clear separation of clean and dirty work areas. Clean areas are used for storage and preparation of medications and unused supplies; dirty areas are used for contaminated equipment.
- Blood spills are promptly cleaned up with EPA-registered tuberculocidal hospital disinfectant per manufacturer directions for use, with a second application of same using a new wipe/cloth for contact time per directions.
- Infectious waste and Sharps are disposed in clearly marked, leak-proof receptacles. Sufficient numbers of infectious waste receptacles and Sharps are available in patient treatment areas at point of use to reduce potential for blood contamination of the patient care environment.
- Hand washing sinks and hand sanitizer dispensers are available in sufficient numbers for use by staff, patients and public to promote hand hygiene.
  - Hand washing sinks with warm water and soap for patient use in isolation room/area; home training room(s); reuse room; medication preparation area; and for every four to six in-center hemodialysis stations.

B. Preventing and managing a specific pathogen exposure

- **Hepatitis B**
  - Surveillance: Test all patients per CDC guidelines: prior to admission; ongoing testing as indicated by patient's immunity status; test results reviewed promptly and acted upon if indicated.
  - Vaccination: Offer vaccine to all susceptible patients and staff with followup testing for vaccine response
  - Management:
    - Isolate hepatitis B surface antigen positive (HBV+) patients for dialysis treatments in a dedicated isolation room. If an isolation room is not possible for facilities Medicare certified prior to October 14, 2008, use an isolation "area" separated from other dialysis stations by the width of one dialysis station.
    - Dedicate the isolation room/area for only HBV+ patient(s) when there is at least one such patient on census; all equipment and supplies are dedicated to the isolation room/area.
    - Staff caring for HBV+ patients must not care for HBV-susceptible patients at the same time, including the period when dialysis is terminated on one patient and initiated on another.
    - When the last HBV+ patient on census is discharged, terminal cleaning of the isolation room/area and equipment is required before use for non-HBV+ patient.
- **Hepatitis C:** Surveillance: Test all patients per CDC guidelines: prior to admission; ongoing testing as indicated by the patient's immunity status; test results reviewed promptly and acted upon if indicated.
- **Tuberculosis:** Surveillance: Baseline testing of all patients and staff with rescreening for symptoms. Develop contingency plan for management of patients with active tuberculosis infection.
- **Influenza:** Offer all patients and staff annual vaccination.
- **Pneumococcal pneumonia:** Offer all patients vaccination.
- **Modified Contact Precautions:**
  - Draining wound: Separation of wound care from any dialysis-related care; full personal protective equipment worn for wound care and discarded when completed; patient separation at a dialysis station with as few adjacent stations as possible; and dedicated gown for staff caring for patient(s) with noncontained draining wound(s).
  - Fecal incontinence: Separation of incontinence care from any dialysis-related care; full personal protective equipment worn for incontinence care and discarded when completed; patient separation at a dialysis station with as few adjacent stations as possible and dedicated gown for staff caring for patient(s) with uncontrolled diarrhea or fecal incontinence

Recommended Infection Prevention Components of Quality Assessment and Performance Improvement

The facility quality assessment and performance improvement program should implement ongoing and effective processes to prevent, detect and manage infections, with a goal of minimizing or eliminating healthcare-associated infections acquired at the facility. The following clinical and technical areas should be continuously monitored, with analysis of the available data, prompt recognition of adverse trends, and implementation of performance improvement activities to achieve and sustain measurable improvements:

1. Infection occurrence surveillance: Occurrences should be logged for—
   a. All bloodstream infections, stratified by vascular access type. The Centers for Disease Control (CDC) National Healthcare Safety Network dialysis event rates should be measured.
   b. All other positive culture results separated by location/site, including hemodialysis or peritoneal dialysis access exit site, wound, etc.

   Sufficient information should be recorded for each occurrence, including patient identification, date of infection diagnosis (positive culture result), site of infection, infecting organisms with antibiotic sensitivities.

2. Disease-specific management should be addressed, with continuous monitoring, at a minimum for—
   a. Hepatitis B and hepatitis C
      i. Surveillance of all patients per CDC guidelines, including comprehensive investigation and reporting of seroconversions
      ii. Vaccination program for hepatitis B-susceptible patients to ensure timely offer of vaccination and followup testing of vaccines for response. Vaccination offered to susceptible staff.
   b. Tuberculosis surveillance of patients and staff
   c. Influenza vaccination programs for patients and staff
   d. Pneumococcal pneumonia vaccination program for patients

3. Vascular access prevalence aimed at minimizing central venous catheter (CVC) rates and achieving optimum arterial venous (AV) fistula use rates, including measuring CVC and AV fistula prevalence rates and AV fistula incidence rates

4. Staff education and visual practice audits
   a. All facility staff receive initial and at least annual education in infection control pertinent to their job duties, using, at a minimum, the information and procedures in Checklists #1–5
   b. Direct care staff are visually audited, using the ICE Checklists #1–5 monthly; each direct care staff visually audited at least annually

5. Patient education should be focused on informing patients about infection prevention through vascular access care/hygiene. Patients should be informed about what to expect of direct patient care staff practices for infection control, and should be empowered as active participants in ensuring their care is appropriate, with freedom to voice concerns without fear of reprisal.

6. Environmental/technical: Ensuring the microbial safety of hemodialysis by monthly evaluation of—
   a. Water and dialysate cultures and endotoxin levels
   b. Dialyzer reprocessing and reuse program (if applicable)
      i. Reuse water source and reuse equipment cultures and endotoxins
   c. Patient pyrogen reactions

Injection Safety/Safe Medication Handling

The Centers for Disease Control and Prevention has identified 33 hepatitis outbreaks between 1998 and 2008 resulting from deficient health care practices. These outbreaks occurred in outpatient settings such as doctor's offices, outpatient clinics, dialysis centers, and nursing homes. Unsafe injection practices, such as reuse of syringes, accounted for most of the infections and exposures. In addition to viruses, unsafe practices when handling medications for injection can put a dialysis patient at risk of central line-associated bloodstream infections.

The following recommendations should be followed in all dialysis centers. They apply to the use of needles, cannulas that replace needles, and, where applicable, intravenous delivery systems:

- Use aseptic technique to avoid contamination of sterile injection equipment and supplies.
- Do not administer medications from a syringe to multiple patients, even if the needle or cannula on the syringe is changed. Needles, cannulae, and syringes are sterile, single-use items; they should never be reused for another patient.
- Do not enter any vial with a used syringe or needle.
- Decontaminate vial stoppers with antiseptic before entering a with a sterile needle
- Use fluid infusion and administration sets (i.e., intravenous bags, tubing, and connectors) for one patient only and dispose appropriately after use. Consider a syringe or needle/cannula contaminated once it has been used to enter or connect to a patient's intravenous infusion bag or administration set.
- Use single-dose vials for parenteral medications whenever possible.
- Do not administer medications from single-dose vials or ampules to multiple patients or combine leftover contents for later use.
- If multiple-dose vials must be used, both the needle or cannula and syringe used to access the multiple-dose vial must be sterile.
- Do not keep multiple-dose vials in the immediate patient treatment area and store in accordance with the manufacturer's recommendations; discard if sterility is compromised or questionable.
- Do not use bags or bottles of intravenous solution as a common source of supply for multiple patients.
- Medications should be prepared only in a dedicated medication area and never at the dialysis station.
- Medication vials should always be discarded whenever sterility is compromised or questionable.
- In addition, the United States Pharmacopeia (USP) General Chapter 797 recommends the following for multiple-dose vials of sterile pharmaceuticals:
    - If a multiple-dose vial has been opened or accessed (e.g., needle-punctured), the vial should be dated and discarded within 28 days unless the manufacturer specifies a different (shorter or longer) date for that opened vial.
    - If a multiple-dose vial has **not** been opened or accessed (e.g., needle-punctured), it should be discarded according to the manufacturer's expiration date.
- The manufacturer's expiration date refers to the date after which an unopened multiple-dose vial should not be used. The beyond-use date refers to the date after which an opened multiple-dose vial should not be used. The beyond-use date should never exceed the manufacturer's original expiration date.
- For information on storage and handling of vaccines, please refer to the Centers for Disease Control Vaccine Storage and Handling Toolkit or the manufacturer's recommendations for specific vaccines.

References

Centers for Disease Control and Prevention. CDC - Multi-dose vials - Safe Practices for Medical Injections FAQs - Injections Safety. www.cdc.gov/injectionsafety/providers/provider_faqs_multivials.html. Accessed January 3, 2014.

One & Only Campaign. What Are They & Why Follow Them? www.oneandonlycampaign.org/content/what-are-they-why-follow-them. Accessed January 3, 2014.

Appendix B. Readiness Assessment

NOTICE Facility Readiness Assessment

Do you know your facility's VAI rate? (Yes/No)

How often are VAIs reported to facility leaders?
(Immediately, Monthly, Quarterly, Other, We do not report VAIs to facility leaders)

Have you participated in any other initiatives to reduce VAIs? (Yes/No) If yes, explain:

_____

For each of the following questions, please indicate the degree to which each of the following has taken place in your facility:

Element	Not implemented and no plans to do so outside of NOTICE project	Currently planning for implementation outside of NOTICE project	Fully implemented outside of NOTICE project
Culture of Safety			
Senior Leader engagement in patient safety			
Systematic analysis and proactive learning from harmful events or events with potential for harm as raised by front-line staff			
Setting regular (i.e. daily, monthly, quarterly) goals based on analysis of facility harmful events			
Educating staff on the "Science of Safety"			
Regular (i.e. monthly, quarterly) internal huddles to discuss culture of safety and safety improvements			
Hand Hygiene			
Use of guidelines on proper techniques for hand hygiene			
Regular in-service training for appropriate healthcare personnel on techniques and procedures for hand hygiene			
Documenting and monitoring proper hand hygiene			
Access Site Preparation and Cleansing			
Use of guidelines on proper techniques for access site preparation			

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Element	Not implemented and no plans to do so outside of NOTICE project	Currently planning for implementation outside of NOTICE project	Fully implemented outside of NOTICE project
Regular in-service training for appropriate healthcare personnel on techniques and procedures for access site preparation			
Documenting and monitoring proper access site preparation			
Reduce and Remove Catheters			
Use of guidelines on proper techniques for reducing and removing catheters			
Regular in-service training for appropriate healthcare personnel on techniques and procedures for reducing and removing catheters			
Documenting and monitoring appropriate catheter usage			
Great Connection and Disconnection Technique			
Use of guidelines on proper connection and disconnection techniques			
Regular in-service training for appropriate healthcare personnel on proper connection and disconnection techniques			
Documenting and monitoring proper connection and disconnection technique			
Evaluation of Team Infection Control Practices			
Regularly collecting and reviewing VAI rates			
Documenting and monitoring of infection control practices			

Appendix C. Exit Assessment

NOTICE Facility Final Assessment

Do you know your facility's Vascular Access Infection (VAI) rate? ☐ Yes ☐ No

How often are VAIs reported to facility leaders?
☐ Immediately ☐ Monthly ☐ Quarterly ☐ Other ☐ We do not report VAIs to facility leaders

For each of the following questions, please indicate the degree to which each of the following has taken place in your facility:

Element	Fully implemented before or separate from the NOTICE project	Implemented as a result of the NOTICE project	Not implemented and no plans to do so
Culture of Safety			
Senior Leaders are engaged in patient safety			
Front-line staff raises the need for systematic analysis and proactive learning from harmful events or events with potential for harm			
Regular (i.e. daily, monthly, quarterly) goals are set based on analysis of facility harmful events			
Staff are educated on the "Science of Safety"			
Regular (i.e. monthly, quarterly) internal huddles are used to discuss culture of safety and safety improvements			
Hand Hygiene			
Consistent use of guidelines on proper techniques for hand hygiene			
Regular in-service training for facility personnel on techniques and procedures for hand hygiene			
Monitoring and documentation of proper hand hygiene			
Access Site Preparation and Cleansing			
Consistent use of guidelines on proper techniques for access site preparation			

Element	Fully implemented before the NOTICE project	Implemented as a result of the NOTICE project	Not implemented and no plans to do so
Regular in-service training for facility personnel on techniques and procedures for access site preparation			
Monitoring and documentation of proper access site preparation			
Reduce and Remove Catheters			
Consistent use of guidelines on proper techniques for reducing and removing catheters			
Regular in-service training for facility personnel on techniques and procedures for reducing and removing catheters			
Monitoring and documentation of appropriate catheter use			
Great Connection and Disconnection Technique			
Consistent use of guidelines on proper connection and disconnection techniques			
Regular in-service training for facility personnel on proper connection and disconnection techniques			
Monitoring and documentation of proper connection and disconnection technique			
Evaluation of Team Infection Control Practices			
Regular collection and Review of VAI and Blood Stream Infection (BSI) rates			
Monitoring and documentation of infection control practices			

Appendix D. Audit Tool

NOTICE Process Checklist

Facility CCN #: **Month:**

Facility Name: **Contact:**

Catheter Initiation

Observation Number	Date*	Shift*	Hand Hygiene	Clean Gloves	Scrub Hub Cap w/ Antiseptic	Scrub Uncapped Hub w/ Antiseptic	Aseptic Connection Technique	Hand Hygiene
CI 1			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
CI 2			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
CI 3			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
CI 4			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
CI 5			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No

Catheter Termination

Observation Number	Date*	Shift*	Hand Hygiene	Clean Gloves	Scrub Hub-Line Connection w/ Antiseptic	Scrub Uncapped Hub w/ Antiseptic	Aseptic Disconnection Technique	Hand Hygiene
CT 1			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
CT 2			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
CT 3			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
CT 4			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
CT 5			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No

Catheter Exit Site Care

Observation Number	Date*	Shift*	Hand Hygiene	Clean Gloves	Formal Inspection of Exit Site Performed	Clean Field Around Catheter Exit Site with Chlorhexidine	Applied Antiseptic Ointment to Exit Site	Sterile Dressing Applied to Catheter Exit Site	Hand Hygiene
EC 1			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
EC 2			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
EC 3			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
EC 4			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
EC 5			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No

AV Access Initiation

Observation Number	Date*	Shift*	Access Site Washed/Cleaned Before Inspection/Palpation	Hand Hygiene	Clean Gloves	Scrub Skin Over Cannulation Sites With Antiseptic	Avoid Contamination of Prepared Cannulation Sites During Needle Insertion	Hand Hygiene
AV I 1			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
AV I 2			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
AV I 3			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
AV I 4			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
AV I 5			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No

AV Access Termination

Observation Number	Date*	Shift*	Hand Hygiene	Clean Gloves Before Disconnect Bloodlines Aseptically	Hand Hygiene	Clean Gloves	Needles Removed Aseptically	Needle Sites Held With Clean, Gloved Hand and Clean or Sterile Gauze
AV T 1			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
AV T 2			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
AV T 3			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
AV T 4			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
AV T 5			Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No

Overall Hand Hygiene

Observation Number	Date*	Shift*	Used Hand Hygiene	WHO Moment	Observation Number	Date*	Shift*	Used Hand Hygiene	WHO Moment
HH 1			Yes / No		**HH 6**			Yes / No	
HH 2			Yes / No		**HH 7**			Yes / No	
HH 3			Yes / No		**HH 8**			Yes / No	
HH 4			Yes / No		**HH 9**			Yes / No	
HH 5			Yes / No		**HH 10**			Yes / No	

WHO MOMENTS: 1. Prior to touching a patient 2. Prior to aseptic procedure 3. After touching a patient 4. After exposure to body fluid 5. After touching patient surroundings

*** Attempt to observe care on multiple days and during all shifts**

notice National Opportunity to Improve Infection Control in ESRD

Appendix E. Audit Tool Instructions

Process Measures Data Collection Guidelines

This audit should be used to assist facilities in evaluating processes and procedures that could be associated with infection in order to identify areas where improvement could be made. It is not meant to be disciplinary or to implicate individual staff members. The information collected will be summarized and returned to facilities in a feedback report to aid in quality improvement activities. It will be shared only with NOTICE project partners for use in this quality improvement project and will not be part of other Network or State Surveyor activities.

How to use the Process Measures Audit

- The process measures audit should be completed once a month by a facility nurse.
- It is recommended that only 1-2 nursing staff members are designated to complete the audits throughout the course of the NOTICE study.
- The auditor should attempt to observe care on multiple days and during all shifts to capture a variety of observations.
- An effort should be made to vary the staff members observed as much as possible during a monthly audit.
- The audits should be unannounced and the auditor should attempt to not influence staff practices.
- Only observations that were physically seen should be recorded.
- The auditor should observe 5 initiation and 5 termination procedures for both fistula/graft and catheter access types each month. In addition, 5 catheter exit site care procedures should be observed.
- It is not mandatory to observe the same fistula/graft patient and staff member for both initiation and termination.
- Record date and shift for every observation.
- If an observed procedure is completed correctly, the auditor should circle "**Yes.**" If an observed procedure is completed incorrectly, or not performed, the auditor should circle "**No.**"
- The data will be submitted through HRET's Comprehensive Data System (CDS).

Catheter Initiation Audit

- **Hand Hygiene** – Circle "Yes" if had hygiene is performed properly at the given point in the observed task. Circle "No" if had hygiene is not performed, performed incorrectly, or hands are contaminated before next step in task.

- **Clean Gloves** - Circle "Yes" if clean gloves are donned at the given point in the observed task. Gloves should be worn prior to contact with patients and potentially contaminated surfaces. All items/surfaces at the dialysis station are considered potentially contaminated. Gloves should always be changed between patients and between clean and contaminated sites on the same patient. Holding a glove in one's hand instead of wearing it is not considered acceptable. Glove use does not preclude the need for hand hygiene after removing gloves. Circle "No" if gloves are not worn or if dirty gloves are worn.

- **Scrub Hub Cap w/ Antiseptic** – Circle "Yes" if prior to cap removal, staff member disinfects the caps and the part of the hub that is accessible and discards the antiseptic pad (i.e., use a separate antiseptic pad for the next step). Circle "No" if staff member does not disinfect the caps prior to removal. **(NOTE: 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)

- **Scrub Uncapped Hub w/ Antiseptic** – Circle "Yes" if staff member removes the caps and applies antiseptic with friction to the catheter, including the sides (threads) and end of the hub, making sure to remove any residue (e.g., blood). Additionally, staff member should move from the hub at least several centimeters towards the body. Hold the limb while allowing the antiseptic to dry. Use a separate antiseptic pad for each hub/ catheter limb. Leave hubs "open" (i.e., uncapped and disconnected) for the shortest time possible. Circle "No" if staff member does not complete all of the steps described above of scrubbing the uncapped hub.

- **Aseptic Connection Technique –** Circle "Yes" if catheter hubs are connected aseptically. Specifically, once disinfected, do not allow the catheter hubs to touch nonsterile surfaces. Circle "No" if catheter hubs are not connected aseptically for any reason including being allowed to touch nonsterile surfaces.

- **Hand Hygiene**

Catheter Termination Audit

- Hand Hygiene

- Clean Gloves

- Scrub Hub-Line Connection w/ Antiseptic – Circle "Yes" if staff member disinfects the connection prior to disconnection. If this is done, staff member should use a separate antiseptic pad for the subsequent disinfection of the hub. Circle "No" if staff member does not disinfect the connection prior to disconnection.

- Scrub Uncapped Hub w/ Antiseptic – Circle "Yes" if after staff member disconnects the blood line from the catheter and disinfect the hub with a new antiseptic pad, including scrubing the sides (threads) and end of the hub thoroughly with friction, making sure to remove any residue (e.g., blood). Staff member should use a separate antiseptic pad for each hub. Leave hubs "open" (i.e., uncapped and disconnected) for the shortest time possible. Circle "No" if staff member does not scrub the sides and end of the hub through with friction or does not use a separate antiseptic pad for each hub.

- Aseptic Disconnection Technique – Circle "Yes" if once disinfected, staff member does not allow the catheter hubs to touch nonsterile surfaces and holds the catheter until the antiseptic has dried. Circle "No" if catheter hubs touched a nonsterile surface or are not allowed to properly dry.

- Hand Hygiene

Catheter Exit Site Care

- Hand Hygiene

- Clean Gloves

- Formal Inspection of Exit Site Performed – Circle "Yes" if you witness staff performing a formal inspection of the exit site. Circle "No" if staff member does not perform inspection.

- Clean Field around Catheter Exit Site with Chlorhexidine – Circle "Yes" if field around catheter exit site is cleaned with Chlorhexidine. Circle "No" if field is not cleaned or cleaned with an agent other than chlorhexidine.

- Applied antiseptic Ointment to Exit Site – Circle "Yes" if staff member applies bacitracin/gramicidin/polymyxin B ointment or povidone-iodine ointment to catheter exit sites during dressing change OR uses a chlorhexidine-impregnated sponge dressing. Circle "No" if no antiseptic ointment is applied.

-

- Sterile Dressing Applied to Catheter Exit Site – Circle "Yes" if staff member applies new, sterile dressing to exit site. Circle "No" if new sterile dressing is not applied to exit site.

- Hand Hygiene

AV Access Initiation

- **Access Site Washed/Cleaned before Inspection/Palpation** – Circle "Yes" if staff member washes access site OR confirms verbally with patient that they washed their own access site before inspection begins. Circle "No" if site is not washed and staff member does not communicate with patient regarding if it had been washed previously.

- **Hand Hygiene**

- **Clean Gloves**

- **Scrub Skin over Cannulation Sites with Antiseptic –** Circle "Yes" if skin antisepsis is done with an appropriate solution and allowed proper time to dry. Use an alcohol-based chlorhexidine (>0.5%) solution as the first line agent for skin antisepsis, particularly for central line insertion and during dressing changes. Povidone-iodine, preferably with alcohol, or 70% alcohol are alternatives. Circle "No" if skin antisepsis is not performed or if skin is contaminated before needle insertion.

- **Avoid Contamination of Prepared Cannulation Sites during Needle Insertion –** Circle "Yes" if cannulations sites are not contaminated during needle insertion. Circle "No" if cannulations sites are contaminated.

- **Hand Hygiene**

AV Access Termination

- **Hand Hygiene**

- **Clean Gloves and disconnect Bloodlines Aseptically**

- **Hand Hygiene**

- **Clean Gloves**

- **Needles Removes Aseptically –** Circle "Yes" if needles are removed aseptically. Circle "No" if needles are not removed aseptically.

- **Needle Sites Held with clean, gloves hand and clean or sterile gauze –** Circle "Yes" if sites are held with clean, gloved hand and clean or sterile gauze. Circle "No" if sites hare held with ungloved hands.

Hand Hygiene

The guidelines below pertain specifically to the Hand Hygiene section of the Audit:

- Collect 10 hand hygiene (HH) observations every month. This may be performed most efficiently from a central desk in the dialysis center.

- All hand hygiene observations should be done during planned observation periods. Observe and record every available hand hygiene opportunity consecutively until 10 observations have been made. The intent is to avoid bias that may be introduced by ad hoc observations of care during the course of normal activities. One **observation** consists of **any** opportunity for hand hygiene included in the 5 moments for hand hygiene listed on the audit. Each opportunity for hand hygiene is considered one observation. For example, observation of a healthcare worker from initiation of dialysis to termination of dialysis, there will be multiple opportunities for hand hygiene. Each HH opportunity should be counted as an individual observation (2 opportunities = 2 observations) and should be documented on separate lines.

- Circle Yes or No if hand hygiene was performed according to the hand hygiene policy.

- Document which of the WHO 5 moments of HH was observed

- Hand hygiene items by specific WHO moments 1-5:

    1. Prior to touching a patient
    2. Prior to aseptic procedure
    3. After touching a patient
    4. After exposure to body fluid

5. After touching patient surroundings

Followup Actions

If the auditor observes care that is not acceptable, it is recommended that the auditor or immediate supervisor follow up with the staff member to address the procedure(s) that needed to be resolved. Additionally, areas that require improvement from all staff should be reviewed at monthly staff quality improvement meetings.

Appendix F. Culture Assessment

ASSESSMENT OF PATIENT SAFETY CULTURE

INSTRUCTIONS

Think about the way things are done in your facility and provide your opinions on issues that affect the overall safety and quality of the care provided to patients in your facility. Please check the box that most closely reflects your opinion. All responses are confidential.

Think about your facility… *How much do you agree or disagree with the following statements?*					
	Strongly Disagree	**Disagree**	**Neither Disagree nor Agree**	**Agree**	**Strongly Agree**
When a lot of work needs to be done quickly, we work together as a team to get the work done					
In this facility, people treat each other with respect					
We are actively changing protocols/policies to reduce vascular access infections (VAIs)					
Mistakes have led to positive changes here					
After we make changes to improve patient safety, we evaluate their effectiveness					
Management in this facility provides a work climate that promotes VAI prevention					
Problems often occur in the exchange of information between patient and staff in this facility					

Think about your facility. How often to the following things happen in your facility?					
	Never	**Rarely**	**Sometimes**	**Most of the Time**	**Always**
Staff will freely speak up if they see something that may increase risk of VAI					
In this unit, we discuss ways to prevent errors from happening again					
We actively include patients and family members in trying to reduce VAIs					

ASSESSMENT CONTINUED ON PAGE 2

Think about your immediate supervisor, manager, or person to whom you directly report… How much do you agree or disagree with the following statements?					
	Strongly Disagree	**Disagree**	**Neither Disagree nor Agree**	**Agree**	**Strongly Agree**
My supervisor/manager gives positive feedback when he/she sees a job done according to established patient safety procedures					
My supervisor/manager seriously considers staff suggestions for reducing VAIs					

Demographics

What is your current professional role at your dialysis center? **(Select all that apply)**

- ☐ Administrative Assistant or Receptionist
- ☐ Dietician
- ☐ Other Technician (e.g. machine, reuse)
- ☐ Nurse Practitioner
- ☐ Charge Nurse
- ☐ Dialysis Facility Administrator
- ☐ Medical Director
- ☐ Social Worker
- ☐ Patient Care Technician
- ☐ Physician Assistant
- ☐ Nurse
- ☐ Nurse Manager
- ☐ Area Manager
- ☐ Medical Doctor

How long have you been providing dialysis treatment services at **any** dialysis center? **(Select one)**

- ☐ Less than 1 year
- ☐ At least 1 year but less than 3 years
- ☐ At least 3 years but less than 5 years
- ☐ At least 5 years but less than 10 years
- ☐ At least 10 years but less than 15 years
- ☐ 15 years of more

How long have you been providing dialysis treatment services at **your current** center? **(Select one)**

- ☐ Less than 1 year
- ☐ At least 1 year but less than 3 years
- ☐ At least 3 years but less than 5 years
- ☐ At least 5 years but less than 10 years
- ☐ At least 10 years but less than 15 years
- ☐ 15 years of more

What time of day do you most often work at your dialysis center? **(Select one)**

- ☐ Days during the week
- ☐ Evenings during the week
- ☐ Nights during the week
- ☐ Days on weekends
- ☐ Evenings on weekends
- ☐ Nights on weekends

In your staff position, do you typically have direct interaction or contact with patients?

- ☐ YES, I typically have direct interaction or contact with patients.
- ☐ NO, I typically do NOT have direct interaction or contact with patients.

Appendix G. Recruitment Flier

NATIONAL OPPORTUNITY TO IMPROVE INFECTION CONTROL IN ESRD

About the Project

Dialysis patients receive treatments that expose them to many risks for infection. Vascular access infections (VAI) occur at an alarmingly high rate and can lead to hospitalizations and death, so efforts to prevent these infections are essential. ESRD facilities in Network 11 and Network 6 are being offered the opportunity to participate in a pilot improvement project that is part of the National Opportunity to Improve Infection Control in ESRD (NOTICE), an initiative of the Agency for Healthcare Research & Quality (AHRQ), in collaboration with CDC and CMS. Participants will receive training related to infection prevention, guidance on how to create systems and a culture of safety that reduces infection risks, and coaching for leadership and staff seeking to provide their patients with the safest possible care.

Benefits

Learning: Dialysis centers will learn how to consistently implement infection control practices and to sustain the use of these practices by creating a culture of safety.
Networking: Teams will be able to network on a national level with other facilities enrolled in the project.
Expertise: Teams will have access to expert faculty and data collection and monitoring support throughout the participation timeframe.

Expected Outcomes

- Increased awareness of appropriate infection control practices in dialysis treatment
- Reduced patient harm from potential infections
- Reduced rates of VAI

National Project Goals

- Reduce mean VAI rates in participating clinical units
- Improve safety culture, communication, teamwork and the use of data to reduce infection occurrences

Interested in enrolling or learning more? Contact Jan Deane (jdeane@nw11.esrd.net) or Dee Tyburski (dtyburski@nw6.esrd.net)

Project Sponsor and National Project Team

Funded by the Agency for Healthcare Research and Quality, the Health Research & Educational Trust (HRET) affiliate of the American Hospital Association is coordinating this national initiative, in partnership with the University of Michigan Kidney Epidemiology and Cost Center (UM-KECC), and the Renal Network of the Upper Midwest, Inc. (Network 11).

Expert Faculty

Expert faculty from UM-KECC include:

- Jack Kalbfleisch, PhD
- Joe Messana, MD
- Rajiv Saran, MBBS, MD, DTCD, MRCP, MS
- Carol Chenoweth, MD

Key Interventions

VAI Prevention: 1) Employ the use of the infection control worksheet (ICWS) and infection control checklists (ICCL); 2) Implement NOTICE change package
Culture: 1) Educate on the science of safety and how to identify and learn from infections and near-misses, 2) Guidance on how to create a culture of safety, 3) Instruction on improving teamwork and communication using proven tools and methods

Program Requirements

Dialysis centers need to participate in a 15-month improvement effort that requires:

- Assemble a team with ability to lead the improvement efforts
- Implement VAI prevention activities
- Work to create a culture of safety
- Submit baseline & monthly VAI rate data and project activity updates
- Submit cultural evaluation at start and finish of project
- Meet as a team to monitor performance improvement
- Participate in improvement calls and events led by expert faculty and coordinated with your Renal Network
- Share your successes and challenges with your peers

Appendix H. Commitment Letter

National Opportunity to Improve Infection Control in ESRD – NOTICE Initiative

Dialysis Facility Participation Agreement

In collaboration with the Agency for Healthcare Research and Quality (AHRQ), the Health Research & Educational Trust (HRET), the University of Michigan Kidney Epidemiology and Cost Center (UM-KECC), the Centers for Medicare & Medicaid Services (CMS), and the Centers for Disease Control (CDC) the National Opportunity to Improve Infection Control in ESRD (NOTICE) aims to reduce mean vascular access infection (VAI) rates in participating clinical facilities and improve safety culture, communication, teamwork, and the use of data to reduce infection risks. Your dialysis facility is one of over 40 dialysis facilities from Network 11 and Network 6 participating in this project.

Benefits of Participation:

1. Participate in a major initiative designed to help facilities implement practices to reduce VAI rates.
2. Learn about current infection control trends and how to identify areas for improvement at your individual facility.
3. Learn about and implement best practices.
4. Learn how to benchmark your infection control data against other facilities and national data.
5. Reduce hospitalizations from infections.
6. Reduce costs by preventing infections, antibiotic administration, and time away from the dialysis unit due to hospitalization for infection.
7. Learn firsthand what is required by the *Conditions for Coverage* for infection control practices so your facility staff can comply with federal regulations.
8. Serve as a leader so that the results of this project can be shared with other dialysis facilities in the USA.

By signing this agreement, you agree to participate in the following activities:

1. Participate in the quality improvement project from February 1, 2013 to March 31, 2014.
2. Enroll and participate in the dialysis module of the Comprehensive Data System (CDS). Some measures can be submitted through NHSN if you wish.
3. Confer rights within NHSN so that the NOTICE team can receive de-identified data from NHSN for the duration of this project.
4. Join either the Network 6 or 11 NHSN group.
5. Assemble a team with the ability to lead improvement efforts.
6. Make the following three types of information available to the NOTICE leadership team:
    a. Infection data: Participating facilities report infection data, consisting of a numerator (the number of infections) and a denominator (the number of persons who could have acquired an infection). Only numerators and denominators are shared, so there is no information that could identify any specific patient in your facility.
    b. Implementation process data: Participating facilities report information about progress in implementing recommended actions to reduce infections and identifies challenges they are facing.
    c. Cultural Data: Each team member from a facility must complete a culture evaluation at the beginning, midpoint, and end of participation.

7. Participate in infection control education opportunities offered as part of this project, including six one-hour educational webinars, a kickoff meeting, and coaching calls.
8. Implement infection control practices from the educational sessions and other materials to improve infection control practices in your facility.

How Is Your Data Used?

1. Infection rate data is used to see whether infections are decreasing or increasing in facilities over time. NOTICE data are kept confidential and will not be shared publicly. Participating facilities will receive reports that will allow them to trend their infection rates over time and compare them to other participating facilities. However, no one other than the project team will see your facility's scores.
2. Implementation process data is used to help the NOTICE leadership team assess the progress each unit is making and to adjust the training and support we provide to enable units to succeed. No one other than the project team will ever see your facility's data.
3. Research and Accountability: Both types of project data may also be used by the project team to write research papers designed to advance knowledge related to unit-based improvement efforts. Project data also will be used in internal and external evaluations of NOTICE that AHRQ requires. No research or accountability data will ever be publicly released that identifies specific facilities or even the aggregate performance of particular states.

Data Protection:

All data submitted to the NOTICE leadership team is stored in a database that complies with all industry security standards regarding data protection. Access to your data is limited to staff from your facility that you have authorized as well as your Network leads. All staff from the project leadership team with access to your data have completed a confidentiality agreement that commits them to only using this data for the purposes described above.

Team Lead

Each facility must have a team lead responsible for data entry into CDS. Please list your team lead's contact information below:

_____	_____	_____
Team Lead's Name	Email Address	Facility Name

_____	_____
Dialysis Facility Representative	Date

_____	_____
Network Representative	Date

Appendix I. Comprehensive Data System (CDS) Manual

HEALTH RESEARCH & EDUCATIONAL TRUST
In Partnership with AHA

Comprehensive Data System

Quick Start Guide
NOTICE B Project

Last update: March 5 2013

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Before you Login

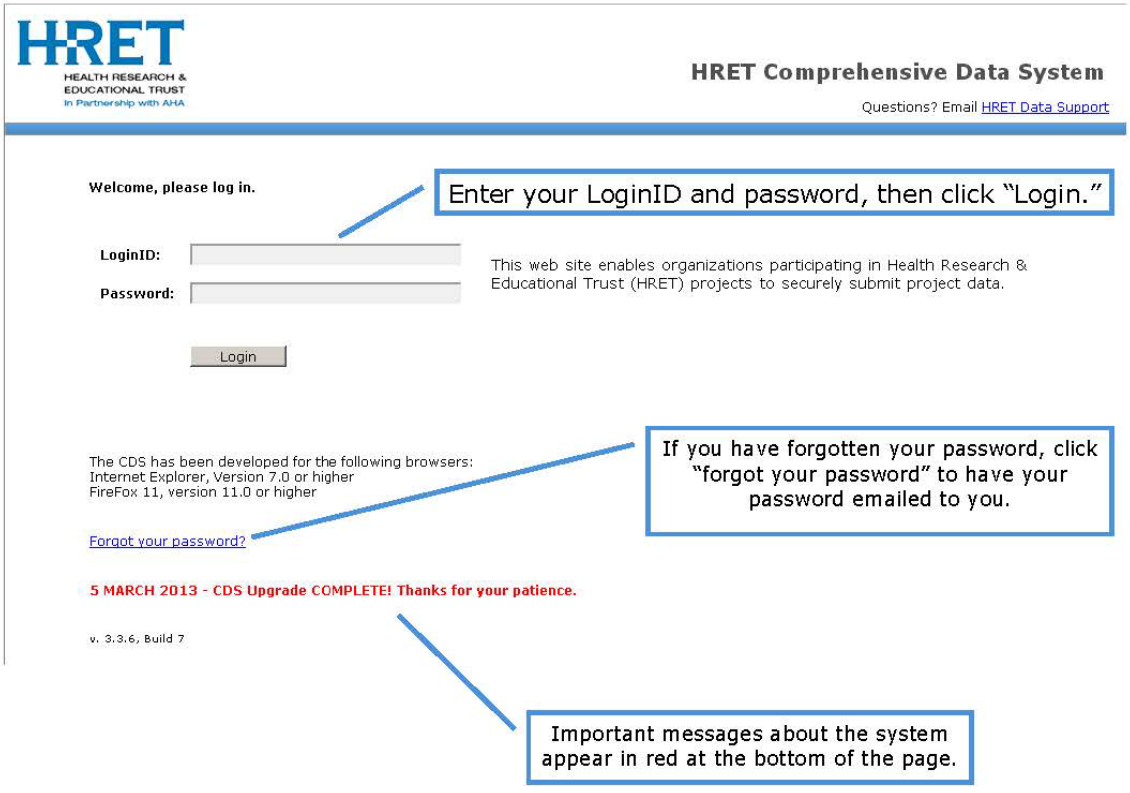
System Requirements

The HRET CDS is a secure, web-based data collection system. Users must have a connection to the Internet and a browser which supports SSL (secure socket layer) encryption.

Currently, CDS supports the use of Internet Explorer v7 or higher and Mozilla FireFox v 11.0 or higher. The system is currently being tested for use with Google Chrome and on iPad (IOS v5 or higher).

Please ensure that your browser settings allow pop-ups from https://www.hretcds.org.

Logging In To get started, visit https://www.hretcds.org/



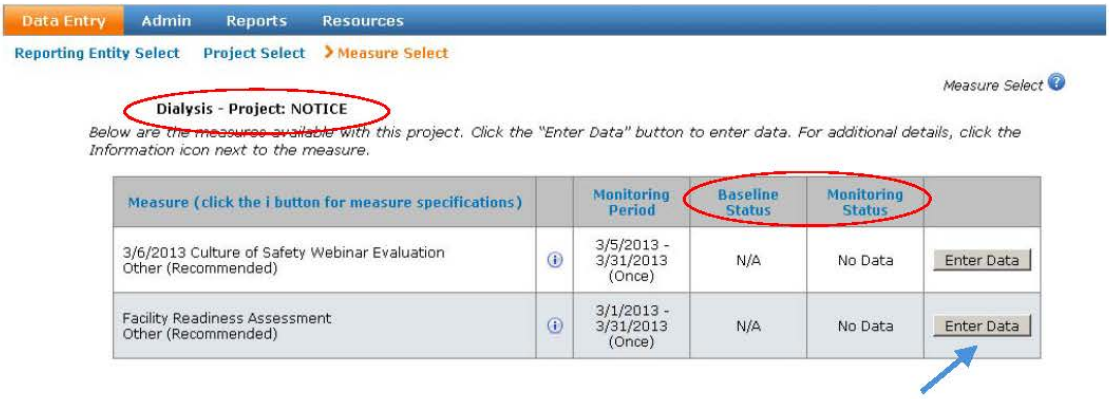
Getting Started with Data Entry in CDS

Data entry for the NOTICE project is simple and straightforward. Once you have logged in, you'll be taken to the Data Entry—Measure Selection screen.

**** Additional project measures will be added in the coming weeks ****

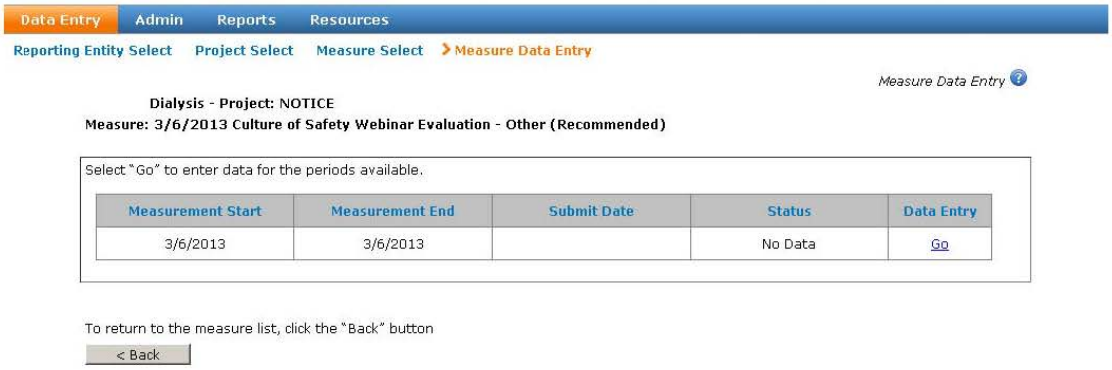
The organization and project selected always appears on the top left:

Data entry status for each measure are shown to the right.

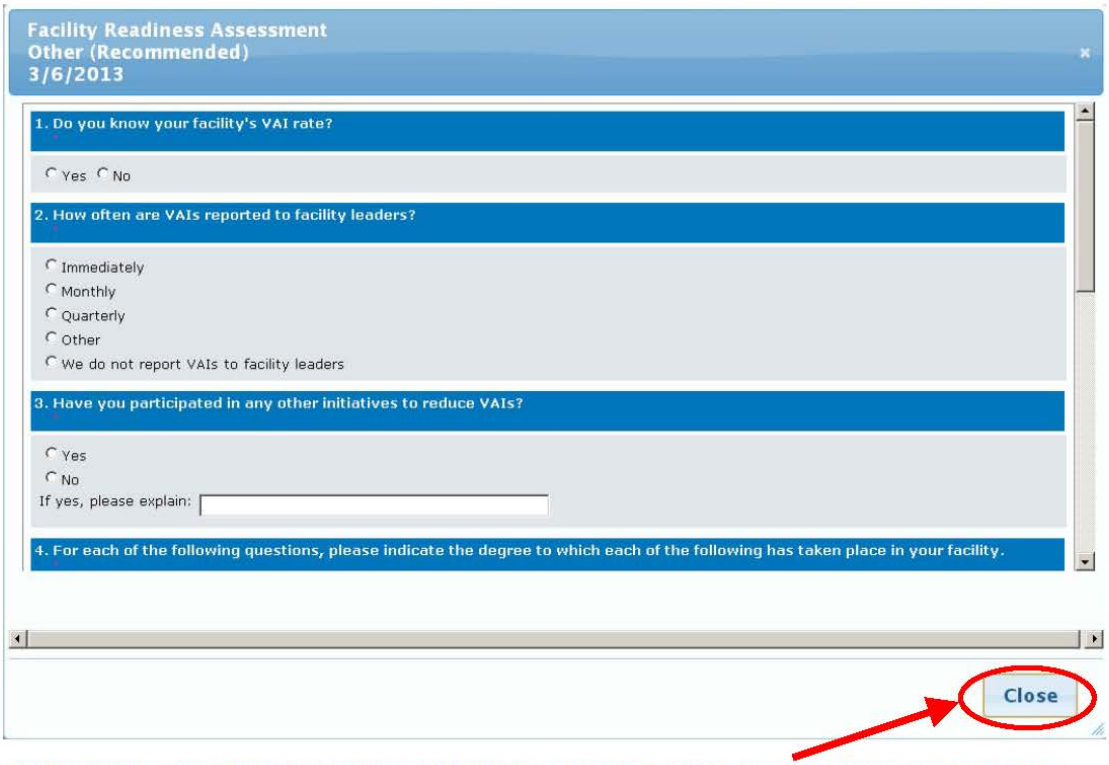


To enter data on a measure from the list, select "Enter Data."
At the next screen, select "Go" under data entry.

For some measures, you may first need to enter the measurement timeframe.
The screen below shows a measure with a preset timeframe.

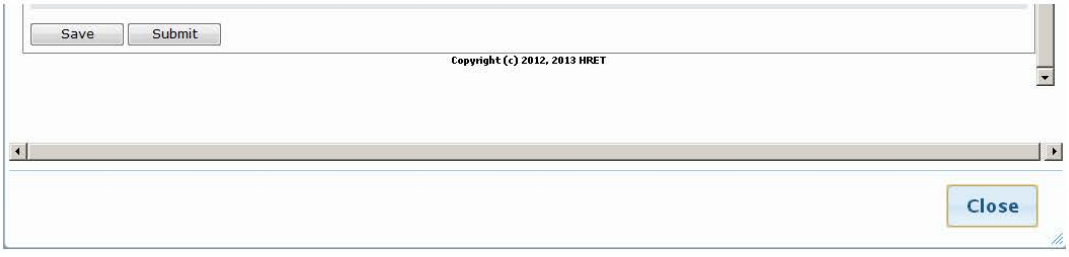


When you select "GO," a pop-up window will display, containing the data that is to be entered and submitted. You may expand the size of the pop-up, and you may use the vertical scroll bar to see the rest of the information. The top of the pop-up window shows the measure and timeframe.



IMPORTANT NOTE: Selecting "CLOSE" will close the pop-up window and any data you have entered will NOT be saved.

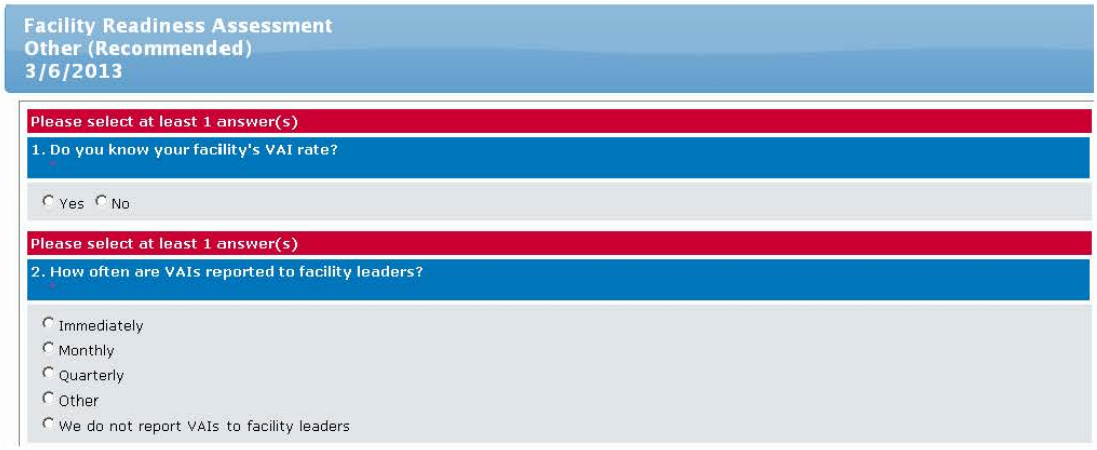
To **save** your data entry to finish at a later date, or to **submit** your data, scroll to the bottom of the window and select your desired option.



When you **submit** your data, it becomes available for reporting. You may **submit** at any time, prior to the data submission deadline, when you are know your data is final.

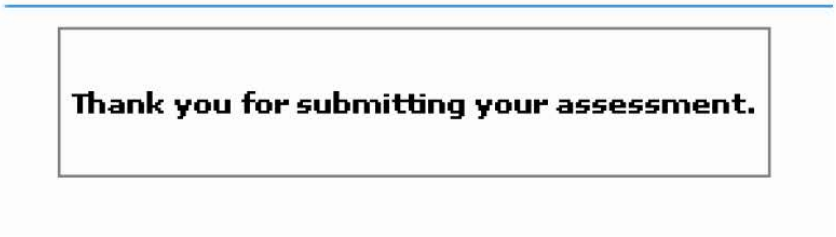
Data Validation in CDS

The CDS has been programmed to warn the user of data entry issues. The warning messages appear in red font or highlighted in red. Data validation takes place at the point of data **submission**.



IMPORTANT NOTE: If you select "SUBMIT" and nothing appears to happen, scroll up to see the warning messages.

Successful data submission leads to the following thank you screen:



User Setup

Data administrators may add additional users to CDS for their organization, and are encouraged to designate at least one additional data administrator and one data entry user.

To add new users, select the "Admin" tab from the top left of the screen, then select "User Setup"

Each user must be created individually. To create a user, enter the First Name, Last Name, login (email address), and a password into the boxes.

Then, select an appropriate role (Data Administrator, Data Entry, or Reporting).
When finished, click the + icon 

IMPORTANT NOTES:

- Password: Passwords must be at least 7 characters long, and contain at least one letter and one number. Users can reset their passwords after they log into CDS.
- Roles:
  - Data administrators should be persons with experience in data collection and measurement. An administrator will be permitted to add and delete users, enter & edit data, view reports, download data, and add/remove measures from the listing.
  - Data entry users should have experience with entering data, and shall only be permitted to enter and edit data.
  - Reporting users can view reports but may not enter or edit data.

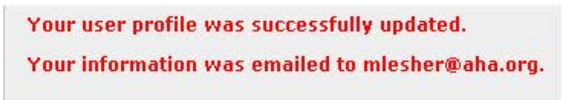
Each user added will receive an email confirmation, which will include their Login, password, role, and to which organization (s) they have been assigned.

User Profile

Once a user has been setup in the CDS, she/he may edit their user information after they log in, by selecting the "User Profile" option.

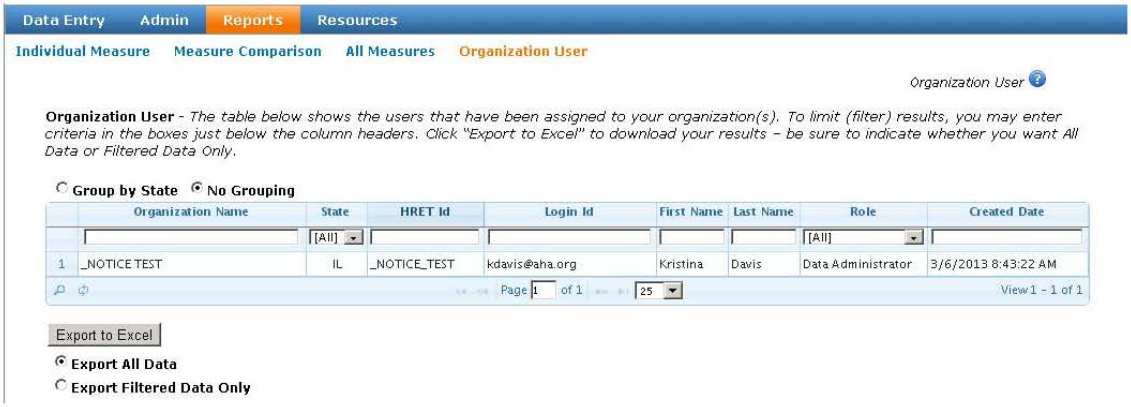
Users may change their LoginIDs (LoginIDs must be valid email addresses), passwords, and first & last names. To make changes, enter the relevant information and click "Update Profile."

A confirmation message appears, and an email is sent to the LoginID (email) address.



Reports

Currently for NOTICE, only the Organization User report is available, and only Administrators may see this report.



The list can be filtered by State & Role using the drop-down options. All other variables shown can be filtered by entering criteria in the text boxes.

Once you have finished filtering the results, you may download them by clicking "Export to Excel" which is at the bottom of the table. Be sure to indicate whether you want All Data or Filtered Data Only.

Resources

The Resources section provides helpful information for using the CDS. HRET strives to keep these Resources up-to-date and welcomes suggestions.

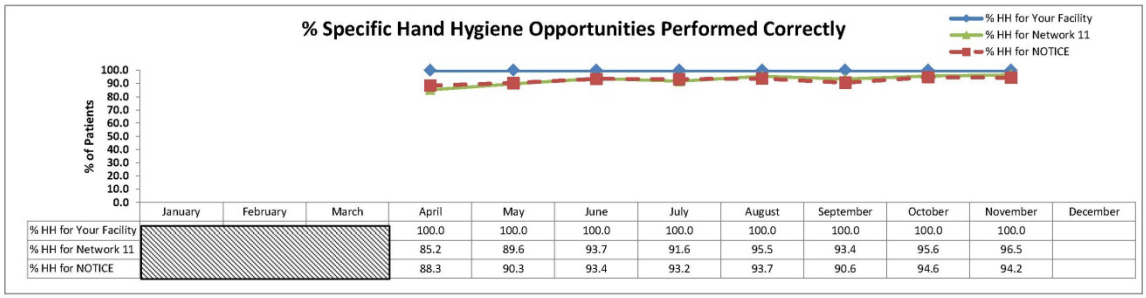
IMPORTANT: Not all resources shown are applicable to NOTICE.

Appendix J. Sample Feedback Report

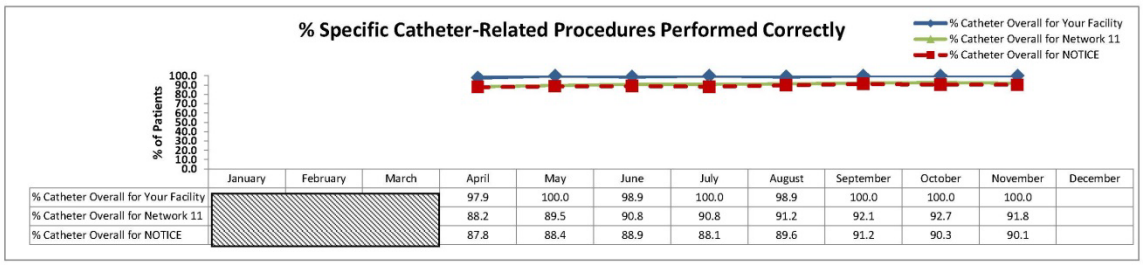
NOTICE Quarterly Data Feedback Report

Facility:SAMPLE **CCN#:**
Address:SAMPLE **Data as of: 1/14/2014**

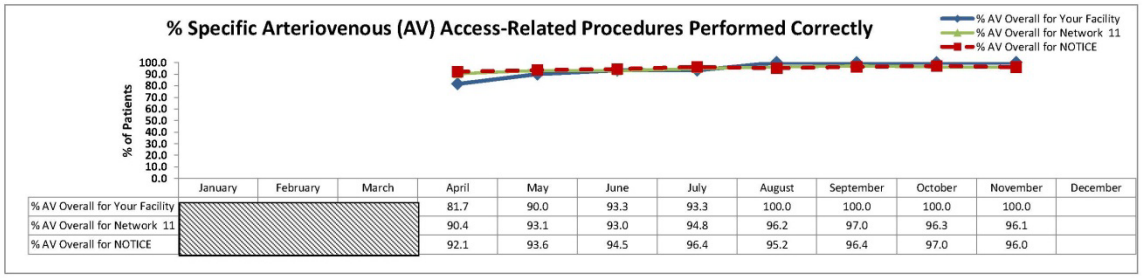
Process Audit Measures:



	January	February	March	April	May	June	July	August	September	October	November	December
% HH for Your Facility				100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
% HH for Network 11				85.2	89.6	93.7	91.6	95.5	93.4	95.6	96.5	
% HH for NOTICE				88.3	90.3	93.4	93.2	93.7	90.6	94.6	94.2	

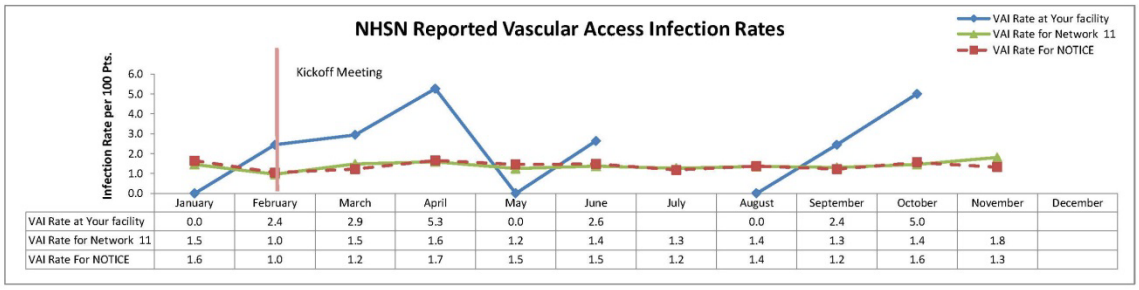


	January	February	March	April	May	June	July	August	September	October	November	December
% Catheter Overall for Your Facility				97.9	100.0	98.9	100.0	98.9	100.0	100.0	100.0	
% Catheter Overall for Network 11				88.2	89.5	90.8	90.8	91.2	92.1	92.7	91.8	
% Catheter Overall for NOTICE				87.8	88.4	88.9	88.1	89.6	91.2	90.3	90.1	

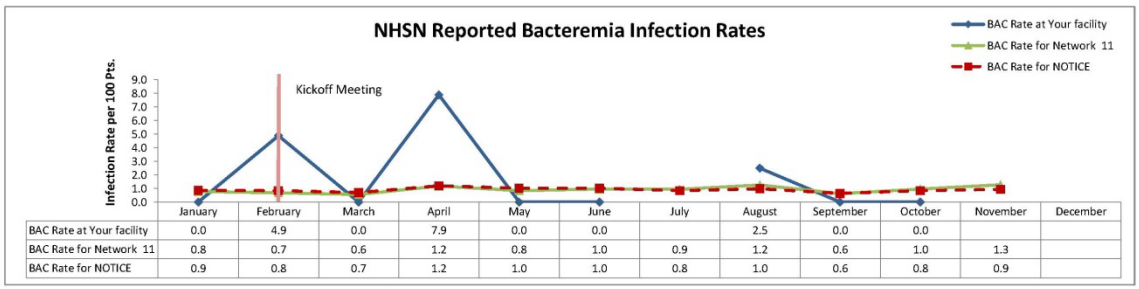


	January	February	March	April	May	June	July	August	September	October	November	December
% AV Overall for Your Facility				81.7	90.0	93.3	93.3	100.0	100.0	100.0	100.0	
% AV Overall for Network 11				90.4	93.1	93.0	94.8	96.2	97.0	96.3	96.1	
% AV Overall for NOTICE				92.1	93.6	94.5	96.4	95.2	96.4	97.0	96.0	

National Health Saftey Network (NHSN):



	January	February	March	April	May	June	July	August	September	October	November	December
VAI Rate at Your facility	0.0	2.4	2.9	5.3	0.0	2.6		0.0	2.4	5.0		
VAI Rate for Network 11	1.5	1.0	1.5	1.6	1.2	1.4	1.3	1.4	1.3	1.4	1.8	
VAI Rate For NOTICE	1.6	1.0	1.2	1.7	1.5	1.5	1.2	1.4	1.2	1.6	1.3	

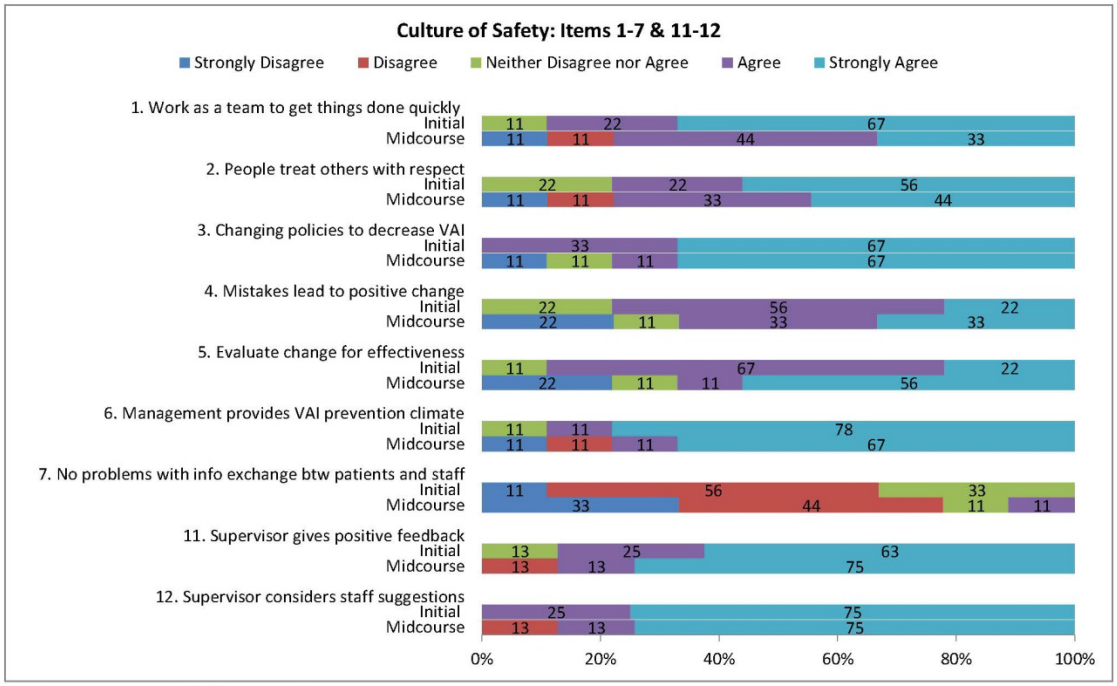


	January	February	March	April	May	June	July	August	September	October	November	December
BAC Rate at Your facility	0.0	4.9	0.0	7.9	0.0	0.0		2.5	0.0	0.0		
BAC Rate for Network 11	0.8	0.7	0.6	1.2	0.8	1.0	0.9	1.2	0.6	1.0	1.3	
BAC Rate for NOTICE	0.9	0.8	0.7	1.2	1.0	1.0	0.8	1.0	0.6	0.8	0.9	

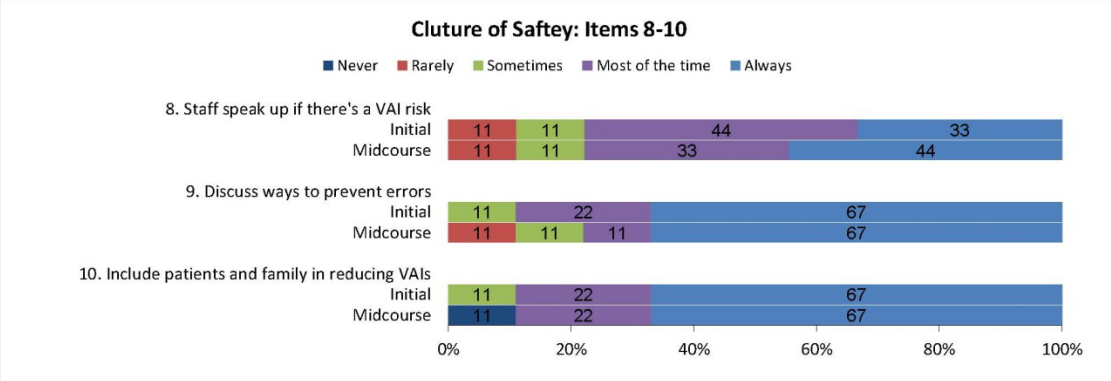
NOTICE Quarterly Data Feedback Report

Facility: SAMPLE **CCN#:**
Address: SAMPLE **Data as of:** 1/14/2014

Percent of Responses for your Facility*



* Numbers may not sum to 100 due to rounding.



* Numbers may not sum to 100 due to rounding.

Percent of Responses that were Strongly Agree/Always for your Facility, Network, and NOTICE

	Number of Responses	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12
Facility Baseline	9	67	56	67	22	22	78	0	33	67	67	63	75
Facility Mid-study	9	33	44	67	33	56	67	0	44	67	67	75	75
Network Mid-study	322	39	27	33	23	24	33	4	39	48	42	37	38
NOTICE Mid-study	583	42	29	33	24	28	35	4	37	49	44	39	41

NOTICE Quarterly Data Feedback Report

Facility: SAMPLE
Address: SAMPLE

CCN:
Data as of: 1/14/2014

Item	Average Culture of Safety Results*			
	Your Facility Baseline	Your Facility Mid Study	Network 11 Facilities Mid Study	NOTICE Facilities Mid Study
Number of Facilities	1	1	26	54
Number of Responses	9	9	322	583
Facility Items				
When a lot of work needs to be done quickly, we work together as a team to get the work done	4.6	3.8	4.2	4.2
In this unit, people treat each other with respect	4.3	3.9	3.9	3.9
We are actively changing protocols/policies to reduce VAIs	4.7	4.2	4.2	4.1
Mistakes have led to positive changes here	4.0	3.6	3.9	3.9
After we make changes to improve patient safety, we evaluate their effectiveness	4.1	3.8	4.0	4.0
Management in this facility provides a work climate that promotes VAI prevention	4.7	4.1	4.2	4.3
Problems often occur in the exchange of information between patient and staff in this facility	2.2	2.0	2.4	2.5
Supervisor				
My supervisor/manager gives positive feedback when he/she sees a job done according to established patient safety procedures	4.0	4.1	4.2	4.1
My supervisor/manager seriously considers staff suggestions for reducing VAIs	4.6	4.3	4.3	4.3
Communication				
Staff will freely speak up if they see something that may increase risk of VAI	4.6	4.3	4.2	4.2
In this unit, we discuss ways to prevent errors from happening again	4.5	4.5	4.1	4.1
We actively include patients and family members in trying to reduce VAIs	4.8	4.5	4.2	4.2

*Average of all responses; Each item scored from 1 (Strongly Disagree/Never) to 5 (Strongly Agree/Always)