AHRQ Safety Program for Long-Term Care: Preventing CAUTI and Other HAIs

DEPARTMENT OF HEALTH & HUMAN SERVICES · USA

AHRQ
Agency for Healthcare Research and Quality

CUSP

AHRQ Safety Program for Long-Term Care: Preventing CAUTI and Other HAIs

Final Report

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Executive Summary

Purpose

This report summarizes the Agency for Healthcare Research and Quality (AHRQ) Contract HHSA290201000025I, PRISM Order Number HHSA29032008T, Task Order #8, from September 19, 2013, through September 18, 2016, titled National Implementation of Comprehensive Unit-based Safety Program (CUSP) to Reduce Catheter-Associated Urinary Tract Infection (CAUTI) in Long-Term Care Facilities. In 2015, AHRQ renamed the program *AHRQ Safety Program for Long-Term Care: HAIs/CAUTI*. The purpose of the contract was to adapt CUSP, which was initially developed for the acute care setting, for use in long-term care (LTC) facilities. Additional tasks included developing State or regional consortia to recruit LTC facilities and implement this program to reduce healthcare-associated infections (HAIs), specifically CAUTI. This report provides results from the evaluation of the impact of this program; summarizes information about the quality improvement (QI) technical assistance provided to facilities, including educational activities such as learning sessions, onboarding Webinars, training modules, and coaching calls; and outlines program enhancements and lessons learned during the contract period as well as recommendations for future QI initiatives in this health care setting.

Background

Healthcare-associated infections (HAIs) are especially significant in LTC settings, as they have been estimated to account for 1.6 million to 3.8 million infections and 388,000 deaths annually.[1,2] Additionally, infections have very high costs for LTC facilities: $38 million to $137 million annually for antimicrobial therapy and $673 million to $2 billion for hospitalizations.[3] CAUTI is a costly and potentially life-threatening HAI for LTC residents and was identified as one of five priority areas in Phase Three of the United States Department of Health and Human Services (HHS) National Action Plan to Prevent Health Care-Associated Infections.[4] An estimated 7 percent to 10 percent of all LTC residents have urinary catheters, including 12 percent of all new admissions at the time of transfer from acute

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[1] Richards CL. Infections in residents of long-term care facilities: an agenda for research. Report of an expert panel. J Am Geriatr Soc 2002;50:570-6 PMID: 11943058.
[2] Montoya A, Cassone M, Mody L. Infections in nursing homes: epidemiology and prevention programs. Clin Geriatr Med 2016;32(3):585-607
[3] Cohen CC, Choi YJ, Stone PW. Costs of infection prevention practices in long-term care settings: a systematic review. Nurs Econ 2016 Jan-Feb;34(1):16-24.
[4] U.S. Department of Health & Human Services. National Action Plan to Prevent Health Care-Associated Infections: Road Map to Elimination. April 2013. Retrieved from https://health.gov/hcq/prevent-hai-action-plan.asp#phase3.

care facilities to LTC facilities.[5,6] The *AHRQ Safety Program for LTC: HAIs/CAUTI* promotes the use of bundles or combinations of interventions to reduce CAUTIs, prevent infections, and improve the safety culture in LTC facilities.

The *AHRQ Safety Program for LTC: HAIs/CAUTI* was coordinated at the national level by the Health Research & Educational Trust (HRET), the research affiliate of the American Hospital Association. HRET's national project team members included Abt Associates, the Association for Professionals in Infection Control and Epidemiology (APIC), Baylor College of Medicine, Qualidigm, Society of Hospital Medicine (SHM), and the University of Michigan. In addition to the national project team, central program partners (i.e., lead organizations) were relied upon to coordinate, promote, and coach facility teams as they implemented the CAUTI prevention protocols and the C.A.U.T.I. and T.E.A.M.S. interventions, both of which are defined below. Lead organizations included State hospital associations, State-based and professional organizations, national partners from LTC corporations, State and regional organizations with expertise in QI, and the Department of Veterans Affairs (VA). AHRQ and HRET also worked with Federal partners, the Centers for Disease Control and Prevention (CDC), and the Centers for Medicare & Medicaid Services (CMS).

Objectives

The objectives of this initiative were to develop and implement a program to support the development, implementation, adoption, and use of a CUSP to reduce CAUTI in LTC facilities and nursing homes in all States, the District of Columbia, and Puerto Rico through State-based or regional consortia or collaboratives in a phased approach. This includes flexible training resources that build on the existing acute-care hospital oriented CUSP for CAUTI materials [7,8,9] and can be adapted to meet the needs of LTC facilities and nursing homes.

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[5] Smith PW, Bennett G, Bradley SF, et al. SHEA/APIC Guideline: Infection prevention and control in the long-term care facility. Infect Control Hosp Epidemiol 2008;29:785-814. PMID: 18786461.

[6] Mody L, Bradley SF, Galecki A, et al. Conceptual model for reducing infections and antimicrobial resistance in skilled nursing facilities: focus on residents with indwelling devices. Clin Infect Dis 2011;52:654-61. PMID: 21292670.

[7] AHRQ Web site: http://www.ahrq.gov/professionals/quality-patient-safety/hais/tools/cauti-hospitals/index.html.

[8] Fakih MG, Krein SL, Edson B, et al. Engaging health care workers to prevent catheter-associated urinary tract infection and avert patient harm. Am J Infect Control 2014 Oct;42(10 Suppl):S223-9.

[9] Saint S, Greene MT, Krein SL, et al. A program to prevent catheter-associated urinary tract infection in acute care. New Engl J Med 2016;374:2111-2119.

The C.A.U.T.I. intervention is made up of evidence-based [10] infection prevention practices focused on catheter removal, catheter management, urine culture ordering,[11] and antimicrobial stewardship [12] and how these practices influence transitions of care. The T.E.A.M.S. intervention focuses on the importance of having a good safety culture and uses TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) training on teamwork and communication. The national project team developed infographics (Appendix A and Appendix B) to assist facilities in implementing these interventions.

C.A.U.T.I. Intervention

- **C**atheters in newly admitted (and readmitted) residents should be removed to assess if still needed; every resident deserves a chance to be "catheter free."
- **A**septic insertion of indwelling catheters is essential, with hand hygiene before and after every resident contact and barrier precautions [13,14] during intimate (e.g., toileting, bathing) assistance with activities of daily living.
- **U**se catheters only if indicated; routine assessments of catheter need (daily for short-term residents, monthly for long-term residents) should be conducted, and alternatives should be considered (such as intermittent catheterization, use of bladder scanner protocols to decrease need for catheterization, and other noncatheter solutions for incontinence).
- **T**raining and mentorship of staff and family regarding catheter care are important, emphasizing the following points: keep the drainage bag below the bladder, no violations of "closed" drainage system, and learn the appropriate use of leg bags.
- **I**ncontinence care planning to address individual resident challenges and solutions is important, including behavioral interventions such as timed and prompted voiding and appropriate medical management.

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[10] Meddings J, Saint S, Krein S, et al. Systematic review of interventions to reduce catheter-associated urinary tract infection in the long-term care setting. Open Forum Infect Dis 2014;1(Suppl 1):S252-3.

[11] Trautner BW, Grigoryan L, Petersen NJ, et al. Effectiveness of an antimicrobial stewardship approach for urinary catheter-associated asymptomatic bacteriuria. JAMA Intern Med 2015 Jul;175(7):1120-7.

[12] Crnich CJ, Jump R, Trautner B, et al. Optimizing antibiotic stewardship in nursing homes: a narrative review and recommendations for improvement. Drugs Aging 2015 Sep;32(9):699-716.

[13] Mody L, Krein SL, Saint S, et al. A targeted infection prevention intervention in nursing home residents with indwelling devices: a randomized clinical trial. JAMA Internal Med 2015;175:714-723.

[14] Roghmann MC, Johnson JK, Sorkin JD, et al. Transmission of methicillin-resistant Staphylococcus aureus (MRSA) to healthcare worker gowns and gloves during care of nursing home residents. Infect Control Hosp Epidemiol 2015 Sep;36(9):1050-7.

T.E.A.M.S. Intervention
- **T**eam Formation—Form a diverse team that will plan, champion, and implement the program.
- **E**xcellent Communication—Encourage and educate the team on communication strategies.
- **A**ssess What's Working—Evaluate current culture, data, and practices; learn and implement; and continually reevaluate.
- **M**eet Monthly—Meet with the team regularly to discuss successes and barriers and to review data trends.
- **S**ustain Efforts—Plan for program sustainability early, and integrate program elements into daily workflow.

Program Spread

HRET partnered with State hospital associations, State or regional organizations with expertise in QI, the VA, and other health care organizations (e.g., Genesis HealthCare) to support the implementation of this program. These lead organizations were tasked with recruiting facilities within their State or region, ensuring facilities were actively participating in the program (e.g., attending educational sessions, submitting data), and disseminating any program-related information, materials, and resources developed by the national project team. A full list of lead organizations is included in Appendix J.

A total of 652 LTC facilities were recruited into five cohorts across 48 States, the District of Columbia, and Puerto Rico. Of these 652 facilities, 505 completed the program and 147 withdrew. Figure 1 highlights program participation by State. In some cases, multiple lead organizations within the same State recruited facilities to participate in this program (e.g., Missouri Center for Patient Safety recruited facilities from Missouri for Cohort 2, while Presbyterian Manors of Mid-America recruited facilities from Missouri and Kansas for Cohort 4).

Figure 1.   Map of Enrolled States/Facilities (n=652)
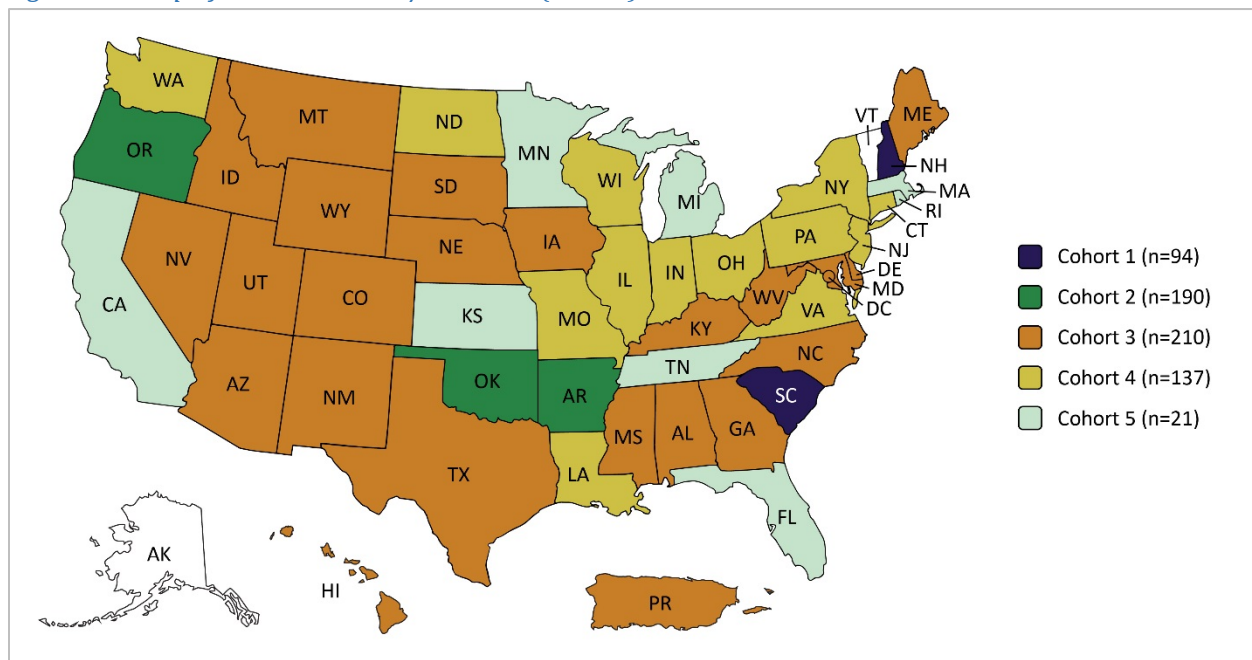
Impact

For this report, the national project team assessed changes in outcomes over time for the facilities in Cohorts 1–4 that were active at the end of the program and submitted data for at least two time periods. Cohort 5 was analyzed separately because of its compressed data submission schedule and difference in program implementation. For Cohort 5, HRET staff assumed the role of the organizational leads and worked with the facilities directly in communicating the educational content, tools, and resources and following up on data submission. During analysis, the national project team found no significant differences in outcome rates between cohorts. Therefore, all analyses and figures in this report illustrate Cohort 1–4 aggregate results unless otherwise specified. Rates broken down by cohort are included in the appendices of this report.

The main outcome measure used for this program was the CAUTI rate, defined using CDC's 2015 National Healthcare Safety Network (NHSN) LTC definition (see Appendix I).[15] Indwelling urinary catheter utilization and urine culture collection rates were also used to monitor progress in achieving the goals of this program.[16,17] Only 20 facilities submitted data into the NHSN system; the rest of the participating LTC facilities submitted their data into HRET's Comprehensive Data System (CDS). The aggregate CAUTI, catheter utilization, and urine culture collection measures for Cohorts 1–4 by program period are presented graphically in Figures 2–5. The numerators, denominators, and number of reporting facilities for each outcome measure are presented in Tables 1–4. Overall, the Month 1 (M1) crude aggregate CAUTI rate using the NHSN definition for LTC (see Equation 1 in Project Measures) was 5.79 CAUTIs per 1,000 catheter days. This rate decreased to 2.72 CAUTIs per 1,000 catheter days in M12, a 47-percent reduction (incidence rate ratio (IRR) = 0.53, 95% confidence interval (CI) = 0.43 to 0.65, $p < 0.0001$). Similarly, population-based CAUTI rates (see Equation 2) decreased by 51 percent (IRR=0.49, 95% CI=0.39 to 0.61, $p < 0.0001$), from 3.00 to 1.47 CAUTIs per 10,000 resident days. Conversely, catheter utilization (see Equation 3) did not change significantly (IRR=0.96, 95% CI=0.90 to 1.04, p=0.31). Urine culture orders decreased from 3.69 at M1 to 3.29 urine cultures per 1,000 resident days at M12, a 14-percent reduction (IRR=0.86, 95% CI=0.79 to 0.94, $p < 0.0001$).

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[15] Stone ND, Palms D, Nguyen D, et al. Long-term care facilities enrolled in the National Healthcare Safety Network (NHSN), January 2013-December 2014: examining reporting patterns of early adopters. Open Forum Infect Dis 2015;2(Suppl 1):S133.

[16] Ground K, Jones W, Drake C, et al. Antibiotic treatment for urinary tract infections in nursing homes: identifying opportunities for antimicrobial stewardship. Open Forum Infect Dis 2015;2(Suppl 1):S46.

[17] Trautner BW, Grigoryan L, Petersen NJ, et al. Effectiveness of an antimicrobial stewardship approach for urinary catheter-associated asymptomatic bacteriuria. JAMA Intern Med 2015 Jul;175(7):1120-7.

Figure 2.   LTC NHSN CAUTI Rate (CAUTIs per 1,000 Catheter Days), Cohorts 1–4
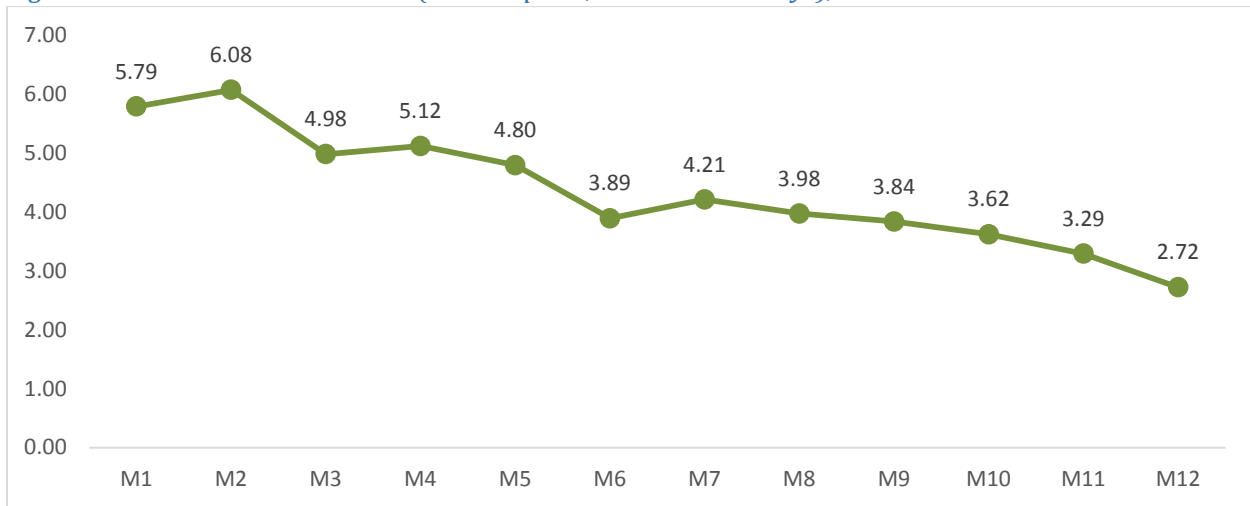
Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating facilities that met inclusion criteria for modeling analysis, as described in Project Results section.

Source: CDS; CAUTIs and catheter days submitted as of July 25, 2016.

Table 1.   Number of CAUTIs, Catheter Days, and Facilities Reporting

Program Month	CAUTIs	Catheter Days	Facilities Reporting *
M1	364	62,845	416
M2	404	66,494	423
M3	339	68,010	430
M4	336	65,596	427
M5	317	66,090	416
M6	241	61,882	406
M7	254	60,270	401
M8	242	60,852	391
M9	221	57,538	378
M10	206	56,858	371
M11	125	37,944	249
M12	87	31,936	216

* Of the 488 facilities that completed Cohorts 1–4, 459 met the inclusion criteria for modeling analysis. Of these 459, not all may have data included in any given program month.

Figure 3.   Population CAUTI Rate (CAUTIs per 10,000 Resident Days), Cohorts 1–4
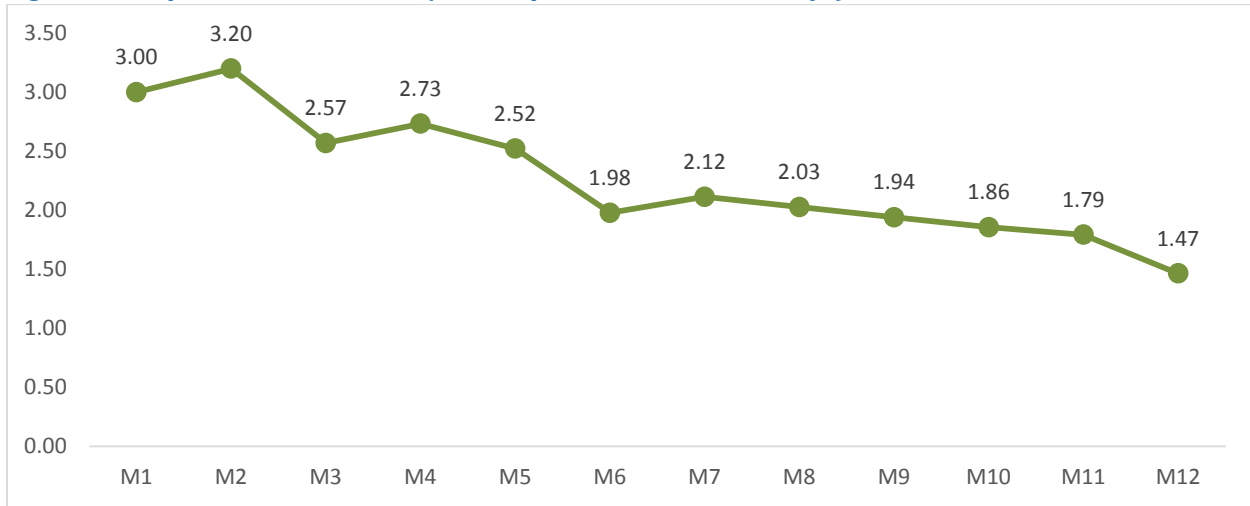
Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating facilities that met inclusion criteria for modeling analysis.

Source: CDS; CAUTIs and resident days submitted as of July 25, 2016.

Table 2.   Number of CAUTIs, Resident Days, and Facilities Reporting

Program Month	CAUTIs	Resident Days	Facilities Reporting *
M1	364	1,212,765	416
M2	404	1,262,024	423
M3	339	1,318,917	430
M4	336	1,228,818	427
M5	317	1,256,419	416
M6	241	1,217,040	406
M7	254	1,200,763	401
M8	242	1,192,914	391
M9	221	1,137,941	378
M10	206	1,108,839	371
M11	125	696,798	249
M12	87	593,494	216

* Of the 488 facilities that completed Cohorts 1–4, 459 met the inclusion criteria for modeling analysis. Of these 459, not all may have data included in any given program month.

Figure 4. Catheter Utilization, Cohorts 1–4
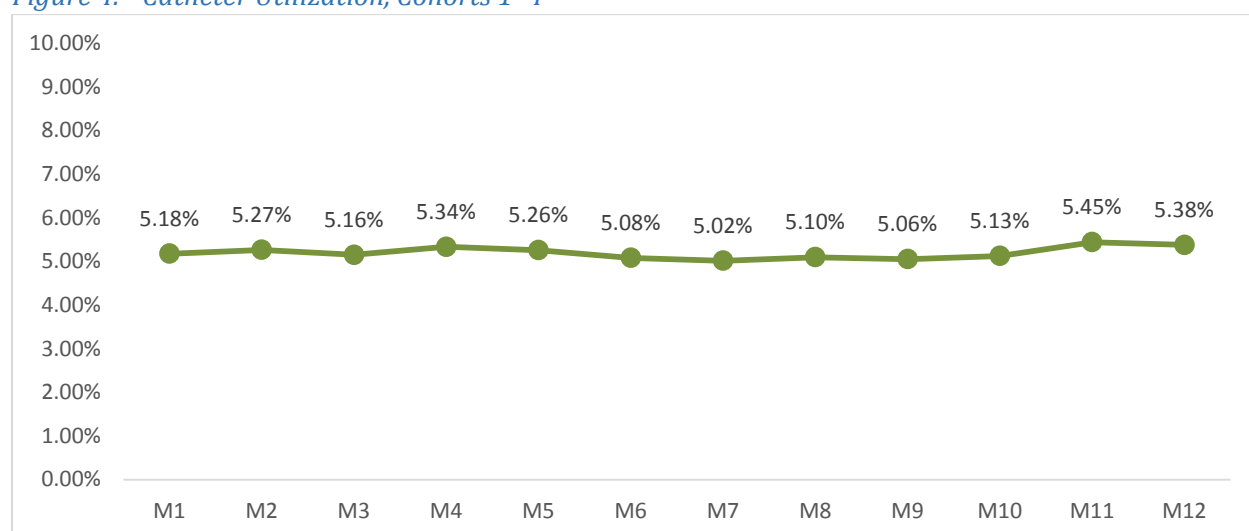
Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating facilities that met inclusion criteria for modeling analysis.

Source: CDS; resident days and catheter days submitted as of July 25, 2016.

Table 3.   Number of Catheter Days, Resident Days, and Facilities Reporting

Program Month	Catheter Days	Resident Days	Facilities Reporting *
M1	62,845	1,212,765	416
M2	66,494	1,262,024	423
M3	68,010	1,318,917	430
M4	65,596	1,228,818	427
M5	66,090	1,256,419	416
M6	61,882	1,217,040	406
M7	60,270	1,200,763	401
M8	60,852	1,192,914	391
M9	57,538	1,137,941	378
M10	56,858	1,108,839	371
M11	37,944	696,798	249
M12	31,936	593,494	216

* Of the 488 facilities that completed Cohorts 1–4, 459 met the inclusion criteria for modeling analysis. Of these 459, not all may have data included in any given program month.

Figure 5.   Urine Culture Collection Rate, Cohorts 2–4
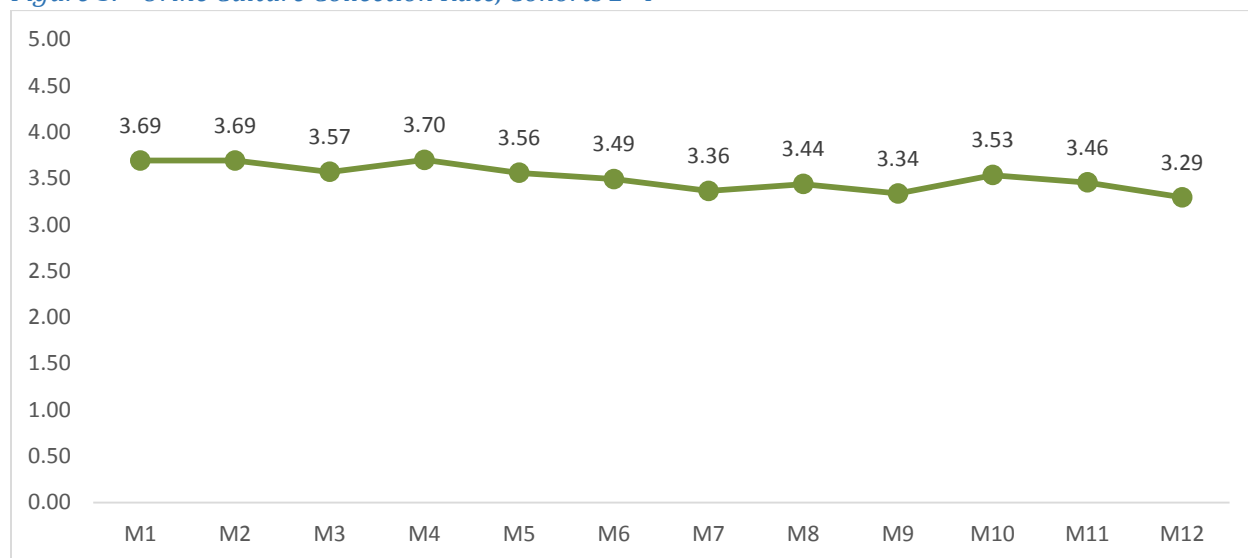
Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating Cohort 2–4 facilities that met inclusion criteria for modeling analysis. Urine culture data were not collected during Cohort 1.

Source: CDS; resident days and urine cultures submitted as of July 25, 2016.

Table 4.   Number of Urine Cultures, Resident Days, and Facilities Reporting

Program Month	Urine Cultures	Resident Days	Facilities Reporting *
M1	3,957	1,071,582	388
M2	4,133	1,119,393	392
M3	4,047	1,134,063	396
M4	4,064	1,098,606	398
M5	4,065	1,142,050	396
M6	3,732	1,069,001	386
M7	3,658	1,087,262	380
M8	3,593	1,045,196	370
M9	3,424	1,026,214	361
M10	3,529	998,550	349
M11	2,113	611,404	232
M12	1,580	479,576	190

* Of the 425 facilities that completed Cohorts 2–4, 405 met the inclusion criteria for modeling analysis for urine cultures collected. Of these 405, not all may have data included in any given program month. Urine culture data were not collected during Cohort 1.

Glossary of Terms and Abbreviations

AHRQ: Agency for Healthcare Research and Quality

APIC: Association for Professionals in Infection Control and Epidemiology

C.A.U.T.I. Intervention: An intervention with evidence-based infection prevention practices focused on improving appropriate urinary catheter use (and avoiding unnecessary use), urine culture ordering and antimicrobial stewardship, and promoting best practices in catheter management

CAUTI: catheter-associated urinary tract infection

CDC: Centers for Disease Control and Prevention

CDS: Comprehensive Data System

CI: confidence interval

CMS: Centers for Medicare & Medicaid Services

CNA: certified nursing assistant

CNE: continuing nursing education

CUSP: Comprehensive Unit-based Safety Program

HAI: healthcare-associated infection

HHS: The United States Department of Health and Human Services

HRET: Health Research & Educational Trust

IRR: incidence rate ratio

LPN: licensed practical nurse

LTC: long-term care

MDS: Minimum Data Set

NCV: National Consumer Voice for Quality Long-Term Care

NHSN: National Healthcare Safety Network

OSCAR: Online Survey, Certification and Reporting

QI: quality improvement

QIN-QIO: Quality Innovation Network-Quality Improvement Organization

RN: registered nurse

SHM: Society of Hospital Medicine

T.E.A.M.S. Intervention: An intervention that focuses on the importance of having a good safety culture and utilizes TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) training on teamwork and communication

TEP: technical expert panel

UTI: urinary tract infection

VA: Department of Veterans Affairs

Background

Healthcare-associated infections (HAIs) are especially significant in long-term care (LTC) settings, as they have been estimated to account for 1.6 million to 3.8 million infections and 388,000 deaths annually.[18,19] Additionally, infections have very high costs to LTC facilities: $38 million to $137 million annually for antimicrobial therapy and $673 million to $2 billion for hospitalizations.[20] Catheter-associated urinary tract infection (CAUTI) is a costly and potentially life-threatening HAI for LTC residents. An estimated 7 percent to 10 percent of all LTC residents have indwelling urinary catheters, including 12 percent of all new admissions at the time of transfer from acute care facilities to LTC facilities.[21,22]

The *Agency for Healthcare Research and Quality (AHRQ) National Implementation of Comprehensive Unit-based Safety Program (CUSP) to Reduce Catheter-Associated Urinary Tract Infection in Long-Term Care Facilities*, herein referred to as the *AHRQ Safety Program for LTC: HAIs/CAUTI*, is a national quality improvement (QI) learning collaborative designed to reduce CAUTIs and enhance resident safety culture. The *AHRQ Safety Program for LTC: HAIs/CAUTI* promotes the use of bundles or combinations of interventions to reduce CAUTIs and improve the safety culture in LTC facilities. It is funded by AHRQ and is part of the United States Department of Health and Human Services (HHS) National Action Plan to Prevent Healthcare-Associated Infections.

The purpose of the contract was to adapt CUSP, which was initially developed for the acute care setting,[23,24] for use in LTC facilities. Additional tasks included developing State or regional consortia to recruit LTC facilities and implement this program to reduce HAIs, specifically CAUTI. This report provides results from the evaluation of the impact of this program; provides information about the QI technical assistance provided to facilities, including educational activities such as learning sessions, onboarding

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[18] Richards, CL. Infections in residents of long-term care facilities: an agenda for research. Report of an expert panel. J Am Geriatr Soc 2002;50:570-6. PMID: 11943058.

[19] Montoya A, Cassone M, Mody L. Infections in nursing homes: epidemiology and prevention programs. Clin Geriatr Med. 2016;32(3):585-607.

[20] Cohen CC, Choi YJ, Stone PW. Costs of infection prevention practices in long-term care settings: a systematic review. Nurs Econ 2016 Jan-Feb;34(1):16-24.

[21] Smith PW, Bennett G, Bradley SF, et al. SHEA/APIC Guideline: Infection prevention and control in the long-term care facility. Infect Control Hosp Epidemiol 2008;29:785-814. PMID: 18786461.

[22] Mody L, Bradley SF, Galecki A, et al. Conceptual model for reducing infections and antimicrobial resistance in skilled nursing facilities: focus on residents with indwelling devices. Clin Infect Dis 2011;52:654-61. PMID: 21292670.

[23] Fakih MG, Krein SL, Edson B, et al. Engaging health care workers to prevent catheter-associated urinary tract infection and avert patient harm. Am J Infect Control 2014 Oct;42(10 Suppl):S223-9.

[24] Saint S, Greene MT, Krein SL, et al. A program to prevent catheter-associated urinary tract infection in acute care. New Engl J Med 2016;374:2111-2119.

Webinars, training modules, and coaching calls; and outlines program enhancements and lessons learned during the contract period as well as recommendations for future QI initiatives in this health care setting.

The *AHRQ Safety Program for LTC: HAIs/CAUTI* was coordinated at the national level by the Health Research & Educational Trust, the research affiliate of the American Hospital Association. The overall program goals were:

1. Develop and implement an intervention adapting CUSP to the LTC setting and considering a variety of additional sources such as information from evidence review and multidisciplinary experts (including those who conducted a recent randomized controlled trial [25]).
2. Reduce CAUTI rates—by implementing the C.A.U.T.I. intervention, informed by a systematic review of the available evidence [26] for interventions to prevent CAUTI in the LTC setting:
   - **C**atheters in newly admitted (and readmitted) residents should be removed to assess if still needed; every resident deserves a chance to be "catheter free."
   - **A**septic insertion of indwelling catheters is essential, with hand hygiene before and after every resident contact and barrier precautions [27] during intimate (e.g., toileting, bathing) assistance with activities of daily living.
   - **U**se catheters only if indicated; routine assessments of catheter need (daily for short-term residents, monthly for long-term residents) should be conducted, and alternatives should be considered (such as intermittent catheterization, use of bladder scanner protocols to decrease need for catheterization, and other noncatheter solutions to incontinence).
   - **T**raining and mentorship of staff and family regarding catheter care are important, emphasizing the following points: keep the drainage bag below the bladder, no violations of "closed" drainage system, and learn the appropriate use of leg bags.
   - **I**ncontinence care planning to address individual resident challenges and solutions is important, including behavioral interventions such as timed and prompted voiding and appropriate medical management.
3. Improve safety culture—as evidenced through improved teamwork and communication by implementing the T.E.A.M.S. intervention.
   - **T**eam Formation—Form a diverse team that will plan, champion, and implement the program.

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[25] Mody L, Krein SL, Saint S, et al. A targeted infection prevention intervention in nursing home residents with indwelling devices: a randomized clinical trial. JAMA Intern Med 2015;175(5):714-723. PMID: 25775048.
[26] Meddings J, Saint S, Krein S, et al. Systematic review of interventions to reduce catheter-associated urinary tract infection in the long-term care setting. Open Forum Infect Dis 2014;1(Suppl 1):S252-3.
[27] Roghmann MC, Johnson JK, Sorkin JD, et al. Transmission of methicillin-resistant *Staphylococcus aureus* (MRSA) to healthcare worker gowns and gloves during care of nursing home residents. Infect Control Hosp Epidemiol 2015 Sep;36(9):1050-7.

- **E**xcellent Communication—Encourage and educate the team on communication strategies.
- **A**ssess What's Working—Evaluate current culture, data, and practices; learn and implement; and continually reevaluate.
- **M**eet Monthly—Meet with the team regularly to discuss successes and barriers and to review data trends.
- **S**ustain Efforts—Plan for program sustainability early and integrate program elements into daily workflow.

Secondary goals for this program were to support expanded infection prevention efforts for *Clostridium difficile*, non-catheter-associated urinary tract infection, and multidrug-resistant organisms by providing education to:
- Improve hygiene practices (e.g., hand hygiene,[28] environmental cleaning, and disinfection)
- Promote antibiotic stewardship [29,30,31]
- Promote catheter stewardship

Program Implementation

The *AHRQ Safety Program for LTC: HAIs/CAUTI* was led by Health Research & Educational Trust (HRET) program staff in collaboration with national faculty and collaborators from a network of seven partner organizations, known as the national project team, as well as a technical expert panel (TEP) of leaders in infection prevention, patient safety, and long-term care (LTC). In addition, implementation of the program at LTC facilities across the country was supported by organizational leads from a variety of State-level and national stakeholders in LTC, including but not limited to State hospital associations, State or regional organizations with expertise in quality improvement (QI), LTC management companies, and professional societies.

Key People and Partnerships

Program Stakeholders

The collaboration of operational stakeholders throughout this program was maintained with optimal care of residents being paramount. In addition to residents and families, operational stakeholders

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[28] Mody L, McNeil SA, Sun R, et al. Introduction of a waterless alcohol-based hand rub in a long-term care facility. Infect Control Hosp Epidemiol 2003;24:165-171.

[29] Crnich CJ, Jump R, Trautner B, et al. Optimizing antibiotic stewardship in nursing homes: a narrative review and recommendations for improvement. Drugs Aging 2015 Sep;32(9):699-716.

[30] Daneman N, Bronskill SE, Gruneir A, et al. Variability in antibiotic use across nursing homes and the risk of antibiotic-related adverse outcomes for individual residents. JAMA Intern Med 2015 Aug;175(8):1331-9.

[31] Mody L, Crnich C. Effects of excessive antibiotic use in nursing homes. JAMA Intern Med 2015 Aug;175(8):1339-41.

included staff in the LTC facilities, lead organizations, the national project team, and the Agency for Healthcare Research and Quality (AHRQ), as illustrated in Figure 6. Partnerships among all stakeholders allowed each group to contribute through sharing of knowledge and experiences, leveraging their unique relationships, developing support for quality care and facility safety, increasing support for the spread of program awareness, and sustaining the program over time.

Figure 6.   Operational Stakeholders for the AHRQ Safety Program for LTC: HAIs/CAUTI
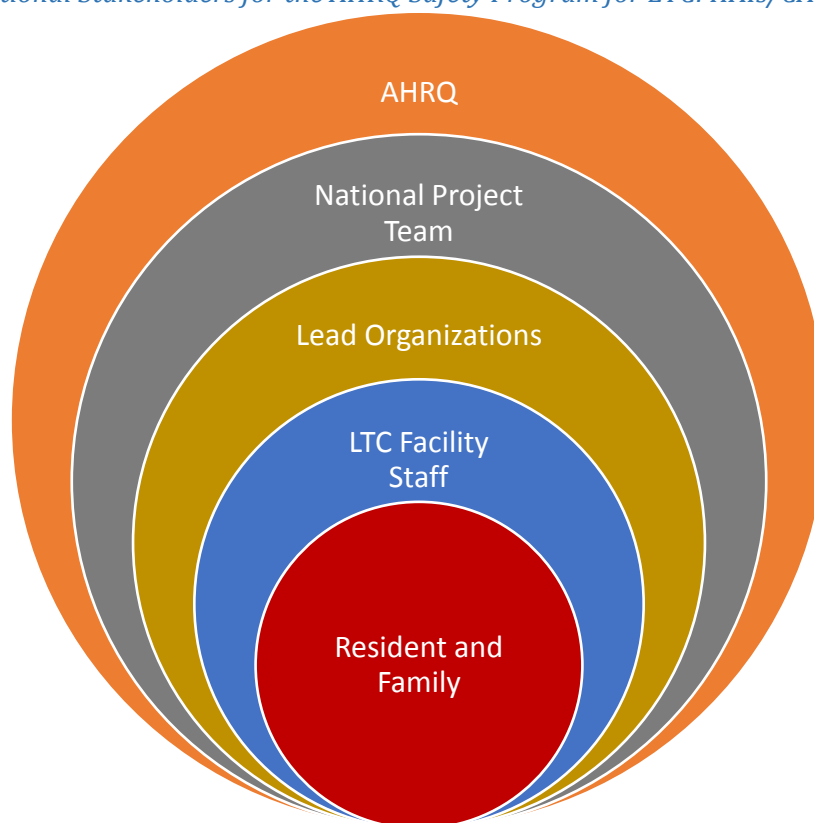
National Project Team

The national project team consisted of several partner organizations, each bringing unique expertise to the initiatives to reduce catheter-associated urinary tract infection (CAUTI) and other healthcare-associated infections (HAIs). The national project team members supported the spread and sustainability of the QI program by incorporating and developing supplemental content from their area of expertise and integrating it into the national collaborative curriculum. They served as subject matter experts, provided leadership, and ensured that their organizations were successful in meeting deliverables for the collaborative. They were coaches to the organizational leads and facility leads and served as expert faculty for learning sessions, training modules, content calls, and coaching calls.

HRET's national project team members included Abt Associates, the Association for Professionals in Infection Control and Epidemiology (APIC), Baylor College of Medicine, Qualidigm, Society of Hospital Medicine (SHM), and the University of Michigan. State hospital associations as well as other State-based and professional organizations were the central program partners that were relied upon to coordinate, promote, and coach facility teams as they implemented the CAUTI prevention protocols and the C.A.U.T.I. and T.E.A.M.S. interventions. In addition, the national project team collaborated with State

and regional organizations with expertise in QI that have other business as Centers for Medicare & Medicaid Services (CMS)-contracted Quality Innovation Network-Quality Improvement Organizations (QIN-QIOs) as well as other government entities, including the Centers for Disease Control and Prevention (CDC), CMS, and the Department of Veterans Affairs (VA), to develop, review, and disseminate key educational content to LTC facilities.

HRET Staff

To manage the range of activities and multiple deliverables associated with this large and complex program, HRET built an internal operations team and developed standardized processes to implement the program and monitor and report progress. HRET designed its program management structure based on six functional areas: (1) content development and dissemination, (2) communications, (3) data management, analysis, and reporting, (4) recruitment and relationship management, (5) operations, and (6) contracts and financial management. HRET staff also gathered information on any opportunities to improve the program based on feedback from the organizational leads and LTC facilities and provided reports to the national project team to determine how best to address these suggestions and concerns. Examples of program improvements include the content redesign (described below), development of data interpretation guides, and additional educational Webinars to help LTC facilities develop action plans based on results from the AHRQ Nursing Home Survey on Patient Safety Culture.

Organizational Leads

Organizational leads were crucial to the facility teams' success in this initiative. The organizational lead was an individual designated by a State or regional lead organization (e.g., State nursing home associations, corporations, or State provider associations) who acted as an intermediary between the national project team and nursing homes. These organizational leads, with the exception of the VA, were brought on as subcontractors with a defined scope of work and payment schedule. This arrangement created accountability for each State to ensure that all deliverables were completed throughout the course of the program. The role of the organizational lead was to recruit and register LTC facilities into the program and provide ongoing program direction, education, and coaching throughout the duration of the program. Organizational leads were also responsible for the promotion and communication of all educational activities, program updates, and available resources. Finally, organizational leads were crucial in supporting the surveillance efforts in the LTC facilities. During monthly coaching calls, they helped LTC facilities review and interpret their data and develop plans to ensure LTC facilities continued to show improvements in their CAUTI reduction efforts. Organizational leads served an important role in program execution, but also an even more important role in program sustainability, as they are there to support LTC facilities at the completion of the program. The tools developed by the national project team as well as the experience in coaching LTC facilities in collecting, reviewing, and using data to drive improvement efforts equipped the organizational leads to continue this work with LTC facilities in their State or region after the conclusion of the program.

Faculty Coaches

Expert faculty were assigned to each organizational lead to assist in training the staff of participating LTC facilities on how to implement and effectively use HAI prevention practices and safety culture tools. Faculty also assisted facilities in correctly identifying CAUTIs using the National Healthcare Safety Network (NHSN) definition for LTC and in interpreting their data. As with the organizational leads, faculty coaches were vital in improving surveillance efforts in LTC facilities. Faculty coaches participated

in recurring coaching calls to facilitate the teams' access to program resources, explore challenges, and identify opportunities to improve the use of clinical and cultural interventions.

Long-Term Care Facilities

Each LTC facility team was led by a facility team lead and consisted of a set of core team members plus others who participated on an as-needed basis. The core team included an administrative champion, a survey coordinator, and a data coordinator. In addition to the required roles, it was suggested that each team include six to eight members, including a nurse champion, physician champion, infection preventionist, and key members of the clinical staff (e.g., registered nurses (RNs), licensed practical nurses (LPNs), and certified nursing assistants (CNAs)). LTC facilities participating in the program were expected to form an active, multidisciplinary program team and conduct training sessions for all staff members, including nurses, nurse aides, housekeeping, dietary, et cetera, on the C.A.U.T.I. and T.E.A.M.S. interventions. Teams were expected to communicate with residents and families about the program; participate in team coaching sessions via teleconference or Webinar on a monthly basis; collect and submit facility demographic data, knowledge assessments,[32] safety culture surveys, and monthly outcome data; and attend all educational events.

Residents and Families

Involving residents and their families in care decisions and program implementation is key to achieving a culture of safety and respect. To ensure resident and family engagement, the national project team created and disseminated educational materials pertaining to residents' and families' roles in CAUTI prevention, antibiotic stewardship, and other topics.

Technical Expert Panel

The program's TEP consisted of stakeholder representatives and nationally recognized and well-respected experts in the areas of patient safety, QI, HAIs, teamwork, and change implementation. The role of the TEP was to provide expert input to the national project team, at annual virtual meetings throughout the program, on strategies to facilitate adoption and implementation of interventions to reduce HAIs and CAUTI.

Other Relationships

The national project team collaborated with the National Consumer Voice for Quality Long-Term Care (NCV) to get input from State and local ombudsmen on program resources, to disseminate information through State NCV networks, and to integrate perspectives and insights of residents and families in LTC facilities into program materials. The national project team shared the education and resources

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[32] Trautner B, Greene T, Rolle AJ, et al. Infection prevention and antimicrobial stewardship knowledge for selected infections among nursing home personnel. Infect Control Hosp Epidemiol 2016 Sept [in press].

available in the program with State, local, and volunteer ombudsmen, who then shared the education gained through this program with residents and their family members. The NCV recruited eight State ombudsmen who reviewed the onboarding, training, and other educational materials developed for the program and then developed and delivered training programs for local and volunteer ombudsmen in their States. Local and volunteer ombudsmen who participated in the training program were encouraged to share the information as appropriate with residents, family members, and staff during the ombudsmen's site visits to LTC facilities.

Project Components

Recruitment Strategy

The recruitment goal of this national program was to spread throughout all 50 States, the District of Columbia, and Puerto Rico. Participation in the program is divided into recruitment of five cohorts, or groupings of LTC facilities, dispersed throughout the 3 years of the contract. Thirty lead organizations recruited facilities within their States or regions for this program. Lead organizations from Cohorts 1 and 2 were a mix of hospital associations and State organizations with expertise in QI (e.g., Professional Nursing Solutions, Qualidigm, Spectrum Health, South Carolina Hospital Association) with 284 facilities recruited during the first year of the program (2014). During Year 2 of the program, HRET identified 15 lead organizations, including the VA, Genesis HealthCare, the Joint Commission, and other national nursing home systems, to participate in Cohorts 3 and 4. A full list of Cohort 1–4 lead organizations is included in Appendix J. For the fifth and final cohort, organizational leads from previous cohorts recruited facilities that were unable to participate in the previous cohorts. However, HRET staff took over the role of the organizational lead for Cohort 5 after facilities registered for the program.

Educational Events and Resources

After joining the program, facility teams participated in a series of educational onboarding events to familiarize themselves with the program, timelines, roles and responsibilities, data collection, and the program's cultural and clinical interventions. This was followed by a series of training modules highlighting general infection prevention practices (e.g., hand and environmental hygiene

practices,[33,34,35] standard precautions,[36,37] and antibiotic stewardship [38]), that can be applied not only to CAUTI prevention but to any other HAI, such as *Clostridium difficile* or other multidrug-resistant organisms. This training addresses our secondary goals for this program.

The program interventions were discussed in detail during three learning sessions and monthly content Webinars. They were then reinforced on the teams' monthly coaching calls or Webinars with their organizational leads and assigned coach who had expertise in infection prevention or QI in LTC. Table 5 describes the different types of program Webinars, calls, and meetings through which facility teams were educated on the interventions.

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[33] Schweon SJ, Kirk J. A realistic approach towards hand hygiene for long-term care residents and health care personnel. Am J Infect Control 2011;39(4):336-338.

[34] Centers for Disease Control and Prevention, Healthcare Infection Control Practices Advisory Committee (HICPAC). Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008. Available at: https://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf. Accessed August 15, 2016.

[35] Han JH, Sullivan N, Leas BF, et al. Cleaning hospital room surfaces to prevent healthcare-associated infections: a technical brief. Ann Intern Med 2015 Oct 20;163(8):598-607.

[36] Stone ND. Revisiting standard precautions to reduce antimicrobial resistance in nursing homes. JAMA Intern Med 2015 May;175(5):723-4.

[37] Siegel JD, Rhinehart E, Jackson M, et al.; Healthcare Infection Control Practices Advisory Committee. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Health Care Settings. Available at: http://www.cdc.gov/hicpac/2007IP/2007isolationPrecautions.html. Accessed August 15, 2016.

[38] Centers for Disease Control and Prevention. The Core Elements of Antibiotic Stewardship for Nursing Homes. Atlanta, GA: US Department of Health and Human Services, CDC; 2015. Available at: http://www.cdc.gov/longtermcare/index.html. Accessed August 15, 2016.

Table 5.   Webinars, Modules, Conference Calls, and Meetings

Category	Description
Informational	This introductory Webinar familiarized the organizational leads and facility teams with a general overview of the program, encouraged enrollment, and provided registration details. (Audience: organizational leads and facility teams of new cohorts)
Onboarding	This series of Webinars at the beginning of each cohort launch reviewed the program collaborative model, the technical and socioadaptive interventions, and data and measurement. Topics are listed in Table 29. (Audience: organizational leads and facility teams of new cohorts)
Training Modules	This four-part series of educational bundles was intended to strengthen knowledge and infection prevention skills related to CAUTI reduction and to the program's secondary goals of reducing other HAIs, such as *Clostridium difficile*. These modules were delivered via live Webinars for Cohorts 1 and 2. For Cohorts 3, 4, and 5, each bundle followed a train-the-trainer format and included a video for core team members outlining how facility team leaders should teach and engage frontline staff with the content; a video for all staff to watch; activities such as skills practice, quizzes, or discussion guides; and an evaluation and certificate of completion. Topics are listed in Table 30. (Audience: organizational leads and facility teams of new cohorts)
Content	On this series of monthly Webinars, the national project team, faculty, coaches, and resident advocates presented on technical, socioadaptive, and coaching topics to teach on the program interventions. Topics are listed in Table 32. (Audience: organizational leads and facility teams of existing cohorts)
Coaching	These organization-level calls or Webinars occurred monthly and were designed to be an open forum among the organizational lead, facility teams, and assigned coach. These meetings provided participating facilities an opportunity to share their experiences and concerns with each other, enhancing their success in program implementation. Most calls reviewed teams' program data, discussed implementation strategies, and reflected on recent content Webinars. (Audience: organizational leads, facility teams, and assigned coaches of new and existing cohorts)
Learning Session #1 (Kick-Off)	Learning Session #1 was the first in-person (or virtual) meeting for the facility teams, led by organizational leads. The purpose of this meeting was to serve as an official program launch and introduce teams to each other, their organizational lead, and their assigned coach for the program. This meeting reviewed information about CAUTI and HAI prevention, data collection, QI, and action planning.

Category	Description
Learning Session #2 (Midcourse)	Learning Session #2 was the second in-person (or virtual) meeting of the program and took place approximately halfway through each cohort's timeline. The purpose of this meeting was to review progress and data, provide strategies to overcome barriers, highlight the work of high-performing participants, and provide an opportunity for teams to network with each other. The organizational lead facilitated this meeting in conjunction with assigned members of the national project team and coach.
Learning Session #3 (Final)	Learning Session #3 was the third and final in-person (or virtual) meeting of the program that occurred during the final months of each cohort's timeline. It was a celebration for facility teams and a time when teams and coaches shared knowledge and plans for ongoing sustainability and spread. The organizational lead facilitated this meeting in conjunction with assigned members of the national project team and coach.
Organizational Lead	This series of monthly Webinars allowed organizational leads across all active cohorts to share their successes, challenges, program implementation strategies, and feedback to the national project team. (Audience: organizational leads)
Long-Term Care Safety Toolkit	The Long-Term Care Safety Toolkit was developed specifically for the LTC population with input from content experts. The toolkit was field-tested by five LTC facilities and then released for all facilities engaged in the program in September 2015. The purpose of the toolkit is to improve safety culture in LTC facilities, support quality improvement and safety initiatives in LTC facilities, and supplement the technical interventions to reduce HAIs, including CAUTIs. The toolkit has six modules. Topics are listed in Table 31.

Content Redesign

The national project team found that LTC facility knowledge [39] and experience with QI was highly variable. In addition, the majority of LTC facility staff who attended educational events in the first two cohorts were the facility team lead or the nurse responsible for infection prevention or both. Facilities identified challenges in pulling frontline staff away from resident care to attend Webinars, and many had difficulty engaging physicians to elicit their support for the program. Many facility team leads also stated that they took the content provided and revised it to meet the educational level and needs

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[39] Trautner B, Greene T, Rolle AJ, et al. Infection prevention and antimicrobial stewardship knowledge for selected infections among nursing home personnel. Infect Control Hosp Epidemiol 2016 Sept [in press].

of their frontline staff. Therefore, prior to the start of Cohort 3 in April 2015, the national project team identified a need to redesign the educational content and delivery to ensure consistency across learning objectives by topic for the facility team leads and frontline staff. Additionally, the national project team began offering continuing nursing education (CNE) credits for Webinars.

The redesigned curriculum provided maximum flexibility for facility educators and allowed facility team leads to adapt train-the-trainer materials for existing education methods. Each topic covered in the following three types of educational events was condensed and customizable so that trainers could use all or some of the slides, videos, and activities to teach and engage frontline staff. The train-the-trainer materials were developed using the earlier materials and a variety of additional resources including information provided by subject matter experts on the team, such as those who conducted a recent randomized clinical trial [40,41]. This format allowed facilities to adapt the educational materials to meet their specific needs and delivery method preferences:

1. Onboarding: Facility team leads participated in a 45-minute Webinar covering team lead-specific content, corresponding content designed to help leaders educate frontline staff, and question-and-answer time. An instructional guide served as a train-the-trainer resource manual to guide team leads as they taught and engaged the frontline staff on each topic area. Each train-the-trainer guide included a training video, accompanying slide set with speaker notes, and active learning materials such as a quiz or team activity.
2. Training modules: Both frontline staff and facility team leads were asked to review four short videos on each infection prevention topic. The team leads were provided with four additional 15-minute videos with train-the-trainer content and an instructional guide that provided additional information to help trainers teach and engage the frontline staff on each technical skill.
3. Content: The content Webinars used the same educational methods as the onboarding modules. The facility team leads were asked to participate in a 45-minute Webinar that covered the team lead-specific content as well as train-the-trainer content and question-and-answer time. An instructional guide and train-the-trainer materials were developed to assist facility educators as they taught and engaged frontline staff.

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[40] Mody L, Krein S, Saint S, et al. A targeted infection prevention intervention in nursing home residents with indwelling devices: a randomized clinical trial. JAMA Intern Med 2015;175(5):714-723. PMID: 25775048.
[41] Koo E, McNamara S, Lansing B, et al. Making infection prevention education interactive can enhance knowledge and improve outcomes: results from the targeted infection prevention (TIP) study. Am J Infec Control 2016 [in press].

As part of the content and delivery redesign process, CNE was offered for a majority of the Webinars targeted toward the facility team leads that were most often nurses, beginning in May 2015. This process ensured consistency across learning objectives and final training materials.

Supplemental Material, Manuals, and National Project Web Site

In addition to the onboarding, training modules, content Webinars, and supplemental tools and all-staff training materials, the national project team developed other tools and resources to assist organizational leads and facility teams in program implementation:

- Organizational Leads
  - Organizational lead manual—Provided to organizational leads at their initial in-person training, this manual summarized the role of organizational leads and discussed all the activities they needed to perform during each phase of the program's lifecycle: planning, execution, and sustainability.
  - Coaching call materials—These tools included a Webinar introducing coaching methods, expectations of each role on the coaching call, and guidance on how to set agendas and what topics to discuss.
  - Dashboards—Each organizational lead received regularly updated dashboards of their facilities' data submission, outcomes, and process measures.
  - Monitoring tools—Organizational leads had access to trackers and communication logs to assess their facility teams' participation and progress in the program. This included guidance on what to do if a facility had low engagement.
- Facilities
  - Facility implementation guide—Provided to facility teams at their Learning Session #1, this guide served as a reference for facility team leads on how to coordinate and implement the program.
  - Physician resources—These tools assisted teams in engaging physicians and prescribing clinicians in supporting the program by outlining the evidence-based practices and clinical guidelines essential to reducing HAIs.
  - Posters and brochures—The national project team developed various posters and brochures to reinforce the program's technical and socioadaptive interventions among facility team members, educate residents and families on appropriate use of antibiotics, and encourage resident and family engagement in the program's goals.
  - Tools—These tools included pocket cards for facility team members to evaluate residents with signs or symptoms of CAUTI before prescribing antibiotic treatment, surveillance assessments with the LTC NHSN criteria, indwelling urinary catheter insertion and maintenance checklists, CAUTI case review forms to identify possible resident care issues that might have contributed to the infection, the Team Communication Guide to help teams assess progress toward implementing program interventions, and an antibiotic stewardship educational video.
  - FAQs—The national project team developed multiple documents to respond to frequently asked questions around clinical and cultural interventions. In most cases, a multidisciplinary team reviewed relevant literature to identify evidence-based practices and then wrote up their findings in a brief, user-friendly format. When questions raised

by facility teams could not be answered through a literature review, content experts from the national project team shared their seasoned experience.

All educational materials were available to participants on the program's password-protected Web site. The Web site served as a central location for a wide range of program information and resources. It included a calendar of educational events, archived Webinars, links to data collection systems, newsletters, and frequently asked questions.

Project Measures

Data Sources

To support QI efforts, participating facilities collected data for five components (Table 6) according to the schedules shown in Figures 7-9 and shared them with the national project team. Many of the assessments and their administration timelines were being developed while Cohort 1 was participating. The national project team reviewed feedback from participating Cohort 1 facilities and finalized the data collection timeline for the subsequent cohorts. Also, because of the compressed time frame for Cohort 5, the knowledge questionnaire was administered at two time points instead of three.

Table 6.   Measurement Components and Data Collection Schedule

Component	Collection Schedule (Cohorts 2–5)	Items Collected
Facility demographics	Month 3	Basic characteristics of each facility as well as current policies and procedures on infection prevention, CAUTI surveillance, and catheter management. The full questionnaire is reproduced in Appendix G.
AHRQ Nursing Home Survey on Patient Safety Culture (i.e., safety culture survey)	Month 4 Month 15	Facility staff perceptions of resident safety and safety culture. The full survey is reproduced in Appendix G.
Knowledge questionnaire	Month 3 Month 10 Month 16	Facility staff knowledge on the clinical and cultural components to preventing CAUTI and enhancing resident safety. The full questionnaire is reproduced in Appendix G.
Outcome data	Monthly beginning in month 5	CAUTIs, resident days, catheter days
Process data	Monthly beginning in month 5	Number of urine cultures collected

Facilities submitted demographics, the safety culture survey, and the knowledge questionnaire via a commercial online survey platform (Cvent). The process data were submitted via HRET's secure, online Comprehensive Data System (CDS). Outcome data were submitted directly to CDS, or facilities using NHSN had the option to confer rights to their outcome data to an HRET group. HRET extracted the NHSN data monthly for the 20 active facilities using NHSN and uploaded the data to CDS. Figures 7–9 illustrate the data collection periods and submission schedules for each of the data components outlined in Table 6 for each cohort.

Figure 7.   Cohort 1 Data Collection Schedule
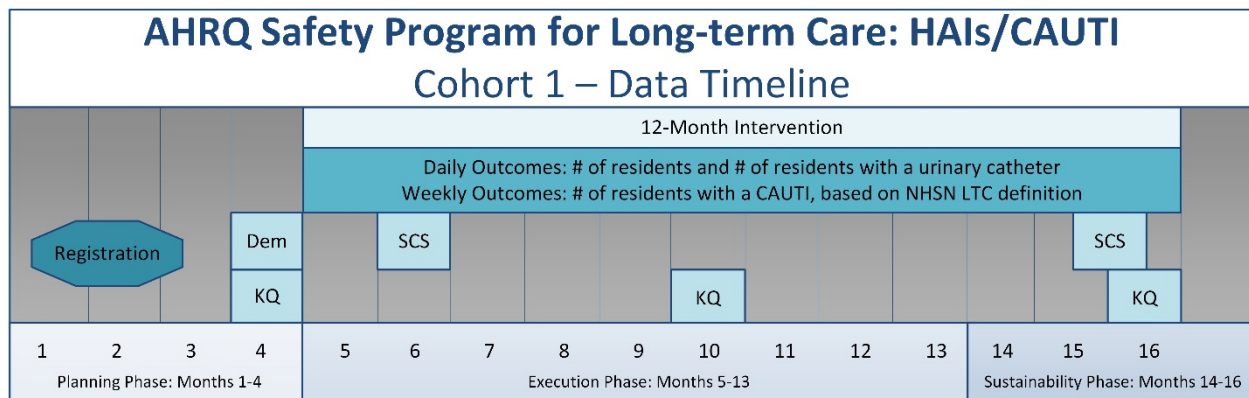
Figure 7.   Cohort 1 Data Collection Schedule

Figure 8.   Cohorts 2–4 Data Collection Schedule
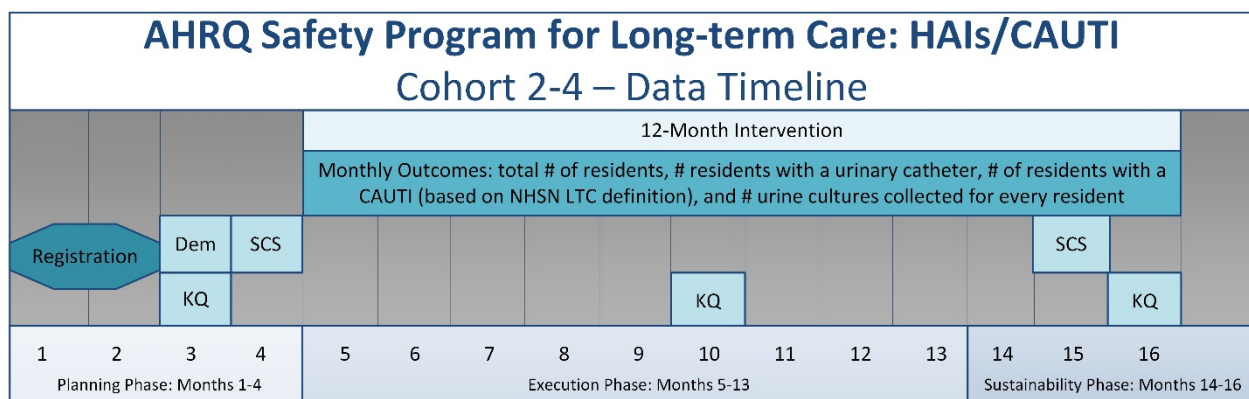
In early fall 2014, after the national project team observed that data submission rates were well below the program target of 70 percent, feedback from Cohort 1 facility teams and organizational leads revealed that daily data submission was a significant burden for facilities. The national project team reviewed the submission schedule (Table 7) and modified it for Cohort 2 and future cohorts. Instead of submitting daily counts of residents and residents with catheters and weekly CAUTI counts, the national project team requested that facility teams submit monthly totals for these measures. This revised schedule lessened the data submission burden and aligned the program data collection with that of NHSN, which also requires monthly submission. The national project team encouraged facilities to collect the data on a daily basis at the facility level. However, submitting the data monthly was sufficient for measuring progress and mitigated the burden of daily data submission.

Figure 9.   Cohort 5 Data Collection Schedule
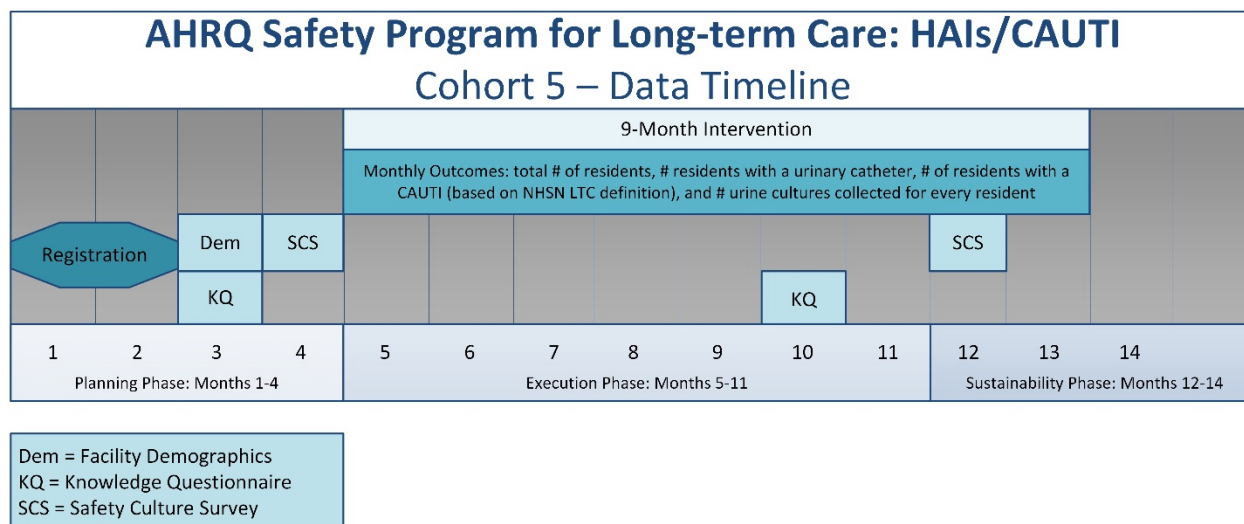
Table 7.   Cohort 1 and Cohorts 2–5 Initial Data Collection and Submission

Outcome Measures	Cohort 1	Cohorts 2–5
Resident days	Submit daily counts each month	Submit monthly totals each month
Catheter days	Submit daily counts each month	Submit monthly totals each month
CAUTI events as defined by LTC NHSN criteria	Submit event counts each week	Submit monthly totals each month

Modifications in the data collection and submission process were made for the 63 VA facilities enrolled as part of the VA-led group in Cohort 3. (Of these 63 enrolled facilities, 55 completed the program.) VA facilities submitted their outcome data monthly directly to the VA organizational lead via a SharePoint site accessible only to those participating in this initiative. The organizational lead then sent a de-identified dataset to HRET to upload to CDS for use in evaluating CAUTI rates and catheter utilization.

Also in early fall 2014, after observing low catheter utilization and CAUTI rates for Cohort 1, the national project team added an additional process measure to assess success in the initiative. Beginning with Cohort 2, facility teams were asked to track and report the number of urine cultures that were collected from catheterized and noncatheterized residents in their facility each month. Since urine culture counts should be readily available from facility contract laboratories, the addition of this measure was not expected to pose an additional data collection burden. The national project team communicated and provided education around the potential impact that culturing stewardship can have on CAUTI rates and the usefulness of monitoring and tracking the rate of urine culturing as a process measure in CAUTI reduction efforts.

Outcome Measures

CAUTI Rates

CAUTI rates are calculated using two methods. First, CAUTI rates are calculated using CDC's NHSN methodology.[42] For the duration of this program the 2015 NHSN LTC facility component for urinary tract infections (UTIs) was used to identify CAUTIs (see Appendix I). The NHSN CAUTI rate is calculated by dividing the total number of CAUTI episodes within a specific period by the total number of indwelling urethral catheter days within the same time period, then multiplying by 1,000 (Equation 1). This measure accounts for the risk of infection for residents with an indwelling transurethral catheter.

Equation 1. NHSN CAUTI Rate

$$NHSN\ CAUTI\ Rate = \frac{CAUTI\ Episodes}{Catheter\ Days} \times 1,000$$

The CAUTI rate is also calculated using a population-based denominator.[43] Specifically, the population CAUTI rate is calculated by dividing the total number of CAUTI episodes within a specific period by the total number of resident days within the same time period and then multiplying by 10,000 (Equation 2). Because the target of many CAUTI interventions is reduction in the number of catheter days, this measure has been shown to be more sensitive in intervention studies, as it is standardized by the population, which is typically constant (unlike catheter days, which can decrease during an intervention).[44]

Equation 2. Population CAUTI Rate

$$Population\ CAUTI\ Rate = \frac{CAUTI\ Episodes}{Resident\ Days} \times 10,000$$

Process Measures

Catheter Utilization Ratio

The catheter utilization ratio more closely assesses the relationship between changes in catheter utilization and resident volume. Catheter utilization is calculated by dividing the total number of catheter days in a given time period by the total number of resident days in the corresponding time

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[42] Dudeck MA, Horan TC, Peterson KD, et al. National Healthcare Safety Network (NHSN) report, data summary for 2010, device-associated module. Am J Infect Control 2011;39(10):798-816. PMID: 22133532.

[43] Fakih MG, Greene MT, Kennedy EH, et al. Introducing a population-based outcome measure to evaluate the effect of interventions to reduce catheter-associated urinary tract infection. Am J Infect Control 2012;40(4):359-64. PMID 21868133.

[44] Wright M-O, Kharasch M, Beaumont JL, et al. Reporting catheter-associated urinary tract infections: denominator matters. Infect Control Hosp Epidemiol 2011;32(7):635-640. PMID: 21666391.

period, reflected as a percentage (Equation 3). Because many CAUTI interventions also focus on decreasing the number of catheter days, this measure assesses whether a reduction in catheter days is the result of a decrease in utilization (i.e., ratio decreases with time) or a decrease in resident volume (i.e., ratio remains relatively constant).

Equation 3. Catheter Utilization Ratio

$$Catheter\ Utilization\ Ratio = \frac{Catheter\ Days}{Resident\ Days} \times 100$$

Urine Cultures Ordered

Decreasing inappropriate use of urine testing (urine cultures) is the first step in decreasing inappropriate use of antibiotics in residents with asymptomatic bacteriuria. Asymptomatic bacteriuria, or a positive urine culture in the absence of symptoms specific to the urinary tract, is extremely common in residents in LTC. Strong evidence supports nontreatment of asymptomatic bacteriuria in older adults residing in LTC settings.[45],[46] Unnecessary use of antibiotics to treat asymptomatic bacteriuria does not confer a clinical benefit and may even cause harm in terms of antibiotic resistance and risk of *C. difficile* infection. Unfortunately, asymptomatic bacteriuria is often confused with UTI, particularly in catheterized adults, who are almost always bacteriuric (have bacteria in their urine). A positive urine culture is a strong driver of subsequent antibiotic use, regardless of whether the resident had symptoms of UTI.[47,48,49] Treatment of asymptomatic bacteriuria with antibiotics is one of the leading causes for antibiotic overuse in LTC. Therefore, the national project team included the number of urine cultures sent as a process metric.

A decrease in the number of urine cultures can be used as a surrogate measure of success of the program's antimicrobial stewardship education. A lower number could indicate more appropriate diagnostic testing for UTIs, by not sending urine cultures for residents without symptoms of UTIs that would warrant antimicrobial use. The urine culture order rate is calculated by dividing the urine cultures collected in a given time period by the total number of resident days in the corresponding time period

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[45] Nicolle L, Bradley S, Colgan R, et al. Infectious Diseases Society of America guidelines for the diagnosis and treatment of asymptomatic bacteriuria in adults. Clin Infect Dis 2005;40:643-54.

[46] Crnich CJ, Jump R, Trautner B, et al. Optimizing antibiotic stewardship in nursing homes: a narrative review and recommendations for improvement. Drugs Aging 2015 Sep;32(9):699-716.

[47] Phillips CD, Adepoju O, Stone N, et al. Asymptomatic bacteriuria, antibiotic use, and suspected urinary tract infections in four nursing homes. BMC Geriatrics 2012;12:7. PMID: 23176555.

[48] Leis JA, Gold WL, Daneman N, et al. Downstream impact of urine cultures ordered without indication at two acute care teaching hospitals. Infect Control Hosp Epidemiol 2013;34:1113-1114.

[49] Trautner BW, Grigoryan L, Petersen NJ, et al. Effectiveness of an antimicrobial stewardship approach for urinary catheter-associated asymptomatic bacteriuria. JAMA Intern Med 2015 Jul;175(7):1120-7.

and then multiplying by 1,000 (Equation 4). Since obtaining individual resident-level data including urine culture order rate is not feasible, this calculation uses facility-level numbers of urine cultures as a surrogate measure. A reduced urine culture order rate may suggest reduced antibiotic use to treat UTIs as an important step in improving antimicrobial stewardship.

Equation 4. Urine Culture Collection Rate

$$Urine\ Culture\ Rate = \frac{Urine\ Cultures\ Collected}{Resident\ Days} \times 1,000$$

Knowledge Questionnaire

The knowledge questionnaire assessed facility staff knowledge on the clinical and cultural components of preventing CAUTI and enhancing resident safety and helped to inform educational needs. The questions on this questionnaire were developed by the national project team and were aligned with the educational components of the program. There were two versions of the questionnaire, one for licensed staff (e.g., RNs, LPNs, or those with more advanced degrees) and another for nonlicensed staff (e.g., CNAs, technicians, or support staff), to account for the differences in education level for nursing home staff. This questionnaire was administered three times during the program period in Cohorts 1–4 (and twice in the abbreviated Cohort 5) to monitor changes in infection prevention and cultural knowledge, identify successes, and inform the national project team of ongoing educational opportunities over time. At least 10 staff members (five licensed and five nonlicensed) were encouraged to complete the questionnaire at each time point. The national project team encouraged facility teams to have the same staff complete the questionnaire at each time point but was aware that, because of high turnover in LTC facilities, this repetition may not have been possible. The national project team provided facility-specific reports with results for facilities that met the minimum completion requirements. Program aggregate results also helped the national project team adjust its educational and coaching approach.

Upon reviewing the baseline results from Cohort 1, the national project team reworded some questions to add specificity (e.g., changing from a response option of "All of the above" to instructing respondents to select all options that apply). These modifications were applied to Cohort 1's midpoint and final questionnaire as well as to all time points for Cohorts 2–5.

Demographics and Cultural Measures
Facility Demographics

The facility demographics assessment was collected once at the start of the program and used to determine each facility team's exposure to other interventions and identify gaps in catheter management and infection prevention practices. Information gathered included basic characteristics of each facility as well as current policies and procedures on infection prevention, CAUTI surveillance, and catheter management.

AHRQ Nursing Home Survey on Patient Safety Culture

The AHRQ Nursing Home Survey on Patient Safety Culture (i.e., the safety culture survey) was used to evaluate the impact of the program's resident safety interventions. This survey was administered at the start and end of the program in order to track changes in resident safety culture over time. LTC facilities were instructed to submit surveys for at least 60 percent of LTC facility staff at each time point to help ensure that results could be representative of the facility. The national project team encouraged facility

teams to administer the safety culture survey to all staff, including those with no direct care to residents, at both time points.

Stakeholder Feedback

The national project team administered a practice change assessment to Cohort 2 LTC facilities and conducted interviews with select LTC facility teams and organizational leads. Information from this feedback allowed the national project team to better understand the needs of program participants in the LTC environment and the program results.

Cohort 2 Practice Change Assessment

To evaluate evidence-based practice changes among Cohort 2 facilities over the course of the program, HRET designed a followup assessment based on the demographics questionnaire. Questions were selected to solicit information about whether or not facilities had implemented specific practices and policies related to program education. The questionnaire was administered to the 136 facilities in Cohort 2 that were active at the end of the Cohort 2 program period. Because of the program closeout in September 2016 and the need for Cohorts 3, 4, and 5 to complete their final knowledge questionnaires and safety culture surveys, the national project team administered this practice change assessment only to Cohort 2.

Questions covered six domains:
1. Catheter management
2. Surveillance
3. QI programs
4. Training
5. Infection prevention policies
6. Sustainability strategies

Stakeholder Interviews

To better understand changes made by facility teams as a result of participation in the program, the national project team conducted a series of 30-minute semistructured qualitative interviews with select facilities in Cohorts 2–4. Most candidates were identified based on either high or low participation in program activities; organizational leads also recommended a few additional facilities to be interviewed. Some organizational leads from Cohorts 3 and 4 were also interviewed about their experiences implementing the program.

The interviews addressed topics including:
- Facilities' reasons for joining the initiative
- Practice changes observed among facility teams
- Which changes the interviewees believed had the greatest long-term impact on clinical practices and why
- Which changes the facilities planned to encourage or sustain over time and why
- Barriers to staff implementing practice changes to reduce CAUTI

Site Visits

The national project team conducted site visits to facilities in seven States, with the purpose of learning about success factors and challenges encountered by participants. The site visit teams included

representatives of HRET, faculty coaches, and organizational leads. Some visits lasted an entire day, while others were half-day visits. Each site visit agenda included a review of the facility's data, a tour of the complex, interaction with staff and residents, and a discussion of what aspects of the program the facility team lead or staff found most useful in implementing the program.

Project Recap Meeting

In August 2016, HRET convened a program recap meeting in Chicago to solicit feedback from stakeholders. The meeting was attended by organizational leads, coaches, HRET staff, and members of the national project team. Through a series of panels, presentations, and discussions, attendees addressed successes of the program, lessons learned, sustainability, and recommendations for future collaboratives in LTC from a variety of perspectives.

Project Results

All analyses in this report are based on data submitted as of July 25, 2016.

Recruitment and Retention

The Health Research & Educational Trust (HRET) recruited 652 facilities in 48 States, plus the District of Columbia and Puerto Rico. Of the 652 recruited facilities, 505 (77%) completed the program and 147 (23%) withdrew. Table 8 summarizes recruitment and retention by cohort.

Table 8.   Recruitment and Retention by Cohort

Cohort	Number of Facilities Recruited	Number of Active Facilities	Retention Rate
1	94	63	67%
2	190	136	72%
3	210	171	81%
4	137	118	86%
5	21	17	81%
Total	652	505	77%

Source: Program participants' database

The most frequently cited reason for withdrawal from the program was staff turnover or staff shortages, followed by time constraints and competing priorities. Because many of the measures were still in development during the start of the program, facilities were asked to complete all of the baseline measures simultaneously during a short time frame. This may also explain why retention for Cohort 1 was lower than for other cohorts (Table 8). Also, the original Cohort 1 data submission schedule, prior to the adjustments described above, may have contributed to Cohort 1's lower retention rate.

Table 9 outlines when during the program period facilities for each cohort withdrew. The majority of facilities withdrew during the execution phase, which was when facilities began collecting and submitting outcome data. Cohorts 2 and 5 also had a large proportion of the facilities withdraw during the planning phase, which was when facilities submitted their demographics, baseline knowledge questionnaire, and baseline safety culture survey and attended the onboarding Webinars.

Table 9.   Stages of Withdrawals (n=147)

Cohort	Facilities Recruited (N)	Withdrew During Planning Phase [a] % (N)	Withdrew During Execution Phase [b] % (N)	Withdrew During Sustainability Phase [c] % (N)
1	94	3% (3)	28% (26)	2% (2)
2	190	16% (30)	13% (24)	0% (0)
3	210	2% (4)	13% (27)	4% (8)
4	137	3% (4)	10% (14)	1% (1)
5	21	14% (3)	5% (1)	0% (0)
Total	652	12% (80)	14% (92)	2% (11)

[a] Planning phase: months 1–4
[b] Execution phase: months 5–13
[c] Sustainability phase: months 14–16
Source: Program participants' database

Statistical Analysis

Modeling Approaches

The statistical analyses conducted for this report employed multilevel mixed-effects negative binomial regression to examine the changes in catheter utilization and catheter-associated urinary tract infection (CAUTI) rates for facilities in Cohorts 1–4. Models included random intercepts and slopes for time to account for repeated measures within each facility and unobservable variations between facilities. All facilities were included in primary analyses, but, because of statistically significant differences between them in terms of baseline outcome rates, the Department of Veterans Affairs (VA) and non-VA units were also analyzed separately for this report.

The log of the number of catheter days was used as an offset for models examining changes in the National Healthcare Safety Network (NHSN) CAUTI rate. The log of the number of resident days was used as an offset for the population CAUTI rate and catheter utilization models. Time was calculated as the number of days from the start of the execution phase (M5) to the end of sustainability period (M16) divided by 335. Time for each reported period is based on the last day of the period, with the first time period set to zero. Therefore, the end of the first time period is Day 0 and the end of the 12th time period is Day 335. The resulting incidence rate ratio (IRR) represents the change over the course of the intervention.

For the non-VA facilities, adjusted models were used to look at the effects of ownership (nonprofit vs. for-profit); facility bed size; data on whether the facility provides subacute care, has a healthcare-associated infection committee, has an infection preventionist with 3 or more years of experience, or is part of a multifacility "chain"; and star rating for both CAUTI rates and catheter utilization. Facility characteristic effects were not included in the VA analyses, as VA facilities' characteristic data were unavailable.

Sensitivity analyses were performed to look at facilities with complete data submission or at least 70-percent data submission to examine the influence of attrition in data submission on CAUTI rate changes.

Inclusion/Exclusion Criteria

To be included in the analyses, facilities had to be active at the end of their cohort and report at least two time periods of outcome data with nonzero denominators. Cohort 1 facilities also had to submit data directly to HRET. There were two Cohort 1 facilities that conferred their NHSN rights to HRET. Because Cohort 1 facilities submitting data into the Comprehensive Data System (CDS) did so daily or weekly, depending on the measure, it is difficult to match the monthly time points from the two Cohort 1 facilities submitting data to NHSN, so these two facilities were excluded from the analysis. After applying these exclusions, 459 of the 631 facilities enrolled in Cohorts 1–4 were included in the analyses. In addition to these exclusions, improbable data, such as large fluctuations in reported device days or resident days from month to month within a given nursing home, were identified and excluded from the analysis dataset.

Facility Characteristics

To better understand the types of facilities participating in this initiative, the national project team compared various characteristics of facilities in this initiative with a control group using publicly available data, as described below. Of the 459 facilities from Cohorts 1–4 that were actively participating in the program and met all criteria for inclusion in the analysis, 55 were VA facilities and five did not participate in Medicare and therefore did not have Federal ID numbers. The remaining 399 had Federal identifiers necessary to link with external data sources from Online Survey, Certification and Reporting (OSCAR), Minimum Data Set (MDS), and Centers for Medicare & Medicaid Services (CMS) health care files.

The presented analyses included only facilities with all four quarters from 2013 in the Nursing Home Compare five-star data (publically available via CMS) and focused on variables with the least missing data. Of the 399 facilities, 12 were missing data from one or more of these three sources and were therefore dropped from the analyses. To obtain a control group, the national project team used the Federal OSCAR data to identify 14,652 facilities with complete Nursing Home Compare data in 2013, OSCAR and MDS data, and a bed size of at least 20 beds (the minimum bed size for facilities participating in this program). To compare characteristics of the two groups, the national project team used one-way analysis of variance.

Among these 387 non-VA program facilities with complete data, the mean bed size was 121, 67 percent were for-profit, and 56 percent were part of a chain (Table 10). The most notable difference between participating and nonparticipating facilities was size: the average participating facility was larger in comparison to nonparticipating control facilities, which had a mean bed size of 107. Resident complexity was about the same, with a case-mix index of 1.30 versus 1.28, a difference that did not reach statistical significance. The CMS five-star rating was higher for participating facilities at 3.5 versus 3.2; however, this overall difference was not driven by differences in quality measure performance, but rather in staffing ratios and health inspection. The characteristics that did not differ were ownership, percentage of patients on Medicare or Medicaid, and reported percentage of residents on antibiotics.

In summary, participating facilities were larger and had slightly better five-star ratings (staffing ratios and health inspection components) than nonparticipating facilities. Therefore, subsequent analyses controlled for these characteristics. The national project team does not expect that the small differences would limit generalizability of results.

Table 10. Participating vs. Nonparticipating Facility Characteristics

Facility Characteristics		Included in Project Analysis (n=387)		Nonparticipating Facilities (n=14,652)		
	Variable	Mean or Percent	SD	Mean or Percent	SD	p
Size	Total beds (range 20–574 for participating, range 20–908 for nonparticipating facilities)	120.7	67.6	107.5	60.1	<0.001
Ownership (categorical)	For-profit ownership	67.2%		70.2%		0.190
	Nonprofit	27.9%		24.0%		
	Government-owned	4.9%		5.8%		
	Part of a chain	56.3%	49.7%	55.6%	49.7%	0.768
Composition by payer (reported percentages)	Reported % of residents on Medicaid	15.4%	14.2%	15.1%	14.2%	0.716
	Reported % of residents on Medicare	58.7%	21.5%	60.4%	22.6%	0.158
	Mean case-mix index from 2011 MDS (range 0.7–2.26)	1.30	0.15	1.28	0.17	0.054
	Reported percent on antibiotics at baseline	10.0%	6.4%	9.7%	7.1%	0.310
5-star ratings	Overall 5-star rating	3.51	1.17	3.24	1.24	<0.001
	5-star quality measures rating	3.70	0.98	3.74	1.02	0.449
	5-star health inspection deficiency rating	3.01	1.22	2.81	1.22	0.001
	5-star staffing rating	3.51	1.03	3.20	1.12	<0.001

Note: statistically significant results are highlighted in color.

Main Outcomes—Facilities From Cohorts 1–4

Data Submission

Figure 10 illustrates the percentage of facilities, by cohort, that submitted all expected data across time. Note that the program goal of 70 percent was an internal HRET operational goal to ensure sufficient data for overall program evaluation and to assess facility engagement.

Figure 10. Percentage of Active Facilities Submitting Outcome Data by Program Month (n=505)

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
◆ Cohort 1 (n=63)	91%	87%	83%	83%	81%	79%	75%	70%	67%	64%	61%	52%
■ Cohort 2 (n=136)	98%	98%	99%	97%	97%	97%	96%	97%	97%	96%	95%	81%
● Cohort 3 (n=171)	85%	88%	89%	93%	92%	88%	87%	82%	80%	75%	68%	59%
▲ Cohort 4 (n=118)	99%	99%	99%	99%	99%	99%	97%	98%	94%	93%		
■ Cohort 5 (n=17)	88%	88%	88%	88%	88%	82%	82%	41%				
⋯ Program Goal	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%
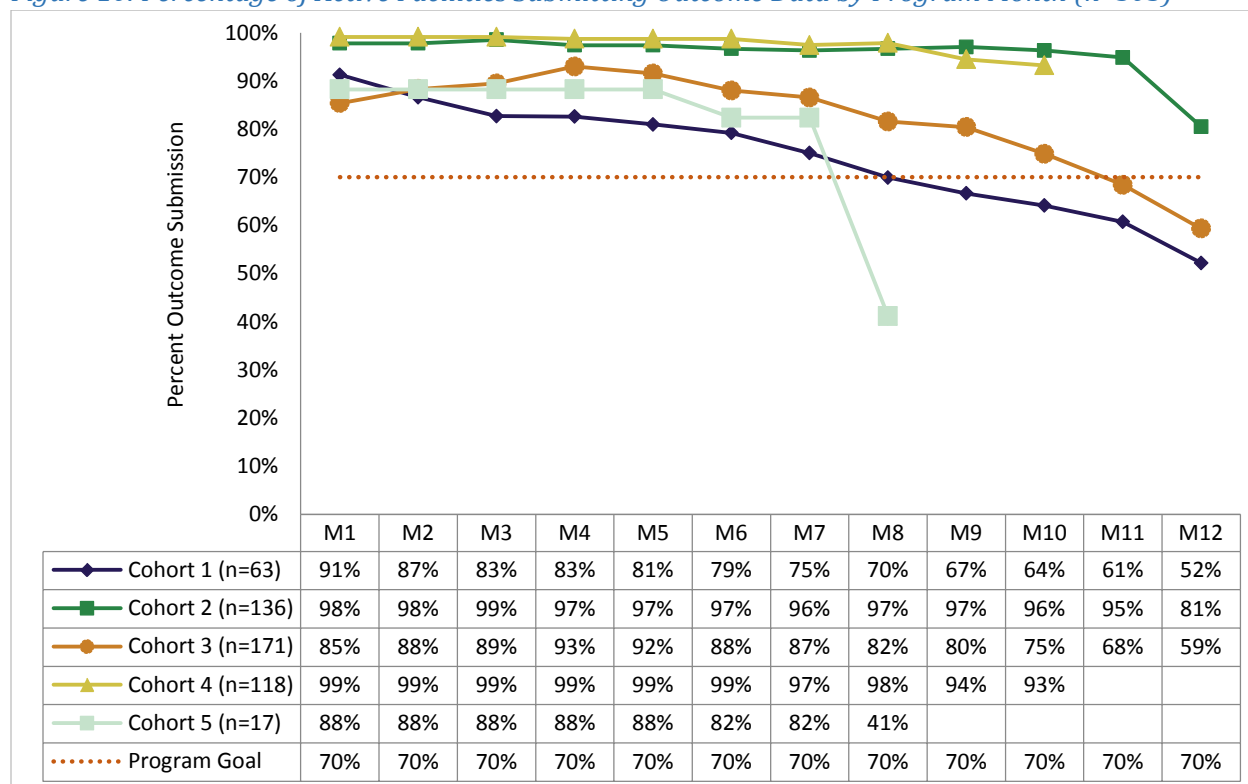
Note: M1 of data is M5 of overall program participation, as shown in Figures 7–9. Cohort 1 M1: May 2014. Cohort 2 M1: November 2014. Cohort 3 M1: June 2015. Cohort 4 M1: September 2015. Cohort 5 M1: November 2015. The N's shown in parentheses represent the number of active facilities in each cohort.

Source: CDS; CAUTIs, resident days, and catheter days submitted as of July 25, 2016.

For Cohort 1 facilities, outcome data submission decreased to below the program goal of 70 percent as the cohort came to a close. Cohort 2 outcome data submission remained strong, with a slight decline for the final month of the program. Cohort 3, which struggled with outcome data submission from the onset of the program, showed trends similar to Cohort 1. Cohort 4 was strong at data submission, while Cohort 5 was above the 70-percent target for all but the last month of data submission (M8). In past programs, the national project team has seen decreases in data submission over time. To address these lower-than-expected rates, the national project team adjusted the submission schedule between Cohorts 1 and 2 and developed a process with organizational leads to monitor data submission rates and develop action plans to improve submission rates as needed. It must also be noted that Cohort 5 was a much smaller cohort and, as described above, was managed differently than previous cohorts. In regard to Cohort 5, HRET advisors developed a decision tree for addressing low data submission with their facilities and increased one-on-one communications with these facilities. Details of actions taken to increase and maintain data submission rates are outlined in later sections of this report.

Outcome Measures: Model-Based Results—Cohorts 1–4

For the final report, the national project team assessed change over time for the facilities in Cohorts 1–4 that were active at the end of the program and submitted at least two time periods worth of data (see

Statistical Analysis). Cohort 5 will be analyzed separately because of its compressed data submission schedule, and results have been included in the appendices along with results by cohort.

Due to the nature of the data, the national project team determined that modeling the data such that facilities can vary at baseline (random intercept) as well as in their changes over time (random slope) was most appropriate. As a result, the IRRs must be interpreted at the individual facility level. Therefore, the IRRs reflect change within a given facility during the course of the program while holding constant all other covariates (bed size, ownership, star rating, etc.) and the random effects, which account for facility variability at baseline and over time. The IRRs are not to be interpreted as a "population average" effect.

Overall, CAUTI rates using the NHSN definition (see Equation 1) were 5.79 CAUTIs per 1,000 catheter days at M1 and 2.72 at M12, a decrease of 47 percent (unadjusted IRR=0.53, 95% confidence interval (CI)=0.43 to 0.65, p<0.0001). Similarly, population-based CAUTI rates (see Equation 2) decreased by 51 percent (unadjusted IRR=0.49, 95% CI=0.39 to 0.61, p<0.0001), a CAUTI rate per 10,000 resident days of 3.00 at M1 and 1.47 at M12. Aggregate NHSN CAUTI rate change over time is illustrated in Figure 11; further details are provided in Table 11. Aggregate population CAUTI rate change over time is illustrated in Figure 12; further details are provided in Table 12.

Figure 11. NHSN CAUTI Rate (CAUTIs per 1,000 Catheter Days), Cohorts 1–4
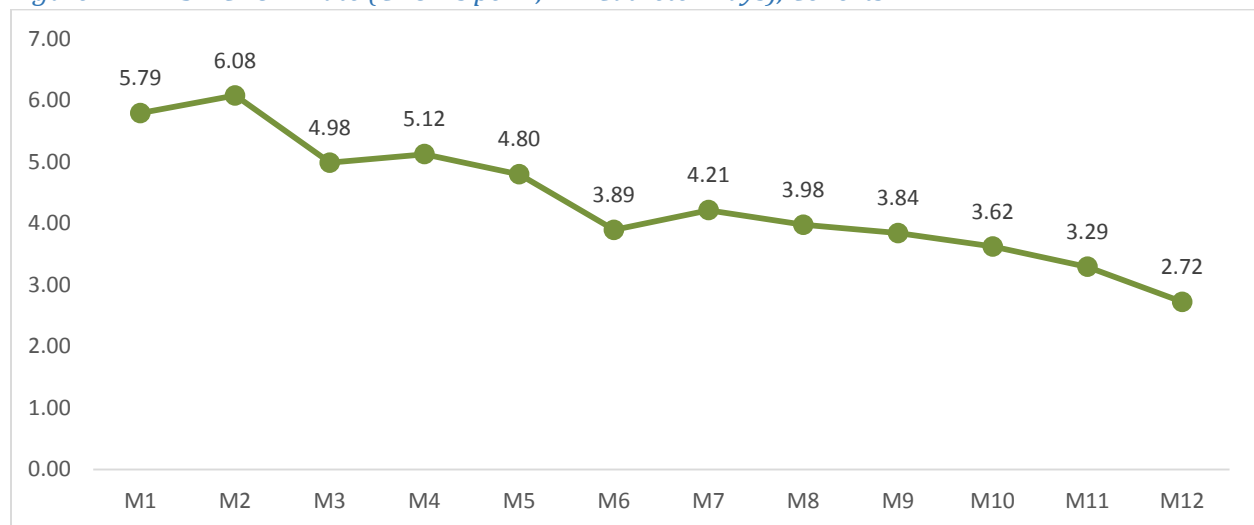
Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating facilities that met inclusions criteria for modeling analysis.

Source: CDS; CAUTIs and catheter days submitted as of July 25, 2016.

Table 11. Number of CAUTIs, Catheter Days, and Facilities Reporting

Program Month	CAUTIs	Catheter Days	Facilities Reporting *
M1	364	62,845	416
M2	404	66,494	423
M3	339	68,010	430
M4	336	65,596	427
M5	317	66,090	416
M6	241	61,882	406
M7	254	60,270	401
M8	242	60,852	391
M9	221	57,538	378
M10	206	56,858	371
M11	125	37,944	249
M12	87	31,936	216

* Of the 488 facilities that completed Cohorts 1–4, 459 met the inclusion criteria for modeling analysis. Of these 459, not all may have data included in any given program month.

Figure 12. Population CAUTI Rate (CAUTIs per 10,000 Resident Days), Cohorts 1–4

Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating facilities that met inclusions criteria for modeling analysis.

Source: CDS; CAUTIs and resident days submitted as of July 25, 2016.

Table 12. Number of CAUTIs, Resident Days, and Facilities Reporting

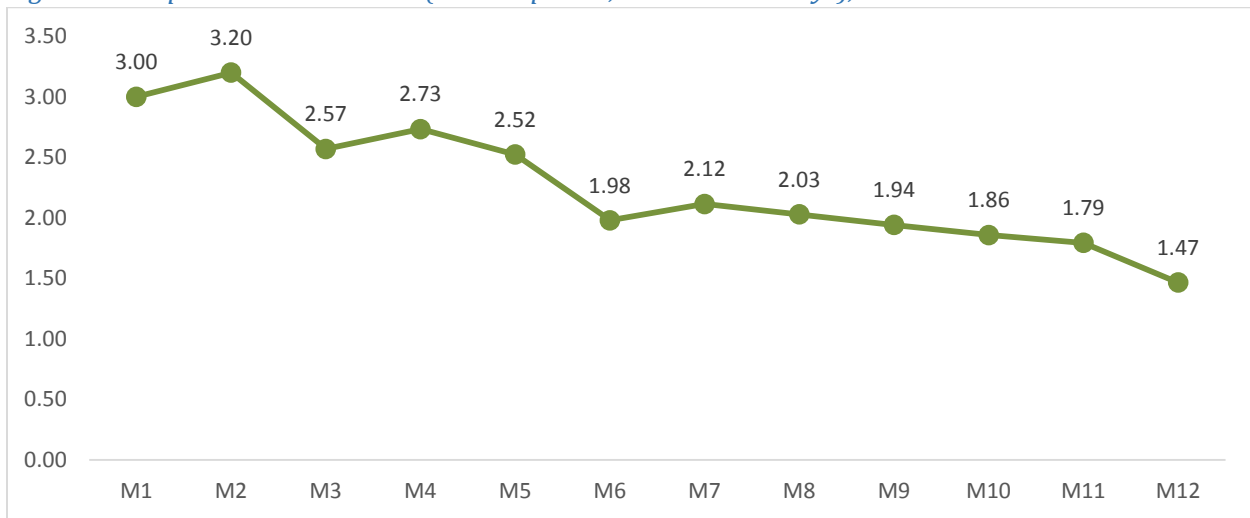| Program Month	CAUTIs	Resident Days	Facilities Reporting *
M1	364	1,212,765	416
M2	404	1,262,024	423
M3	339	1,318,917	430
M4	336	1,228,818	427
M5	317	1,256,419	416
M6	241	1,217,040	406
M7	254	1,200,763	401
M8	242	1,192,914	391
M9	221	1,137,941	378
M10	206	1,108,839	371
M11	125	696,798	249
M12	87	593,494	216

* Of the 488 facilities that completed Cohorts 1–4, 459 met the inclusion criteria for modeling analysis. Of these 459, not all may have data included in any given program month.

Using Cohort 1–4 data, NHSN CAUTI rates differed by VA status at baseline (IRR=0.40, 95% CI=0.27 to 0.57, p<0.0001) and over time (IRR=1.79, 95% CI=1.03 to 3.12, p=0.04). Given known differences between veteran and nonveteran resident populations, coupled with these overall findings, the national project team also analyzed the VA and non-VA facilities separately. Among non-VA facilities included in program analyses (n=404), NHSN CAUTI rates decreased from 6.78 CAUTIs per 1,000 catheter days at M1 to 2.63 at M12, a reduction of 52 percent (IRR=0.48, 95% CI=0.38 to 0.60, p<0.0001). After adjustment for facility characteristics, the results were similar (IRR=0.46, 95% CI=0.36 to 0.58, p<0.0001). Similarly, the M1 and M12 population-based CAUTI rates were 3.06 and 1.28 CAUTIs per 10,000 resident days respectively, a decrease of 53 percent (IRR=0.47, 95% CI=0.37 to 0.60, p<0.0001). The results were again similar after adjustment (IRR=0.45, 95% CI=0.34 to 0.58, p<0.0001).

VA facilities began the program with markedly lower CAUTI rates than non-VA facilities (2.26 vs. 6.78 CAUTIs per 1,000 catheter days). Among VA facilities in Cohort 3 included in program analyses (n=55), NHSN CAUTI rates and population-based CAUTI rates did not change significantly. The NHSN CAUTI rate among VA facilities was 2.26 CAUTIs per 1,000 catheter days at M1 and 3.19 at M12, while the population rate (i.e., CAUTIs per 10,000 resident days) at M1 and M12 was 2.49 and 3.61, respectively. The unadjusted IRRs, 95% CIs, and p-values were 0.99, 0.67 to 1.44, p=0.94; and 0.99, 0.67 to 1.47, p=0.95, respectively. The VA rate in later months, especially M12, should be interpreted with caution because of the small number of VA facilities reporting and small number of CAUTIs.

In summary, 75 percent of non-VA facilities reported at least 40 percent reduction in CAUTIs. This result is presented only for non-VA facilities because, as noted above, although VA facilities began the program with markedly lower CAUTI rates, significant CAUTI rate reductions were not observed among the VA facilities.

Non-VA versus VA NHSN and population CAUTI rates are illustrated in Figures 13 and 14. Further details are provided in Tables 13-16.

Figure 13. NHSN CAUTI Rate (CAUTIs per 1,000 Catheter Days), Non-VA (Cohorts 1–4) vs. VA (Cohort 3)

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Non-VA	6.78	7.03	5.57	5.70	5.31	4.17	4.52	4.31	4.16	3.91	3.41	2.63
VA	2.26	2.63	2.68	2.78	2.53	2.66	2.82	2.43	2.27	2.16	2.84	3.19

Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating facilities that met inclusion criteria for modeling analysis, stratified by VA status. The VA rate in later months, especially M12, should be interpreted with caution because of the small number of facilities reporting.

Source: CDS; resident days and catheter days submitted as of July 25, 2016.

Table 13. Number of CAUTIs, Catheter Days, and Facilities Reporting, Non-VA Facilities (Cohorts 1–4)

Program Month	CAUTIs	Catheter Days	Facilities Reporting *
M1	333	49,140	361
M2	366	52,062	368
M3	302	54,227	376
M4	300	52,660	374
M5	286	53,839	366
M6	211	50,618	361
M7	223	49,285	358
M8	216	50,137	349
M9	199	47,862	337
M10	186	47,618	333
M11	104	30,538	216
M12	70	26,610	193

* Of the 433 non-VA facilities that completed Cohorts 1–4, 404 met the inclusion criteria for modeling analysis.
  Of these 404, not all may have data included in any given month.

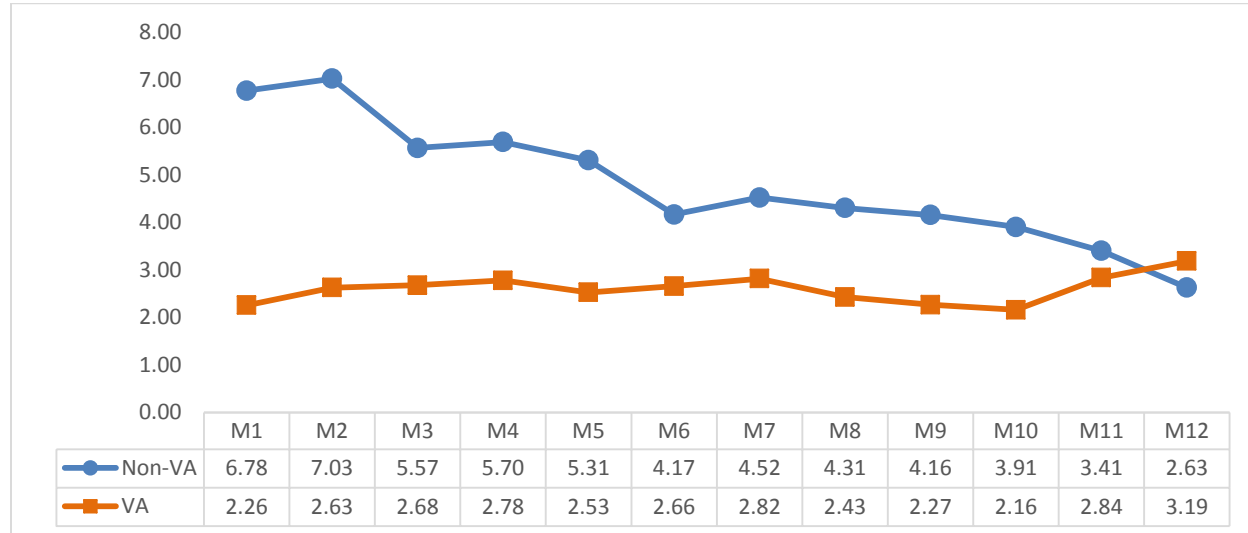*Table 14. Number of CAUTIs, Catheter Days, and Facilities Reporting, VA Facilities (Cohort 3)*

Program Month	CAUTIs	Catheter Days	Facilities Reporting *
M1	31	13,705	55
M2	38	14,432	55
M3	37	13,783	54
M4	36	12,936	53
M5	31	12,251	50
M6	30	11,264	45
M7	31	10,985	43
M8	26	10,715	42
M9	22	9,676	41
M10	20	9,240	38
M11	21	7,406	33
M12	17	5,326	23

* Of the 55 VA facilities that completed Cohort 3, 55 met the inclusion criteria for modeling analysis. Of these 55, not all may have data included in any given program month.

Figure 14. Population CAUTI Rate (CAUTIs per 10,000 Resident Days), Non-VA (Cohorts 1–4) vs. VA (Cohort 3)

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Non-VA	3.06	3.23	2.53	2.70	2.51	1.89	2.02	1.97	1.89	1.83	1.67	1.28
VA	2.49	2.96	2.95	3.06	2.69	3.00	3.18	2.71	2.56	2.22	2.91	3.61

Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating facilities that met inclusion criteria for modeling analysis, stratified by VA status. The VA rate in later months, especially M12, should be interpreted with caution because of the small number of facilities reporting.

Source: CDS; resident days and catheter days submitted as of July 25, 2016.

Table 15. Number of CAUTIs, Resident Days, and Facilities Reporting, Non-VA Facilities (Cohorts 1–4)

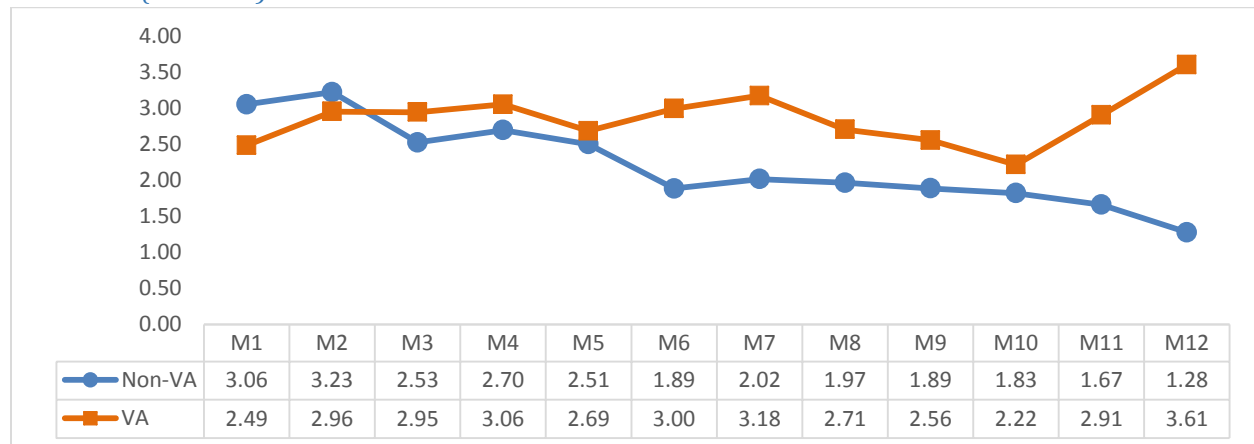| Program Month	CAUTIs	Resident Days	Facilities Reporting *
M1	333	1,088,405	361
M2	366	1,133,680	368
M3	302	1,193,286	376
M4	300	1,111,043	374
M5	286	1,141,294	366
M6	211	1,117,165	361
M7	223	1,103,247	358
M8	216	1,097,094	349
M9	199	1,051,891	337
M10	186	1,018,566	333
M11	104	624,526	216
M12	70	546,357	193

* Of the 433 non-VA facilities that completed Cohorts 1–4, 404 met the inclusion criteria for modeling analysis. Of these 404, not all may have data included in any given month.

Table 16. Number of CAUTIs, Resident Days, and Facilities Reporting, VA Facilities (Cohort 3)

Program Month	CAUTIs	Resident Days	Facilities Reporting *
M1	31	124,360	55
M2	38	128,344	55
M3	37	125,631	54
M4	36	117,775	53
M5	31	115,125	50
M6	30	99,875	45
M7	31	97,516	43
M8	26	95,820	42
M9	22	86,050	41
M10	20	90,273	38
M11	21	72,272	33
M12	17	47,137	23

* Of the 55 VA facilities that completed Cohort 3, 55 met the inclusion criteria for modeling analysis. Of these 55, not all may have data included in any given program month.

Process Measures: Model-Based Results—Cohorts 1–4

Catheter Utilization

No statistically significant changes, based on unadjusted models, were observed in catheter utilization overall (IRR=0.96, 95% CI=0.90 to 1.04, p=0.31) or by VA status (non-VA IRR=0.96, 95% CI=0.89 to 1.04, p=0.31; VA IRR=1.02, 95% CI=0.95 to 1.09, p=0.64). Additionally, no statistically significant changes were observed in catheter utilization among non-VA facilities after adjustment for facility characteristics (IRR=0.95, 95% CI=0.88 to 1.03, p=0.26).

The raw aggregate catheter utilization by program period is presented graphically in Figure 15; further details are provided in Table 17. Catheter utilization was 5.18 percent at M1 and 5.38 percent at M12. Raw catheter utilization rates stratified by VA status are illustrated in Figure 16; further details are provided in Tables 18 and 19. Among VA facilities in Cohort 3, catheter utilization at M1 and M12 were 11.02 and 11.30 percent, respectively.[50]

Figure 15. Catheter Utilization, Cohorts 1–4
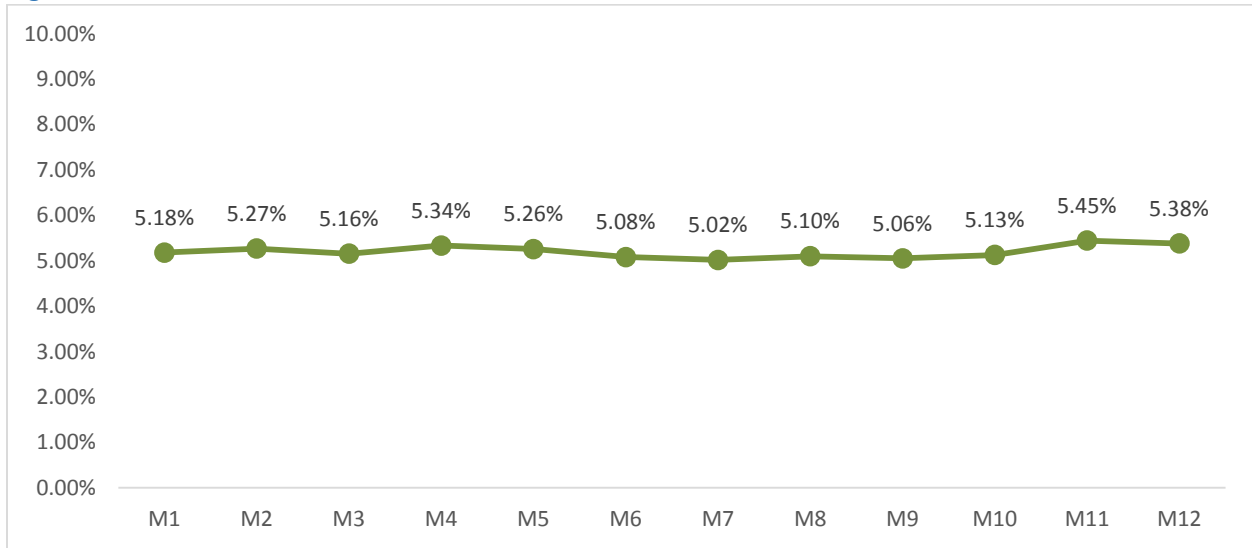
Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating facilities that met inclusion criteria for modeling analysis.

Source: CDS; resident and catheter days submitted as of July 25, 2016.

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[50] Tsan L, Langberg R, Davis C, et al. Nursing home-associated infections in the Department of Veterans Affairs community living centers. Am J Infect Control 2010;38:461-6.

Table 17. Number of Catheter Days, Resident Days, and Facilities Reporting

Program Month	Catheter Days	Resident Days	Facilities Reporting *
M1	62,845	1,212,765	416
M2	66,494	1,262,024	423
M3	68,010	1,318,917	430
M4	65,596	1,228,818	427
M5	66,090	1,256,419	416
M6	61,882	1,217,040	406
M7	60,270	1,200,763	401
M8	60,852	1,192,914	391
M9	57,538	1,137,941	378
M10	56,858	1,108,839	371
M11	37,944	696,798	249
M12	31,936	593,494	216

* Of the 488 facilities that completed Cohorts 1–4, 459 met the inclusion criteria for modeling analysis. Of these 459, not all may have data included in any given program month.

Figure 16. Catheter Utilization, Non-VA (Cohorts 1–4) vs. VA (Cohort 3)
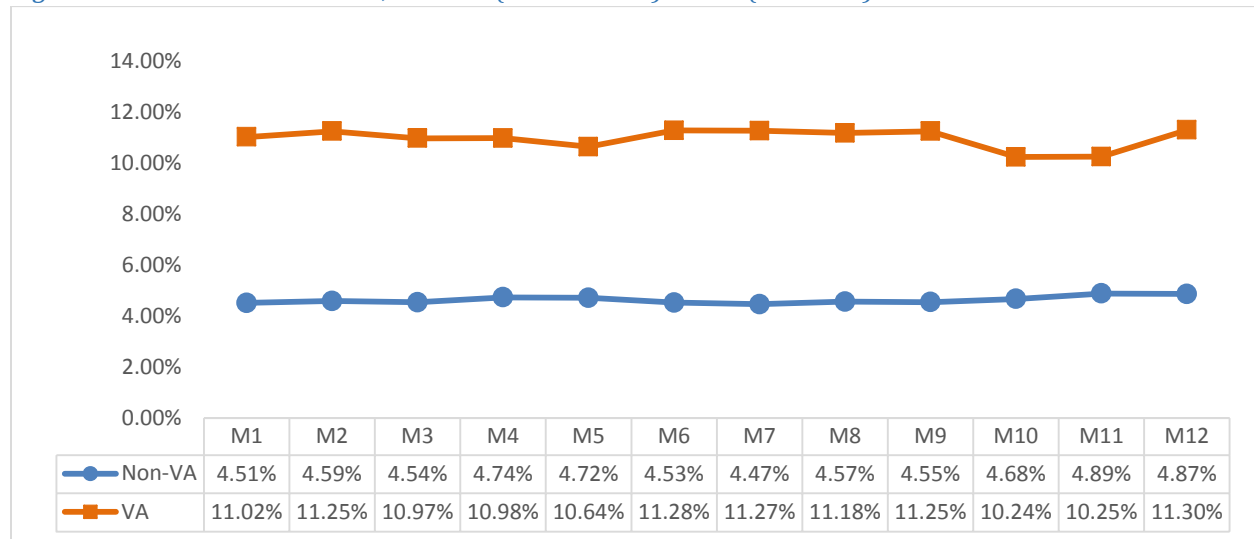
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Non-VA	4.51%	4.59%	4.54%	4.74%	4.72%	4.53%	4.47%	4.57%	4.55%	4.68%	4.89%	4.87%
VA	11.02%	11.25%	10.97%	10.98%	10.64%	11.28%	11.27%	11.18%	11.25%	10.24%	10.25%	11.30%

Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating facilities that met inclusion criteria for modeling analysis, stratified by VA status. The VA utilization in later months, especially M12, should be interpreted with caution because of the small number of facilities reporting.

Source: CDS; resident days and catheter days submitted as of July 25, 2016.

Table 18. Number of Catheter Days, Resident Days, and Facilities Reporting, Non-VA Facilities (Cohorts 1–4)

Program Month	Catheter Days	Resident Days	Facilities Reporting *
M1	49,140	1,088,405	361
M2	52,062	1,133,680	368
M3	54,227	1,193,286	376
M4	52,660	1,111,043	374
M5	53,839	1,141,294	366
M6	50,618	1,117,165	361
M7	49,285	1,103,247	358
M8	50,137	1,097,094	349
M9	47,862	1,051,891	337
M10	47,618	1,018,566	333
M11	30,538	624,526	216
M12	26,610	546,357	193

* Of the 433 non-VA facilities that completed Cohorts 1–4, 404 met the inclusion criteria for modeling analysis. Of these 404, not all may have data included in any given month.

Table 19. Number of Catheter Days, Resident Days, and Facilities Reporting, VA Facilities (Cohort 3)

Program Month	Catheter Days	Resident Days	Facilities Reporting *
M1	13,705	124,360	55
M2	14,432	128,344	55
M3	13,783	125,631	54
M4	12,936	117,775	53
M5	12,251	115,125	50
M6	11,264	99,875	45
M7	10,985	97,516	43
M8	10,715	95,820	42
M9	9,676	86,050	41
M10	9,240	90,273	38
M11	7,406	72,272	33
M12	5,326	47,137	23

* Of the 55 VA facilities that completed Cohort 3, 55 met the inclusion criteria for modeling analysis. Of these 55, not all may have data included in any given program month.

Urine Culture Collection Rate

Urine culture data were not collected during Cohort 1. For the Cohort 2–4 facilities included in the analysis, urine culture collection rates were 3.69 urine cultures per 1,000 resident days at M1 and 3.29 at M12, an overall reduction of 14 percent (Figure 17) (IRR=0.86, 95% CI=0.79 to 0.94, p<0.001). This reduction was more pronounced and statistically significant among the non-VA facilities (IRR=0.85, 95% CI=0.77 to 0.93, p=0.001) compared with the VA facilities (IRR=0.93, 95% CI=0.82 to 1.05, p=0.25). After facility characteristic adjustment, the results in the non-VA facilities held (IRR=0.85, 95% CI=0.77 to

0.94, p=0.001). Among VA facilities in Cohort 3, urine cultures per 1,000 resident days for M1 and M12 were 5.27 and 5.31, respectively.

Figure 17. Urine Culture Collection Rate, Cohorts 2–4
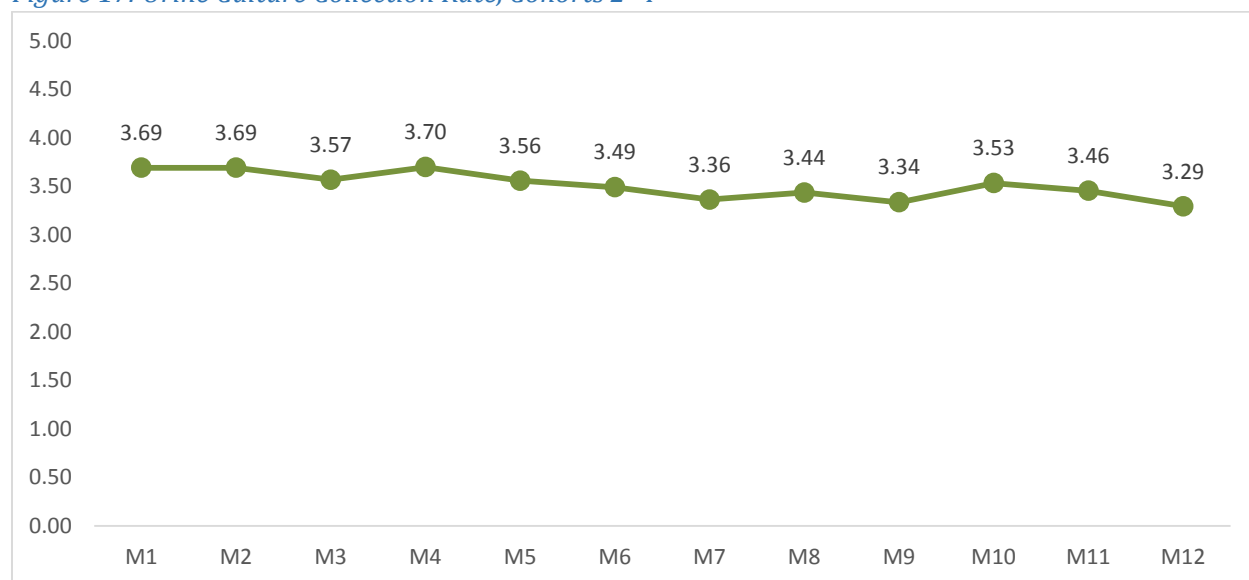
Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating Cohort 2–4 facilities that met inclusion criteria for modeling analysis. Urine culture data were not collected during Cohort 1.

Source: CDS; resident days and urine cultures collected submitted as of July 25, 2016.

Table 20.   Number of Urine Cultures, Resident Days, and Facilities Reporting

Program Month	Urine Cultures	Resident Days	Facilities Reporting *
M1	3,957	1,071,582	388
M2	4,133	1,119,393	392
M3	4,047	1,134,063	396
M4	4,064	1,098,606	398
M5	4,065	1,142,050	396
M6	3,732	1,069,001	386
M7	3,658	1,087,262	380
M8	3,593	1,045,196	370
M9	3,424	1,026,214	361
M10	3,529	998,550	349
M11	2,113	611,404	232
M12	1,580	479,576	190

* Of the 425 facilities that completed Cohorts 2–4, 405 met the inclusion criteria for modeling analysis for urine cultures collected. Of these 405, not all may have data included in any given program month. Urine culture data were not collected during Cohort 1.

The raw Cohort 2–4 aggregate urine culture order rate by program period is presented graphically in Figure 17; further details are provided in Table 20. The raw urine culture order rate stratified by VA status is illustrated in Figure 18; further details are provided in Tables 21 and 22.

Figure 18. Urine Culture Collection Rate, Non-VA (Cohorts 2–4) vs. VA (Cohort 3)
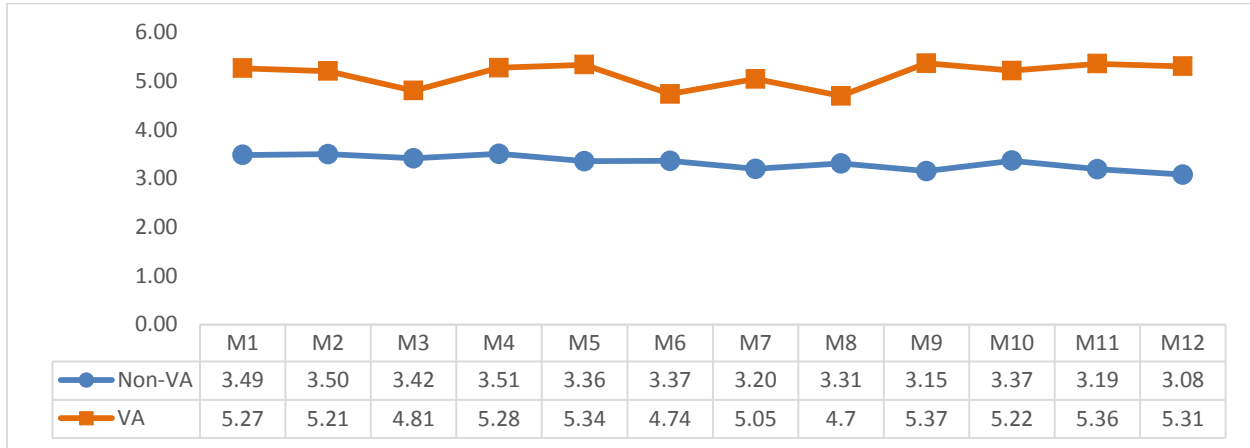
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Non-VA	3.49	3.50	3.42	3.51	3.36	3.37	3.20	3.31	3.15	3.37	3.19	3.08
VA	5.27	5.21	4.81	5.28	5.34	4.74	5.05	4.7	5.37	5.22	5.36	5.31

Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating Cohort 2–4 facilities that met inclusion criteria for modeling analysis, stratified by VA status. Urine culture data were not collected during Cohort 1. The VA rate in later months, especially M12, should be interpreted with caution because of the small number of facilities reporting.

Source: CDS; resident days and urine cultures collected submitted as of July 25, 2016.

Table 21. Number of Urine Cultures, Resident Days, and Facilities Reporting, Non-VA Facilities (Cohorts 2–4)

Program Month	Urine Cultures	Resident Days	Facilities Reporting *
M1	3,302	947,222	333
M2	3,483	994,550	339
M3	3,454	1,010,825	343
M4	3,439	980,125	345
M5	3,445	1,025,941	345
M6	3,269	971,371	342
M7	3,166	989,746	337
M8	3,148	950,495	329
M9	2,968	941,270	321
M10	3,061	908,821	311
M11	1,715	537,194	198
M12	1,336	433,667	168

* Of the 370 non-VA facilities that completed Cohorts 2–4, 350 met the inclusion criteria for modeling analysis. Of these 350, not all may have data included in any given month.

Table 22. Number of Urine Cultures, Resident Days, and Facilities Reporting, VA Facilities (Cohort 3)

Program Month	Urine Cultures	Resident Days	Facilities Reporting *
M1	655	124,360	55
M2	650	124,843	53
M3	593	123,238	53
M4	625	118,481	53
M5	620	116,109	51
M6	463	97,630	44
M7	492	97,516	43
M8	445	94,701	41
M9	456	84,944	40
M10	468	89,729	38
M11	398	74,210	34
M12	244	45,909	22

* Of the 55 VA facilities that completed Cohort 3, 55 met the inclusion criteria for modeling analysis. Of these 55, not all may have data included in any given program month.

Sensitivity Analyses

Additional analyses were conducted to determine if attrition of facilities reporting over the course of the program period affected the outcome rates.

Of the 459 facilities in the primary analysis, 258 (56%) submitted all expected data for each period of the program. Among these 258 facilities, the NHSN CAUTI rate was 5.38 CAUTIs per 1,000 catheter days at M1 and 2.55 at M12, a decrease of 45 percent (IRR=0.55, 95% CI=0.43 to 0.72, p<0.001). At least 70 percent of expected data was submitted by 384 facilities (84%), and among these facilities the M1 and M12 NHSN CAUTI rates were 5.77 and 2.70 CAUTIs per 1,000 catheter days, respectively, an overall decrease of 49 percent (IRR=0.51, 95% CI=0.42 to 0.63, p<0.001).

Of the 368 non-VA facilities with data for all covariates included in the adjusted analysis, 228 (62%) submitted all expected data for each period of the program. Among these 228 facilities, the NHSN CAUTI rate was 6.09 CAUTIs per 1,000 catheter days at M1 and 2.52 at M12, a decrease of 50 percent (IRR=0.50, 95% CI=0.38 to 0.66, p<0.001). At least 70 percent of expected data was submitted by 318 facilities (86%), and among these facilities the M1 and M12 NHSN CAUTI rates were 6.72 and 2.59 CAUTIs per 1,000 catheter days, respectively, an overall decrease of 55 percent (IRR=0.45, 95% CI=0.35 to 0.58, p<0.001).

These results support that attrition of data submission among a subset of long-term care facilities throughout the program period was not responsible for the rate reductions observed.

Knowledge Questionnaire

Knowledge Questionnaire Submission

At least 10 staff members from each facility were encouraged to complete the knowledge questionnaire at the baseline, midpoint, and final time points (see Project Measures for details). Cohort 1-4 submission windows are shown in Table 23, and Tables 24 and 25 summarize submission rates by cohort for each

time point. Of the 488 Cohort 1–4 facilities that completed the program, 420 (86%) submitted baseline knowledge questionnaires, 308 (63%) submitted midpoint knowledge questionnaires, and 200 (41%) submitted final knowledge questionnaires.

Table 23.   Knowledge Questionnaire Submission Windows by Cohort

Cohort	Baseline	Midpoint	Final
1	Not included because of change in questionnaire	October–December 2014	March–May 2015
2	August–November 2014	February–May 2015	September–November 2015
3	March–June 2015	October–December 2015	April–June 2016
4	June–August 2015	February–March 2016	July 2016

Table 24.   Knowledge Questionnaire Submission Rates by Cohort—At Least One Submission

Cohort	Baseline	Midpoint	Final
1 (n=63)	78%	49%	29%
2 (n=136)	99%	93%	74%
3 (n=171)	86%	45%	25%
4 (n=118)	76%	63%	32%
Total (n=488)	86%	63%	41%

Table 25.   Knowledge Questionnaire Submission Rates by Cohort—At Least 10 Submissions

Cohort	Baseline	Midpoint	Final
1 (n=63)	6%	27%	17%
2 (n=136)	93%	86%	60%
3 (n=171)	64%	22%	12%
4 (n=118)	70%	53%	17%
Total (n=488)	66%	48%	27%

As with the decrease in outcome data submission over time, there were challenges with collecting followup knowledge questionnaires across all cohorts. The national project team continued to work with organizational leads to follow up on data submission and developed guides to show the value of collecting the knowledge questionnaire. Nonetheless, difficulty sustaining data submission over time was one of the major limitations of this program.
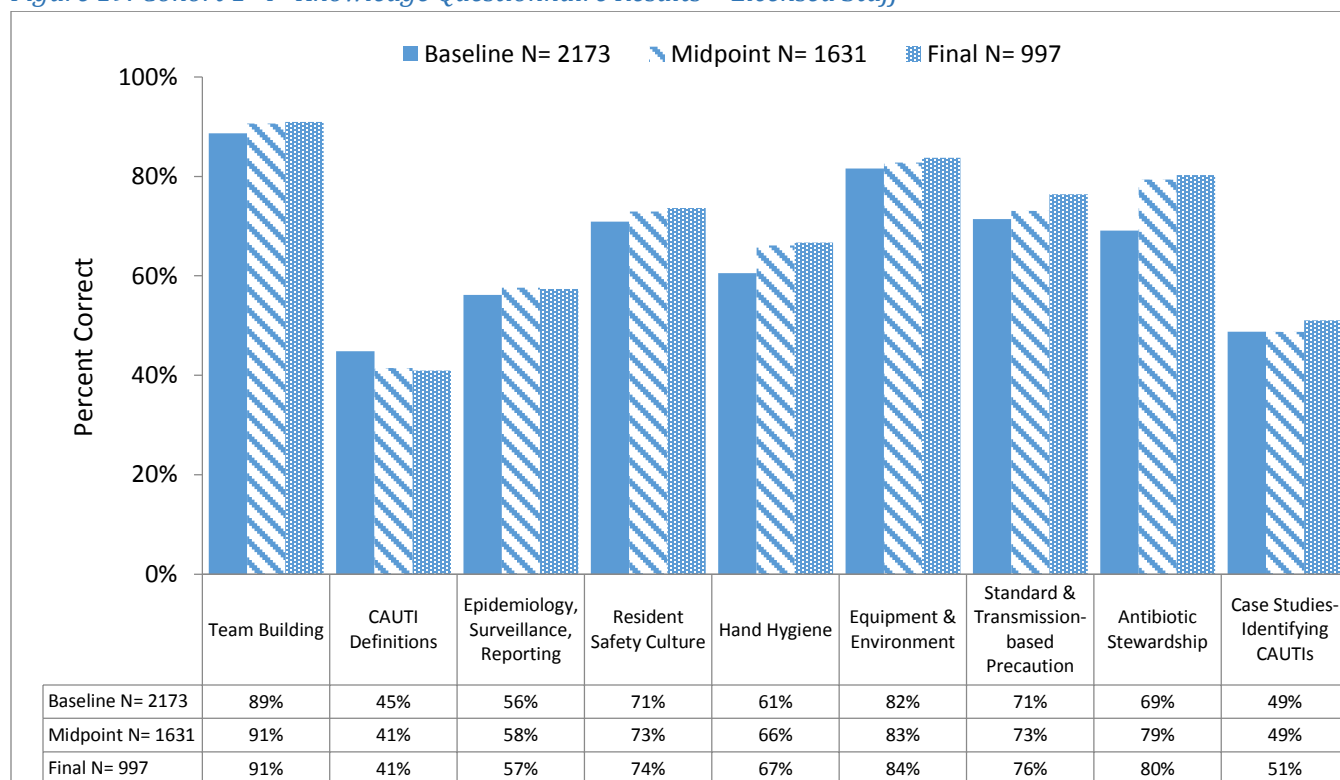
Knowledge Questionnaire Changes Over Time
Preliminary analysis compared respondent-level percent-positive responses for each survey domain at the baseline and final time points. Licensed and nonlicensed staff questionnaires were analyzed separately. As noted in the Project Measures section, certain questions were changed after a review of Cohort 1's baseline knowledge questionnaire results. Because of the differences in these questions between Cohort 1's baseline and all other time points for all cohorts, the baseline results for Cohort 1 were excluded from this analysis.

The analysis showed that licensed staff scores (Figure 19) appear to have improved between the baseline and final questionnaires for eight of the nine domains, with the largest absolute increases in percent-positive responses in the domains of Antibiotic Stewardship (11% increase, from 69% to 80%) and Hand Hygiene (6% increase, from 61% to 67%). Nonlicensed staff (Figure 20) appeared to show increases in percent-positive responses in eight of eight domains, with the largest absolute increases in the domains of Antibiotic Stewardship (16% increase, from 55% to 71%), Standard and Transmission-Based Precautions (10% increase, from 57% to 66%), and Epidemiology, Surveillance, and Reporting (9% increase, from 70% to 79%). Note that any discrepancies between the percent changes and the domain totals, as shown in Figures 19 and 20, are due to rounding.
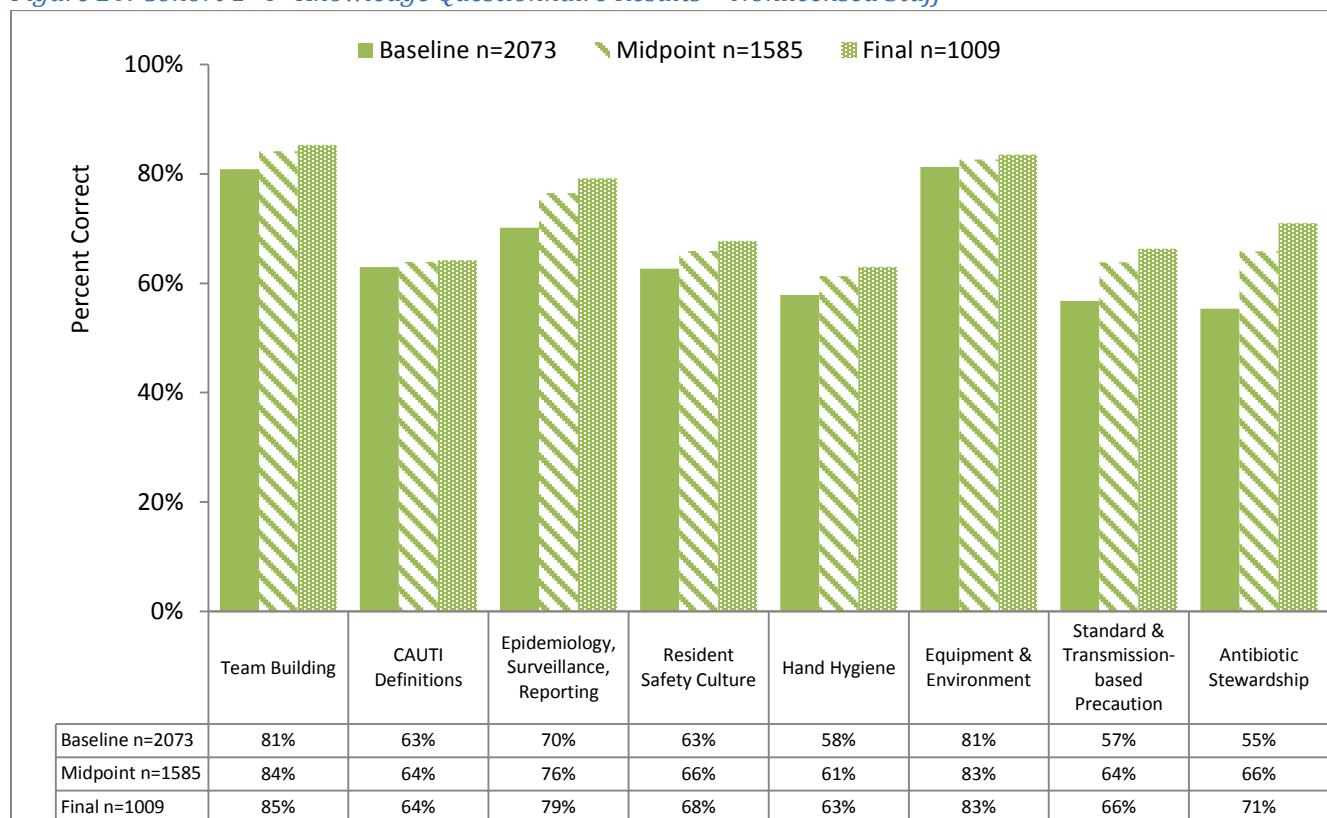
Figure 19. Cohort 1–4* Knowledge Questionnaire Results—Licensed Staff

	Team Building	CAUTI Definitions	Epidemiology, Surveillance, Reporting	Resident Safety Culture	Hand Hygiene	Equipment & Environment	Standard & Transmission-based Precaution	Antibiotic Stewardship	Case Studies-Identifying CAUTIs
Baseline N= 2173	89%	45%	56%	71%	61%	82%	71%	69%	49%
Midpoint N= 1631	91%	41%	58%	73%	66%	83%	73%	79%	49%
Final N= 997	91%	41%	57%	74%	67%	84%	76%	80%	51%

* Due to changes to the questionnaire, baseline results include only Cohorts 2–4.

These results need to be interpreted with caution because different staff members may have completed the questionnaire at each time point. The lower data submission at each followup time point also must be taken into consideration. Note that these changes were not tested for statistical significance.

Figure 20. Cohort 1–4 Knowledge Questionnaire Results—Nonlicensed Staff*

	Team Building	CAUTI Definitions	Epidemiology, Surveillance, Reporting	Resident Safety Culture	Hand Hygiene	Equipment & Environment	Standard & Transmission-based Precaution	Antibiotic Stewardship
Baseline n=2073	81%	63%	70%	63%	58%	81%	57%	55%
Midpoint n=1585	84%	64%	76%	66%	61%	83%	64%	66%
Final n=1009	85%	64%	79%	68%	63%	83%	66%	71%

* Due to changes to the questionnaire, baseline results include only Cohorts 2–4.

Nursing Home Survey on Patient Safety Culture (Safety Culture Survey)

Safety Culture Survey Submission

To increase the likelihood that results would be representative of each facility, the national project team set a target of at least 60 percent of all facility staff completing the safety culture survey both at baseline and at the end of the program. Survey submission windows are listed in Table 26, and Tables 27 and 28 summarize each cohort's submission rate at each time point. Of the 488 Cohort 1–4 facilities that completed the program, 407 (83%) submitted baseline safety culture surveys and 271 (56%) submitted followup safety culture surveys.

Table 26. Safety Culture Survey Submission Windows by Cohort

Cohort	Baseline	Followup
1	June–August 2014	March–April 2015
2	September–October 2014	August–October 2015
3	July–December 2015	January–April 2016
4	September–December 2015	May–June 2016

Table 27.   Safety Culture Survey Submission Rates—Any Staff Submitting

Cohort	Baseline	Followup
1 (n=63)	81%	51%
2 (n=136)	97%	80%
3 (n=171)	80%	43%
4 (n=118)	74%	47%
Total (n=488)	83%	56%

*Table 28.   Safety Culture Survey Submission Rates—At Least 60% of Staff Submitting*

Cohort	Baseline	Followup
1 (n=63)	40%	25%
2 (n=136)	79%	53%
3 (n=171)	28%	4%
4 (n=118)	36%	20%
Total (n=488)	46%	24%

Safety Culture Survey Pre-/Post-Crude Results

A total of 407 active Cohort 1–4 facilities (83%) submitted safety culture surveys at baseline, while 271 facilities (56%) submitted followup surveys. Preliminary analysis, incorporating all baseline (n=26,469) and followup (n=14,879) responses from these facilities, is visible in Figure 21. This analysis compared the respondent-level percent-positive responses for each of the 12 domains at baseline and followup. Eight of the twelve domains saw increases in aggregate absolute percent-positive responses over time. The greatest absolute increases were observed in the domains of Management Support for Resident Safety (6% increase, from 69% to 74%), Communication Openness (5% increase, from 54% to 59%), and Teamwork (4% increase, from 65% to 70%). Overall positive responses decreased in the domain of Organizational Learning (−1%, from 71% to 70%). Note that any discrepancies between the percent changes and the domain totals, as shown in Figure 21, are due to rounding.

These results need to be interpreted with caution because of the lower rate of data submission at the followup time point. Note also that these changes were not tested for statistical significance. Additional analyses assessing statistically significant changes in responses to the safety culture survey are reported below.

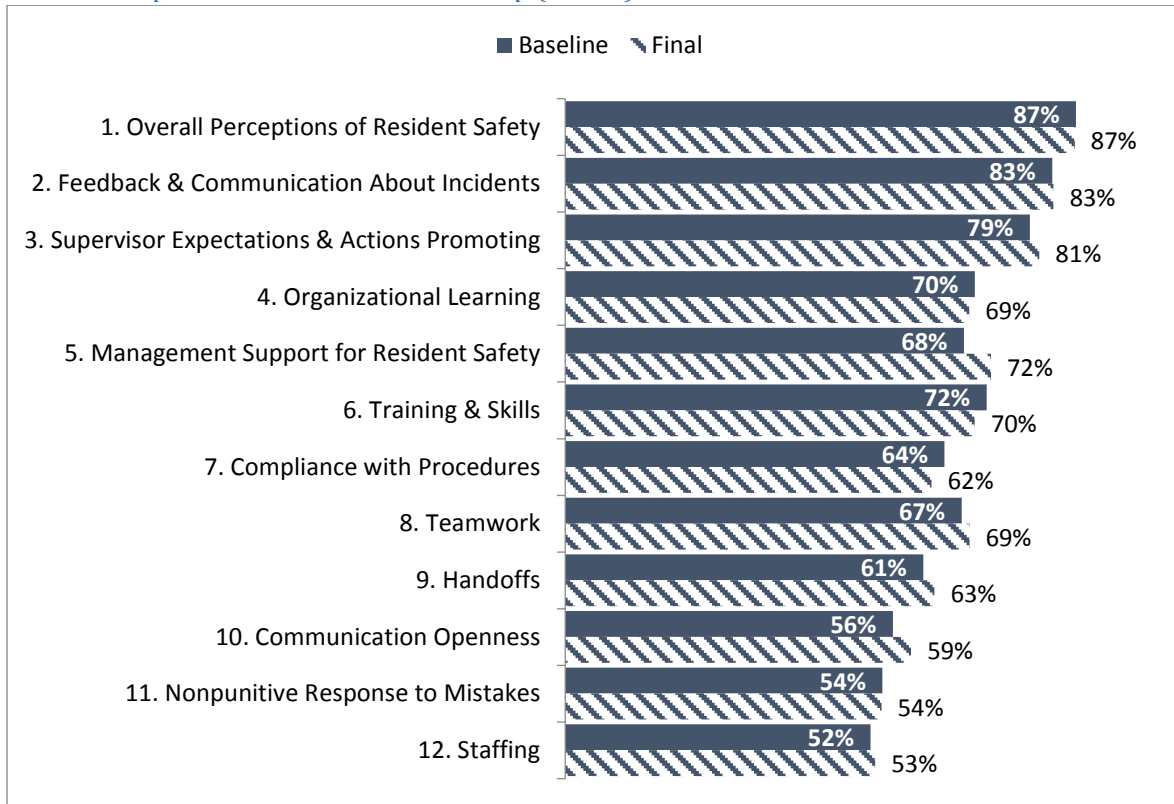*Figure 21. Safety Culture Survey Results—Cohorts 1–4 Aggregate*
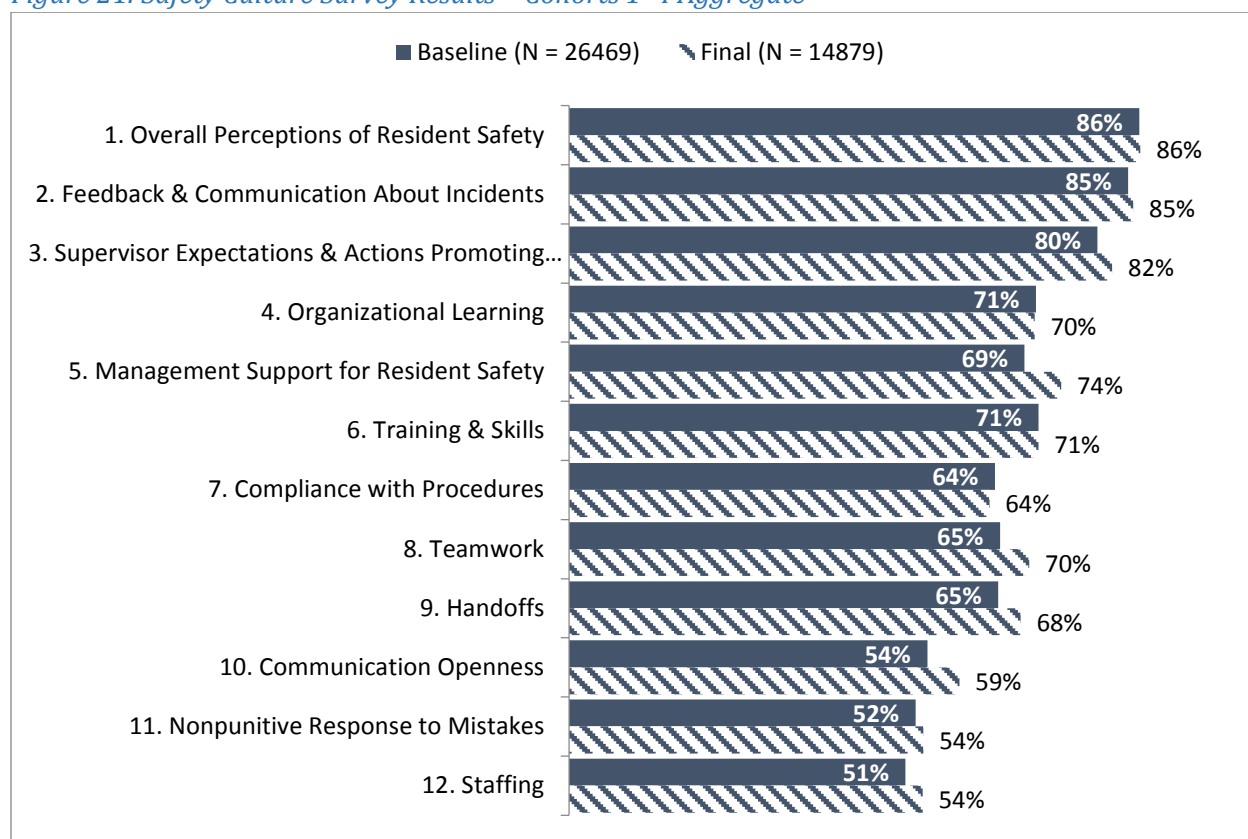
N's represent number of facility staff who completed the safety culture survey. 407 facilities submitted at least one safety culture survey at baseline, while 271 facilities submitted at the end of the project. Note that any discrepancies between this figure and the explanation above are due to rounding.

Safety Culture Survey Pre-/Post-Results

Excluding VA facilities, 202 facilities in Cohorts 1–4 had at least five safety culture surveys submitted at both the baseline and followup data collection points. Relative to non-VA sites that had safety culture surveys only at baseline for five or more respondents (n=171), the facilities included in this analysis had significantly higher percent-positive responses at baseline for nine of the 12 safety culture domains.

Changes in safety culture were examined by comparing the facility-level percent-positive responses for each of the 12 domains at baseline and followup. Figure 22 presents the aggregate responses by domain for each time point. Six domains saw increases in aggregate percent-positive responses from baseline to followup. However, only the increase in Management Support for Resident Safety was significant (absolute increase 3.8%; t=−2.40, p=0.02). The remaining six domains saw small, insignificant declines in facility-level percent-positive responses between the baseline and followup surveys.

■ Baseline ＼ Final

Measure	Baseline	Final
1. Overall Perceptions of Resident Safety	87%	87%
2. Feedback & Communication About Incidents	83%	83%
3. Supervisor Expectations & Actions Promoting	79%	81%
4. Organizational Learning	70%	69%
5. Management Support for Resident Safety	68%	72%
6. Training & Skills	72%	70%
7. Compliance with Procedures	64%	62%
8. Teamwork	67%	69%
9. Handoffs	61%	63%
10. Communication Openness	56%	59%
11. Nonpunitive Response to Mistakes	54%	54%
12. Staffing	52%	53%

Discussion

In this large-scale national collaborative conducted in the long-term care (LTC) setting, the national project team recruited 652 facilities to participate over the 3-year contract period, and 505 LTC facilities completed the program. Of the facilities that completed this initiative, there were significant reductions in catheter-associated urinary tract infection (CAUTI) rates, both National Healthcare Safety Network (NHSN) and population, as well as decreases in the number of urine cultures collected.

As shown in Figure 10, data submission decreased over time for all cohorts. To assess the possible impact of attrition in data submission on overall outcome trends, the national project team conducted a sensitivity analysis comparing the NHSN CAUTI rate of facilities that reported at least 70 percent of expected data (i.e., at least eight time points for Cohorts 1–3 and at least six time points for Cohort 4) with all active facilities included in the main analysis. The results led the national project team to conclude that attrition of data submission was likely not responsible for the decreases in overall CAUTI rates. The unadjusted incidence rate ratios (IRRs) are 0.51 (95% CI=0.42 to 0.63) for the group with at least 70 percent of data available and 0.53 (95% CI=0.43 to 0.65) for the full group.

Catheter utilization did not decrease significantly during the collaborative, perhaps in part because utilization rates were low at the start. With catheter use being a Centers for Medicare & Medicaid Services (CMS) publicly reported measure since 1990,[51,52] LTC facilities have already developed a culture of prompt removal of catheters once clinical need is resolved.[53] Indeed, an assessment of CAUTI prevention practices at the start of the collaborative showed that a high percentage of nursing homes required documentation of indications as well as a physician order.[54] As a result, unnecessary urinary catheters were generally removed within 48 hours of nursing home admission. Moreover, catheters are seen by nursing providers as an impediment to functional independence of older nursing home residents.[55]

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[51] Centers for Medicare & Medicaid Services. Nursing Home Compare. https://data.medicare.gov/data/nursing-home-compare. Accessed July 5, 2016.

[52] Centers for Medicare & Medicaid Services. Five-star quality rating system. 2015. Available at: https://www.cms.gov/medicare/provider-enrollment-and-certification/certificationandcomplianc/fsqrs.html. Accessed July 5, 2016.

[53] Hawes C, Mor V, Phillips CD, et al. The OBRA-87 nursing home regulations and implementation of the Resident Assessment Instrument: effects on process quality. J Am Geriatr Soc 1997;45:977-85.

[54] Mody L, Greene M, Krein S, et al. Influence of ownership status on the infection prevention program resources between for-profit and not-for-profit nursing homes: a national study. J Am Geriatr Soc 2015;63:S9-S10.

[55] Saint S, Lipsky BA, Goold SD. Indwelling urinary catheters: a one-point restraint? Ann Intern Med 2002;137:125-7.

Qualitative interviews with participating facility team leads confirmed a preexisting culture of catheter avoidance and removal. Many facility leaders reported having low rates of catheters at the start of the program and catheter reduction programs already in place. However, interviewees also spoke about other policies implemented as a result of the program that may have positively impacted infection rates: increased hand hygiene, reducing inappropriate urine cultures, facilitywide education about CAUTI, walking rounds, better monitoring, and random auditing to ensure adherence to best practices for urinary catheter insertion and maintenance. Data from the interviews also indicated potential improvement in infection surveillance, as team leads spoke about how organizational leads, educational modules, and other resources helped staff learn standard definitions and best practices. Additionally, interviewees described cultural shifts as a result of the program, such as nursing staff's feeling more empowered to speak with physicians and senior leadership about not requesting unneeded urine cultures.

The CAUTI reductions seen in this program are likely the result of several factors. First, the collaborative emphasized foundational infection prevention strategies as well as strategies specific to catheter use. In particular, with low rates of catheter utilization, the intervention focused primarily on evidence-based strategies for catheter maintenance and appropriate diagnostic testing as shown by reductions in urine culture order rates. Second, the educational sessions were informed by knowledge and practice gaps identified by prior literature and the baseline knowledge questionnaire. The educational sessions followed a train-the-trainer model, which allowed the team leads to share with frontline personnel the educational content along with additional tools, including infographics and pocket cards. Third, socioadaptive elements modified from successful large-scale Comprehensive Unit-based Safety Program (CUSP) projects in acute care were an explicit and unique part of the intervention to facilitate adoption of the technical elements. Fourth, facility teams received sustained external support through the program's network of organizational leads and coaches, including through coaching calls and learning from teams at other facilities. For example, external support provided by the organizational leads and coaches allowed facilities to understand their infection data in relation to local and national benchmarks and provided targeted feedback to enhance evidence-based practices, making facilities' surveillance data actionable. These external partners helped to identify opportunities for improvement which then allowed facility teams to lead local efforts.

Insights From Stakeholder Feedback

The national project team gathered information about facilities' challenges, success factors, and responses to program elements through the Cohort 2 practice change assessment, qualitative interviews with Cohorts 2–4, site visits to facilities, and meetings and interviews with various stakeholders. Overall, the following successes and opportunities for improvement for the program emerged:

- Successes
  - Enhancement of the work that facilities were already doing to reduce CAUTI
  - Valuable educational materials for staff training
  - Tips on how to work with and engage residents and families as partners
  - Help with physician buy-in
  - Broadened awareness of evidence-based practices
  - Support for leaders and staff in identifying gaps in knowledge and opportunities for improvement

- Challenges
  - Significant burden for small facilities, especially if one person was assigned to complete all of the program work
  - Turnover and staff changes, especially turnover in senior leadership

Feedback from facility team leaders, organizational leads, coaches, and national project team members is further explored in the Lessons Learned section, as this feedback provides valuable insights that can be used to enhance future LTC facility resident safety programs.

Lessons Learned: Challenges and Success Factors

Lessons Specific to Environment

Bringing National Attention to Long-Term Care

One intangible yet crucial success of the program was featuring the important work of LTC facilities. Many faculty coaches noted that the program respected the LTC environment by its very nature and demonstrated to LTC facilities that they are as significant as acute care settings when it comes to quality of health care. As one faculty coach commented, "People that can make a difference are finally paying attention to long-term care." Organizational leads also discussed the value of the program for introducing facilities to quality improvement (QI). Faculty coaches and other national project team members were thankful for the attention the program brought to the field, as well. For example, many were able to connect with other colleagues and clinicians in geriatrics and infectious diseases and were appreciative of how the program highlighted the importance of infection prevention in LTC facilities to their academic communities and physician residents in training.

Importance of Relationships

Relationships were extremely important among the organizational leads, the facilities, and the faculty coaches. Having someone at the State or national level to contact when they had issues, or to share successes, was a benefit for some facilities, particularly those without a large corporate support structure. The organizational leads and coaches were highly invested in the success of the LTC facilities, brainstormed how they could help overcome barriers, and provided recommendations on new and innovative ideas to work with the individual facilities. Organizational leads who were interviewed about their experiences described their role as that of intermediary, translator, coach, and creator of a safe space for facility teams to ask questions and receive resources and support. Feedback provided by the facility team leads who were interviewed was unanimous: interviewees described their organizational leads and national project team contacts as proactive, responsive, helpful, and knowledgeable. Specific types of organizational lead support mentioned during interviews included help with data entry and survey submission and one-on-one help overcoming physician resistance by providing resources and education on best practices for CAUTI reduction.

Relationships among the LTC facility team members were also key to program success. During qualitative interviews, facility team leads indicated that strong staff relationships led to more excitement and support among the staff participating in the program, while weak or nonexistent relationships meant that staff would not participate in the same way or would only dedicate the minimum time and energy toward completing the program goals. In the same vein, facility leads who were new in their positions often found it harder to achieve buy-in because of the lack of relationships with the staff. Finally, the relationships among participating facilities were also very beneficial with

respect to teams' ability to learn from peers in the same cohort. Qualitative interview feedback from team leads indicated that Webinars were appreciated as opportunities to bring many facilities together at once and allowed for the exchange of ideas and experiences. Unfortunately, several organizational leads and faculty coaches also reported that coaching calls were sometimes unsuccessful because facility teams were reluctant to share their challenges in front of a group. In many cases, organizational leads and coaches supplemented group calls with one-on-one coaching.

Limitations of Technology

LTC facilities had various challenges to participating in a distance-based QI program, including but not limited to lack of access to computers with internet, firewalls not allowing access to the program Web site, and inability to download files during Webinars. Interviews with facility team leads confirmed that staff at some facilities had a limited ability to fill out surveys electronically and to view Webinars. Several organizational leads and national project team members observed that attending hour-long Webinars is not realistic for most facility staff.

To overcome these challenges, the national project team and organizational leads came up with innovative ways to enable LTC facilities to access the education. Organizational leads downloaded resources and sent them via email to LTC facilities or printed and distributed paper copies. Some organizational leads also supported LTC facilities without internet access for staff by providing paper copies of the surveys and entering the data for the facilities afterward. The national project team made the train-the-trainer materials available for download during Webinars and provided print and electronic materials in binders with flash drives to LTC facilities at the conclusion of the program. Finally, the national project team lengthened the duration of educational Webinars from 45 minutes to 1 hour because of the large volume of questions and discussion that occurred. This change also allowed the national project team to offer 1 full hour of continuing nursing education credit.

Staff Turnover/Shortages

Participants voiced issues with high rates of staff turnover throughout the program. During site visits and qualitative interviews, many facility team members spoke about changes in facility administration, leadership, and licensed and nonlicensed staff. Teams reported that these changes hindered dissemination of education and training. Turnover, especially among leadership, also led to challenges with consistency of engagement in the program, consistency of data quality and submission rates, and, at times, a lack of ongoing understanding of program expectations. Organizational leads and faculty coaches reiterated these challenges with communication, expectation-setting, and engagement during interviews and the program recap meeting.

Staff turnover resulted in unique challenges in onboarding new staff and forced the national project team to define exactly what leaders, staff, and teams needed to assume program responsibility after previous staff members left. The content redesign process provided standardized, yet adaptable, educational materials to support LTC facilities—especially those that had high staff turnover. The instructional guide offered suggestions for using the materials, such as incorporating the education into staff orientation and annual competency testing. The national project team also emphasized the importance of team building and identifying backups for team roles to combat challenges with turnover.

Varying Experience With Surveillance, Infection Prevention, and QI Initiatives

Unlike most acute care hospitals, many LTC facilities did not have a full-time infection preventionist on staff at baseline or during the initiative.[56] The responsibilities of an infection preventionist were more often shared among staff, and a number of facilities shared an infection preventionist who was part of a broader hospital or LTC system. To address gaps in infection prevention knowledge and shared responsibilities, the national project team developed many tools and manuals about data collection and offered one-on-one and group coaching to facilities. In addition, the content was redesigned to include a train-the-trainer component to ensure consistency across learning objectives and materials provided and to support the varying levels of knowledge and expertise of the facility team members conducting the training. Education was customizable and flexible to allow for LTC facilities to focus on gaps identified in the knowledge questionnaire and safety culture survey results. Moreover, each monthly newsletter included a "Making It Work" column that highlighted specific strategies and ideas to implement key components of the content released the month prior. Organizational leads and faculty coaches emphasized the lesson that education must be kept as short, simple, and targeted as possible. Overall, facility team leads interviewed about their experience with the program indicated that their teams found program resources, including educational materials and specific tools (e.g., NHSN definition pocket cards), to be very helpful and informative.

Engaging All Staff

A theme that emerged during site visits and interviews with facility team leaders was the importance of involving all levels of staff in improving infection prevention and resident care. Team leads emphasized that all staff at LTC facilities participate in resident care, including certified nursing assistants (CNAs), nurses, physicians, environmental services, physical therapists, laundry, et cetera, and that all need to be educated on best practices for infection prevention. Several stakeholders voiced the difficulty and the importance of involving staff on overnight and weekend shifts. Many teams took a holistic approach, broadening their teams, leveraging internal relationships, and involving CNAs and others in QI meetings. Some suggested that program education was too narrowly geared toward nurses and should have been expanded to include resources for a wider array of staff—a concern that was at least partially addressed by the content redesign. During the program recap meeting in August 2016, national project team members discussed opportunities for CNAs and other frontline staff to be more involved in curriculum development and pilot testing in future initiatives.

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[56] Mody L, Langa KM, Saint S, et al. Preventing infections in nursing homes: a survey of infection control practices in Southeast Michigan. Am J Infect Control 2005;33:489-492.

Engaging Physicians and Senior Leadership

Stakeholders at all levels emphasized the need to engage physicians, as well as strategies to do so. During site visits, several facility teams spoke about activating physician champions to communicate with other physicians about catheter care and antibiotic stewardship, including urologists and others in local acute care facilities. Coaches and organizational leads reported during organizational lead calls and the program recap meeting how they provided literature for facility teams to share with clinicians and coached teams on crafting one-on-one appeals.

Another group critical to program success was facility leadership. In qualitative interviews and during site visits, both organizational leads and facility team leads emphasized that committed leadership support is essential for both initial buy-in and for sustainability of the program goals. The national project team also reflected during the program recap meeting on the value to teams of receiving support from administration, and on the barriers faced by those facilities whose team leaders were not decisionmakers. Faculty coaches described the ideal implementation structure as both bottom-up and top-down.

The national project team addressed both of these important needs by developing tools and resources for organizational leads and facility teams to share with physicians and leaders to encourage their buy-in. Feedback suggested that coaching on physician and leadership engagement was a key benefit of many faculty coach-facility relationships.

Engaging Residents and Families

The national project team actively sought and encouraged the involvement of residents and families in the program's infection prevention efforts. The national project team engaged residents and family members in the review of select educational materials, in the presentation of content during national content Webinars, and in the development of a number of tools and resources designed to address residents' and families' perspectives and engagement. During site visits, teams spoke about using program materials to communicate with residents' families about the program's aims and to respond to resident or family resistance to best practices in preventing CAUTIs.

The national project team collaborated with the National Consumer Voice for Quality Long-Term Care (NCV) to recruit eight State ombudsmen who helped develop and deliver training programs for local and volunteer ombudsmen in their States. The content for the training programs aligned with the national project's education and resources. Feedback from ombudsmen and national resident advocates indicated that engaging residents and families was essential to empowering residents to speak up and get involved in their care, and to translating technical infection prevention language into easy-to-understand language for consumers. Local and volunteer ombudsmen who participated in the training program were encouraged to share the information with residents, family members, and staff as appropriate during the ombudsmen's site visits to LTC facilities. One trainer who helped present to local ombudsmen was quoted as saying:

> *Seeing recognition in the eyes of volunteers as they realized that CAUTI was about basic resident rights, participation by residents, and dignity issues involving everything they were already doing—that made them realize that this new topic fit right in with their work and gave them confidence about pursuing this issue for residents.*

Over 330 local ombudsmen participated in the State-led training programs. Training evaluations showed that over 90 percent of participants agreed that the training increased their knowledge of the signs and symptoms of CAUTI and increased their knowledge of ways to prevent CAUTI. The majority of participants completed pre- and post-training questionnaires on knowledge of infection prevention and CAUTI. Overall, knowledge increased in both areas. Participants in the training programs reported in the evaluations that they would share the knowledge they gained during visits with residents and families and at resident and family council meetings.

Near the close of the contract, NCV invited all State ombudsmen and their staff to attend a national Webinar titled "Engaging Ombudsmen, Residents, and Families as Partners in Preventing Catheter-Associated Urinary Tract Infections (CAUTI)." The purpose of the Webinar was to share the program with ombudsmen nationwide as a way to generate interest in CAUTI prevention. Fifty-one people from 17 States participated in the national Webinar, and two of the eight partner State ombudsmen presented a summary of their experiences with the CAUTI program. Eighty-three percent of attendees indicated that they planned to use the resources discussed on the Webinar, and 75 percent indicated they would like to implement the project in their State.

Lessons Specific to Program Implementation

Purpose and Messaging of Program Value

Because this program was focused on reducing CAUTI, it presented challenges with recruitment and retention of LTC facilities. For most LTC facilities, CAUTI was not viewed as a pressing issue to address. Despite changing the name of the program to include all healthcare-associated infections (HAIs), discussing the other benefits of participating related to antibiotic stewardship and QI, and having multiple communications with organizational leads and LTC facilities, the national project team found that the main focus on CAUTI affected recruitment of LTC facilities or hindered their engagement in the program.

The national project team attempted to address this barrier by emphasizing that, although much of the evidence-based clinical education focused on CAUTI reduction and catheter stewardship, the socioadaptive elements and general QI concepts could be applied across efforts to reduce any HAI. The national project team focused on the transferability of the knowledge and skills gained through participation and strategies to integrate the program into facilities' preexisting practices. Qualitative interviews with facility team leads indicated some success in this messaging about the broad applicability of the education. Facilities were able to see how this program, while aimed at reducing CAUTIs, had messaging and education, specifically regarding personal protective equipment and hand hygiene, that could be translated to broader infection prevention efforts. Organizational leads and faculty coaches also reported success in tying this program to antibiotic stewardship, with one organizational lead describing improved antibiotic stewardship as the "low-hanging fruit."

In addition, it was important for the national project team to understand current requirements of the LTC environment, such as CMS's Quality Assurance and Performance Improvement programs and differences from acute care hospitals (e.g., NHSN is voluntary for LTC facilities but has been mandated for hospitals), and to provide the LTC facilities with the knowledge, tools, and resources to better sustain their QI gains.

Variations in Surveillance Practices

Long-term care facilities had varying degrees of knowledge around surveillance practices, including identifying CAUTIs using the Centers' for Disease Control and Prevention (CDC's) NHSN criteria and using standardized processes to submit data, monitor and track infection rates, and utilize the data to drive improvement efforts. According to interviews with facility team leads, the educational modules, program tools, and support from organizational leads helped staff learn to use standard definitions and implement surveillance best practices. Faculty coaches also provided education and guidance on appropriately identifying CAUTIs. The national project team was in constant communication with organizational leads to verify data submitted by their facilities, as potential errors in data submission or inappropriate use of CAUTI definitions could lead to either unusually high rates or large month-to-month rate fluctuations. It was essential to provide continual education and support on understanding and applying standard surveillance measures in LTC facilities to ensure accurate data results.

The Health Research & Educational Trust's (HRET's) Comprehensive Data System provided a centralized location for LTC facilities to submit and monitor their surveillance data. By providing this platform and demonstrating the impact that standard surveillance practices can have in reducing HAIs, this initiative gave LTC facilities tools to evaluate outcome rates for future HAI QI initiatives. The national project team encouraged LTC facilities to continue their surveillance practices by enrolling into CDC's NHSN, as this could also assist with sustainability. The ongoing technical and clinical coaching in applying standard surveillance measures to drive QI efforts, along with a centralized platform to submit and monitor surveillance data, were critical to the successful CAUTI surveillance performed by more than 500 LTC facilities participating in this initiative.

Value of Aligning Project Metrics With Educational Content

As described under Project Components, numerous metrics were developed and collected for use in overall program evaluation. Organizational leads, coaches, and facility teams reported that data could be one of the most powerful motivators for change. Teams appreciated seeing clinical changes immediately reflected in their outcome data, and one organizational lead described the data reports as "empowering" to teams. Surveys and assessments could also be powerful motivators when results were used to understand gaps and drive the development of action plans, particularly when facility leadership was involved.

Unfortunately, among all cohorts, followup assessment submission was low and organizational leads reported difficulty in convincing teams of the value of completing assessments at the end of the program. Several facility team leads who were interviewed reported that program assessments were too long and submission was too frequent. To address this, the national project team took several approaches. First, after reviewing results from Cohort 1's assessments and hearing their feedback, the national project team worked to better align the results from the various data collected with the program's interventions. The national project team developed and shared feedback reports and discussion guides that helped the LTC facilities identify potential gaps in infection prevention knowledge or practices, develop action plans, and align the program's educational content and resources to address those gaps. This allowed the LTC facilities to use their data to drive their improvement efforts. Next, HRET worked closely with the organizational leads and faculty coaches to review the data during coaching calls to guide discussions around barriers and best practices with the LTC facilities. Lastly, Webinars after completion of the baseline safety culture survey and near the end of each cohort

highlighted the importance of using the results to show change over time and to drive improvement. HRET also supplied organizational leads with materials on sustainability of change using these results, for use with their facilities at the final learning session.

Ultimately, stakeholders at the program recap meeting suggested that program participants may have been expected to meet too many measurement targets for the program timeframe. One suggestion for future programs included extracting pieces of the Agency for Healthcare Research and Quality Nursing Home Survey on Patient Safety Culture directly related to program content, rather than administering the full survey.

Coaching Experience Across Organizational Leads, Faculty, and HRET Staff
Participating LTC facilities were recruited by regional or administrative organizational leads and were assigned coaching faculty and HRET staff members to guide them through the program. Although each of the groups used the same coaching structure, there was unavoidable variation in LTC facility teams' experiences in the program, due in part to organizational leads, faculty, and HRET staff having different levels of familiarity with the subject matter, coaching, and QI initiatives.

Organizational leads noted that effective relationships with facilities and coaches made a positive impact on the overall program. Organizational leads who had preexisting relationships with their recruited facilities, for example through the nursing home division of their State's Quality Innovation Network-Quality Improvement Organization (QIN-QIO), reported more success with engagement and compliance. In cases where LTC facilities were part of a corporate system or chain of nursing homes that implemented systemwide mandates, teams may have also been more responsive to their organizational leads and the requirements of the program.

While organizational leads received in-person training prior to starting their cohort, some faculty coaches suggested that more training and onboarding, whether virtually or in-person, may have been beneficial for their role. More robust job descriptions and orientation may have better prepared coaches for their responsibilities, as would shadowing or viewing experienced coaches in action.

Flexible Implementation Model
The national project team adapted the implementation model for the program over time to address lessons learned and each cohort's needs. As needs were identified, the national project team redeveloped materials, education, and processes. For instance, beginning in Cohort 3, educational programming changed from standard educational Webinars to a train-the-trainer model. The new model used a combination of team lead-specific content delivered via a live Webinar and additional content specifically designed to help leaders educate and engage frontline staff in the education. The additional content included an instructional guide, a training video, a slide set with speaker notes, and a quiz or team activity to support the team leads as they taught frontline staff on each topic area. The train-the-trainer model allowed LTC facilities to adapt the materials to meet their unique educational needs. This redesigned approach provided maximum flexibility for facility educators who requested more condensed and customizable materials to teach and engage frontline staff. Qualitative interviews with organizational leads and facility team leads indicated success in facilities using the materials and integrating them into preexisting practices.

The flexible materials also integrated the evidence-based clinical education and the socioadaptive elements. Materials, especially the training videos on personal protective equipment and hand hygiene, reinforced the idea that general education on QI concepts can be used to help staff reduce any HAI. Content was also developed to help frontline staff understand current and future requirements such as Quality Assurance and Performance Improvement.

While the national project team's flexibility meant that the program was able to meet a range of LTC facility needs, it also had some disadvantages. As much as Cohort 1 was a pilot group, educational materials still had to be created and taught without time to elicit feedback and modify materials before implementation. Faculty coaches also noted the challenges of trying to educate facility staff on interventions while concurrently developing the interventions. Redesigning educational content and processes in response to feedback was time-consuming for the national project team. Changes also meant that the national project team could not truly compare results across all cohorts, and they led to unexpected challenges and revision to developing materials before LTC facility recruitment or while the program was implemented.

In-Person Meetings
As this program was implemented on a national scale, the majority of engagement with participants occurred virtually. While travel and time associated with in-person meetings can be expensive, the national project team heard from many LTC facilities, organizational leads, and faculty coaches that some of their most gratifying experiences were during in-person meetings. Connections are more strongly forged face to face than over the phone or via distance-based technology. Sharing of knowledge about best practices and barriers is also more likely to occur in an in-person collaborative setting. When budgets allowed, the national project team implemented in-person learning sessions, site visits, organizational lead trainings, national project team "reboot" meetings, and an in-person program recap meeting to help foster better working relationships and participation in the program. During qualitative interviews, facility team leads reinforced the value of these in-person meetings for creating an environment for open discussion and collaboration. Many team leads said that they would have liked more in-person meetings, although they understood that it was not always feasible.

Project Fatigue
Project teams had numerous responsibilities, and, as the program continued over time, data submission and participation in online education declined. The national project team also recognized that there were numerous components for participation that may have been seen as competing priorities to the day-to-day work being done in the facilities. Most team leads interviewed near the end of the program confirmed that project fatigue occurred for multiple reasons, including staff shortages and turnover. Some facilities began to lose dedication to the purpose of the program, and staff willingness to complete multiple surveys and questionnaires declined.

Learning from this, the national project team modified the requirements of the program, became flexible with submission deadlines, and communicated that the work in this program should not be an "add-on," but should rather be integrated into current processes. The amount of information collected and time needed from participants is something to consider for future initiatives. The beginning and end of this initiative were heavily loaded with program activities, so clearly communicating time commitment, expectations, and the value of having a team to implement this program was vital to

continued engagement over the course of the program. Also, as mentioned previously, it was important to develop and communicate this intervention in a way that allowed participating facilities to easily integrate this work into their existing practices. The national project team wanted LTC facilities to view this program as a way to enhance their QI efforts, not only to reduce CAUTI, but all HAIs, rather than viewing it as additional work that ends once participation in the program concludes.

Sustainability

Tools and Resources

As mentioned earlier, the Long-Term Care (LTC) Safety Toolkit was developed as part of this program. The entire toolkit was translated into Spanish for use with a wider audience of LTC facility staff.

The national project team provided all educational materials, tools, and resources through Webinars and on the program Web site. However, organizational leads and participants indicated that many facilities had technological barriers to accessing computers or the internet. Some facilities relied on print materials, DVDs, and flash drives to access and share information. To support the legacy of the program, the national project team offered participating facilities a binder of hard-copy materials, including educational bundles from a selection of the content Webinars, brochures and infographics, data collection and surveillance tools, and the LTC Safety Toolkit, along with a flash drive of these materials and accompanying educational videos.

Several enduring electronic resources will also be submitted to the Agency for Healthcare Research and Quality (AHRQ) for posting on the AHRQ Web site.

Manuscripts

Members of the national project team have developed several manuscripts, abstracts, and presentations for national conferences based on the overall program. The following manuscripts have been published or are in various stages of development.

Mody L, Meddings J, Edson B, et al. Enhancing Resident Safety by Preventing Healthcare-Associated Infection: A National Initiative To Reduce Catheter-Associated Urinary Tract Infections in Nursing Homes. Clin Infect Dis 2015; 61(1):86-94. This manuscript provides an overview of the program, outlining the strategy of emphasis on professional development in catheter utilization, catheter care and maintenance, and antimicrobial stewardship as well as promoting patient safety culture, team building, and leadership engagement. The program timeline, educational program, and data collection plan is described.

Crnich C, Jump R, Trautner B, et al. Optimizing Antibiotic Stewardship in Nursing Homes: A Narrative Review and Recommendations for Improvement. Drugs Aging 2015; 32:699-716. This review summarizes current research and presents ways in which antibiotic stewardship can be implemented and optimized in the nursing home setting.

Meddings J, Saint S, Krein S, et al. Systematic Review of Interventions To Reduce Catheter-Associated Urinary Tract Infection in Nursing Home Residents. Submitted to the Journal of Hospital Medicine July 2016. This review summarizes current research for urinary tract infection (UTI) and CAUTI prevention that was used to inform the program intervention. While no single intervention was effective in reducing UTIs, several best practices that reduce UTI, CAUTI, and urinary catheter use when implemented as a bundle were identified. These practices include hand hygiene, avoiding placement and prompting catheter removal, aseptic catheter insertion/maintenance, and education. Other strategies studied with success target challenges common for LTC residents, such as prolonged catheter use, hydration needs, incontinence, and preemptive barrier precautions for patients with indwelling devices.

Mody L, Green MT, Saint S, et al. Comparing Catheter-Associated Urinary Tract Infection Prevention Programs Between VA and Non-VA Nursing Homes. Analysis includes data from Cohorts 1–3. Submitted to Infection Control and Hospital Epidemiology August 2016, in revision.

Trautner BW, Greene MT, Krein S, et al. Infection prevention and antimicrobial stewardship knowledge for selected infections among nursing home personnel. Analysis includes data from Cohorts 1–3. Accepted to Infection Control and Hospital Epidemiology September 2016.

Banaszak-Holl J, Reichert H, Greene MT, et al. Safety Culture and CAUTI Prevention in Nursing Homes: Results From a National Safety Program. Analysis includes data from Cohorts 1-2. (in progress).

Bradley S, Schweon S, Mody L, et al. Identifying Safe Practices for Use of the Urinary Leg Bag Drainage System in the Post-Acute and Long-Term Care Setting: An Integrative Review. This integrative review will provide evidence-based guidance for leg bags. (in progress).

Mody L, Greene MT, Meddings J, et al. A National Implementation Project To Prevent Catheter-Associated Urinary Tract Infection in Nursing Home Residents. This will be the main manuscript to describe outcomes of the project for community-based nursing homes across Cohorts 1–4. (in progress).

Smith S, Greene MT, Mody L, et al. Evaluation of the Association Between Nursing Home Survey on Patient Safety (NHSOPS) Measures and Catheter-Associated UTI Outcomes in a National Collaborative of Nursing Homes. This manuscript will use baseline and followup safety culture survey results merged with CAUTI outcome data from non-VA facilities in Cohorts 1–4. Data analysis and manuscript preparation is in progress.

Krein S, Greene MT, Saint S, et al. Main analysis of project outcomes for VA nursing homes. Data analysis and manuscript preparation are in progress.

Recommendations for Continued QI Work

In this large-scale quality improvement (QI) initiative in the LTC setting, the national project team was able to recruit 652 facilities, with 505 completing the initiative. This implementation model was able to show a 47-percent reduction in the catheter-associated urinary tract infection (CAUTI) rate per 1,000 catheter days. Furthermore, 75 percent of non-VA facilities reported at least 40 percent reduction in CAUTIs. However, there's more work in QI efforts to be done in LTC facilities, as this initiative focused primarily on CAUTI reduction, and facilities participating in this initiative are a small sample of the more than 15,000 LTC facilities nationwide.

Given the lessons learned over the past 3 years, the national project team has several recommendations for future directions that will help sustain and spread the work of this program. Any future work in the LTC environment needs to emphasize the importance of forming a team to implement any QI initiative, including backups for each team role. If coaching models are put in place, there should be training and resources available for the coaches to ensure they understand, and are comfortable with, their roles and expectations. It is also important to involve the frontline staff when developing the intervention, as they are the ones providing direct care to residents. Their needs should be addressed when developing any education, tools, and resources, since they will be the main group of staff members applying education learned from any initiative. Similarly, any education should be simple, streamlined, and visually appealing, tightly focused around what staff members need to know to ensure the highest quality of resident care. Additionally, the development, implementation, and evaluation of education, tools, and resources should include residents and family members as key partners in improving quality and resident safety.

Regarding program evaluation, it is essential that any measures being considered be directly related to overall program goals as well as the content provided. It is important to show LTC facilities how the data

they collect aligns with the education and interventions so they can use the data to drive their improvement efforts. One strategy to consider is modifying validated surveys to collect only certain sections that are relevant to specific program interventions. It is also vital that any initiative takes into account the technological needs and limitations of LTC facilities; otherwise, participants will quickly disengage.

Finally, to maintain engagement of LTC facilities, any successful program should demonstrate not only how implementation of the initiative can impact facility star ratings and adherence to Federal regulations but also how it can improve the overall care of residents.

Appendix A. C.A.U.T.I. Infographic

REMEMBER C.A.U.T.I. TO PREVENT CAUTI

Infections are a leading cause of illness and death in long-term care facilities.

These infections include catheter-associated urinary tract infections (CAUTIs).

C — Catheter Removal

Think about catheters really of your residents. Are of your residents' catheters really necessary? Remove the catheter if there is no good indication for it. (See below.)

Every resident deserves a chance to be catheter-free and infection-free.

A — Aseptic Insertion

Only trained personnel should insert catheters.

Use hand hygiene, and insert using aseptic technique.

Use the smallest catheter size that will allow good drainage for the resident.

Avoid contamination of the catheter.

Use catheter securement devices.

U — Use Regular Assessments

Insert new urinary catheters only where there is a good indication. Incontinence is NOT an appropriate indication for an indwelling urinary catheter.

Consider alternatives to using a urinary catheter.

Use a bladder ultrasound to guide management.

Implement a process to see whether residents need catheters.

T — Training for Catheter Care

Train staff, resident, and family.

Maintain a closed drainage system, and maintain unobstructed urine flow.

Use routine hygiene. Do not clean the periurethral area with antiseptics.

Routine catheter changes, urinalysis, and cultures are not required.

I — Incontinence Care Planning

Consider alternatives to using a urinary catheter when developing individual resident care plans and behavioral interventions.

Consider timed and prompted voiding and use of a voiding diary.

Remember: No catheter means no CAUTI!

Appropriate Indications for an Indwelling Urinary Catheter

To assist in healing of open sacral or perineal wounds in incontinent residents

For acute urinary retention or bladder outlet obstruction

To improve comfort for end-of-life care if needed

Source: Centers for Disease Control and Prevention Healthcare Infection Control Practices Advisory Committee. Guideline for Prevention of Catheter-associated Urinary Tract Infection, 2009. http://www.cdc.gov/hicpac/cauti/001_cauti2009_abbrev.html

The AHRQ Safety Program for Long-Term Care: HAIs/CAUTI provides guides, tools and educational videos that will help you provide safer care for residents. Visit http://www.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/cauti-ltc/index.html for more information.

The AHRQ Safety Program for Long-Term Care: HAIs/CAUTI

AHRQ Pub No. 16-0003-16-EF
September 2016

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Appendix B. T.E.A.M.S. Infographic

Culture consists of values, attitudes, and beliefs that can have an impact on resident safety, care outcomes, and staff satisfaction.

Culture influences how change can occur.

T.E.A.M.S.

REMEMBER T.E.A.M.S. TO IMPROVE SAFETY CULTURE

T — Team Formation
The most effective teams are diverse. Make sure your team includes people of differing perspectives and roles.

E — Excellent Communication
Communication should be effective. Communication at transfer and shift changes is especially critical. Team members, employees, residents, and family members should feel encouraged to speak up.

A — Assess What's Working
Assess and share project data to encourage, inspire, and motivate the facility staff, residents, and family members. Re-evaluate your culture annually. Are the intended changes happening?

M — Meet Monthly
Evaluating culture is an ongoing process. Meet regularly to discuss team successes and barriers and to review your data trends. Review cases of resident safety issues (e.g., catheter-associated urinary tract infections) each month to find causes and solutions.

S — Sustain Efforts
Make plans for sustaining the project as you launch the project. Integrate elements of the project in your day-to-day work. Don't forget to celebrate the team's wins!

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The AHRQ Safety Program for Long-Term Care: HAIs/CAUTI

AHRQ Pub No. 16-0003-16-EF
July 2016

Appendix C. Exclusion Criteria


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┌─────────────────────┐
│ All enrolled facilities │ ──────────► ┌──────────────────────────┐
│      (n=652)        │               │ Exclusion of facilities enrolled in │
└─────────────────────┘               │           Cohort 5          │
          │                           │           (n=21)            │
          ▼                           └──────────────────────────┘
┌─────────────────────┐
│ Enrolled in Cohorts 1-4 │ ──────────► ┌──────────────────────────┐
│      (n=631)        │               │ Exclusion of facilities not active in │
└─────────────────────┘               │   any program components    │
          │                           │           (n=143)           │
          ▼                           └──────────────────────────┘
┌─────────────────────┐
│   Active facilities  │ ──────────► ┌──────────────────────────┐
│      (n=488)        │               │    Exclusion of Cohort 1    │
└─────────────────────┘               │        NHSN users          │
          │                           │           (n=2)            │
          ▼                           └──────────────────────────┘
┌─────────────────────┐
│     CDS users       │ ──────────► ┌──────────────────────────┐
│      (n=486)        │               │    Exclusion of facilities with │
└─────────────────────┘               │       no outcome data       │
          │                           │           (n=11)            │
          ▼                           └──────────────────────────┘
┌─────────────────────┐
│ Facilities with data │ ──────────► ┌──────────────────────────┐
│ available for analysis │             │    Exclusion of facilities with │
│      (n=475)        │               │  "improbable" data for all months │
└─────────────────────┘               │           (n=4)            │
          │                           └──────────────────────────┘
          ▼
┌─────────────────────┐
│ "Probable" data available │ ────────► ┌──────────────────────────┐
│      (n=471)        │               │    Exclusion of facilities with │
└─────────────────────┘               │  no catheter days for all months │
          │                           │           (n=5)            │
          ▼                           └──────────────────────────┘
┌─────────────────────┐
│ Catheter-day data available │ ──────► ┌──────────────────────────┐
│      (n=466)        │               │    Exclusion of facilities with │
└─────────────────────┘               │  <2 valid data points reported │
          │                           │           (n=7)            │
          ▼                           └──────────────────────────┘
┌─────────────────────┐
│ Facilities in main    │ ──────────► ┌──────────────────────────┐
│ modeling analysis    │               │   Exclusion of VA facilities from │
│      (n=459)        │               │    non-VA modeling analysis  │
└─────────────────────┘               │           (n=55)            │
          │                           └──────────────────────────┘
          ▼
┌─────────────────────┐
│ Facilities in non-VA  │
│ modeling analysis    │
│      (n=404)        │
└─────────────────────┘
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Appendix D. Cohort Results

Figure 23. NHSN CAUTI Rate (CAUTIs per 1,000 Catheter Days), by Cohort
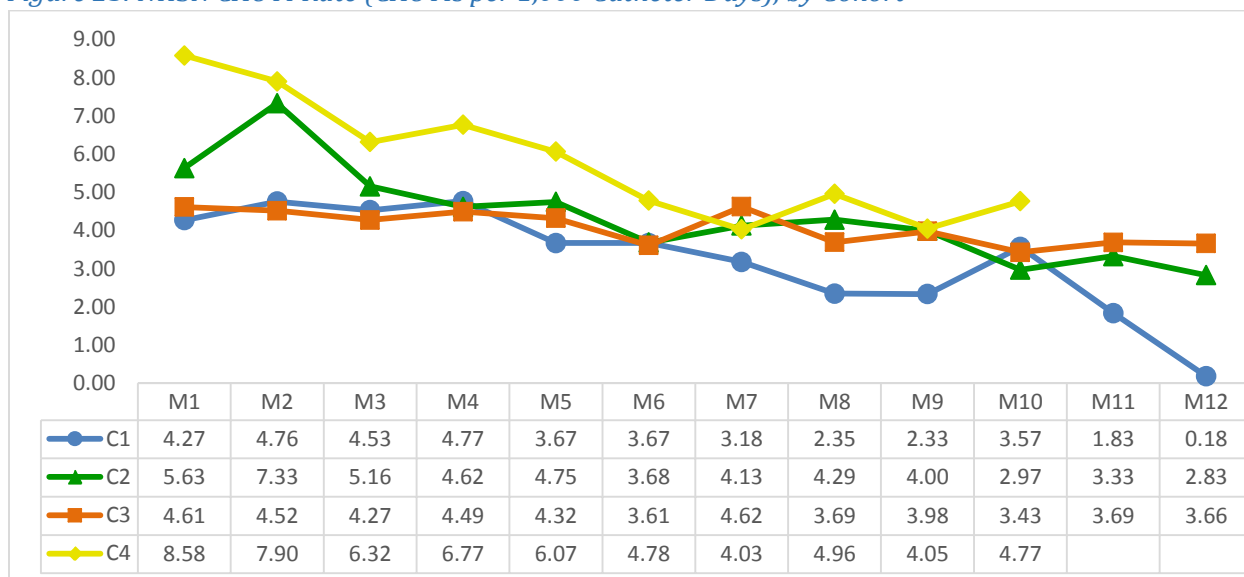
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
C1	4.27	4.76	4.53	4.77	3.67	3.67	3.18	2.35	2.33	3.57	1.83	0.18
C2	5.63	7.33	5.16	4.62	4.75	3.68	4.13	4.29	4.00	2.97	3.33	2.83
C3	4.61	4.52	4.27	4.49	4.32	3.61	4.62	3.69	3.98	3.43	3.69	3.66
C4	8.58	7.90	6.32	6.77	6.07	4.78	4.03	4.96	4.05	4.77		

Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015.
Data illustrating facilities that met inclusions criteria for modeling analysis.

Source: CDS; CAUTIs and catheter days submitted as of July 25, 2016.

Figure 24. Population CAUTI Rate (CAUTIs per 10,000 Resident Days), by Cohort
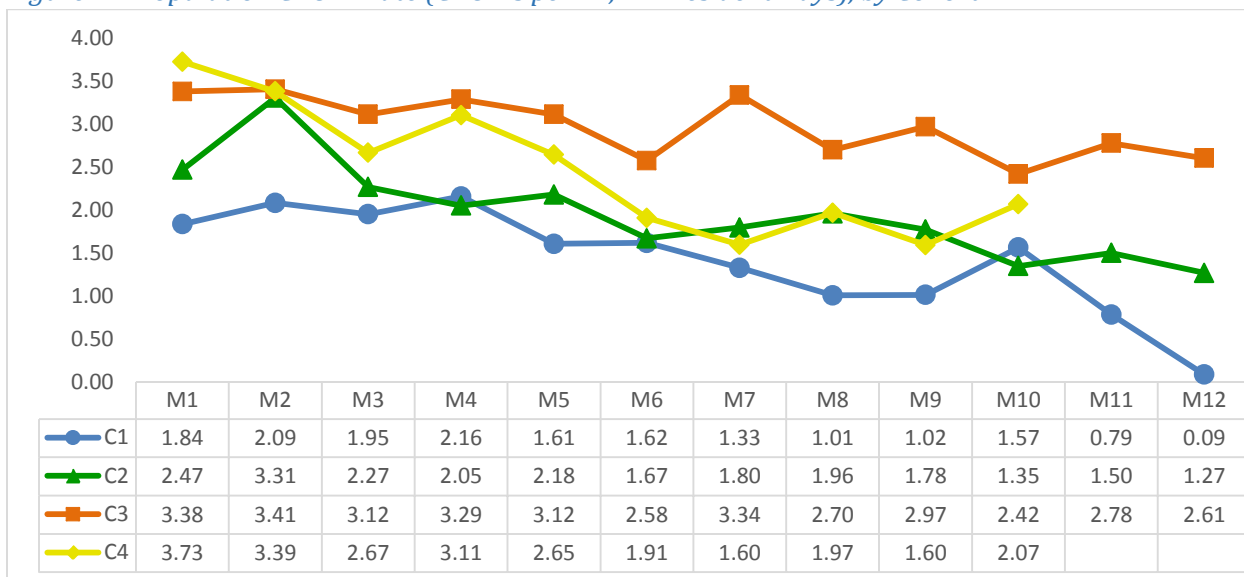
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
C1	1.84	2.09	1.95	2.16	1.61	1.62	1.33	1.01	1.02	1.57	0.79	0.09
C2	2.47	3.31	2.27	2.05	2.18	1.67	1.80	1.96	1.78	1.35	1.50	1.27
C3	3.38	3.41	3.12	3.29	3.12	2.58	3.34	2.70	2.97	2.42	2.78	2.61
C4	3.73	3.39	2.67	3.11	2.65	1.91	1.60	1.97	1.60	2.07		

Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015.
Data illustrating facilities that met inclusions criteria for modeling analysis.

Source: CDS; CAUTIs and resident days submitted as of July 25, 2016.

Figure 25. Catheter Utilization, by Cohort
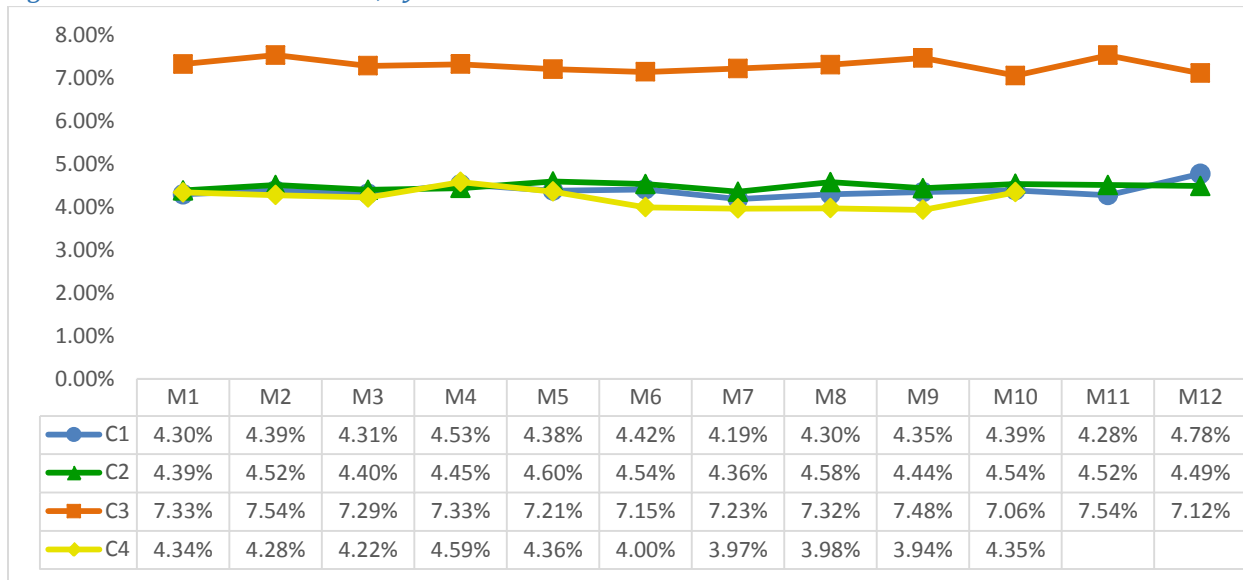
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
C1	4.30%	4.39%	4.31%	4.53%	4.38%	4.42%	4.19%	4.30%	4.35%	4.39%	4.28%	4.78%
C2	4.39%	4.52%	4.40%	4.45%	4.60%	4.54%	4.36%	4.58%	4.44%	4.54%	4.52%	4.49%
C3	7.33%	7.54%	7.29%	7.33%	7.21%	7.15%	7.23%	7.32%	7.48%	7.06%	7.54%	7.12%
C4	4.34%	4.28%	4.22%	4.59%	4.36%	4.00%	3.97%	3.98%	3.94%	4.35%		

Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating facilities that met inclusions criteria for modeling analysis. As discussed above, higher catheter utilization in Cohort 3 is driven by the higher utilization in the 55 included VA facilities, which make up 40 percent of Cohort 3.

Source: CDS; catheter days and resident days submitted as of July 25, 2016.

Figure 26. Urine Culture Collection Rate, by Cohort
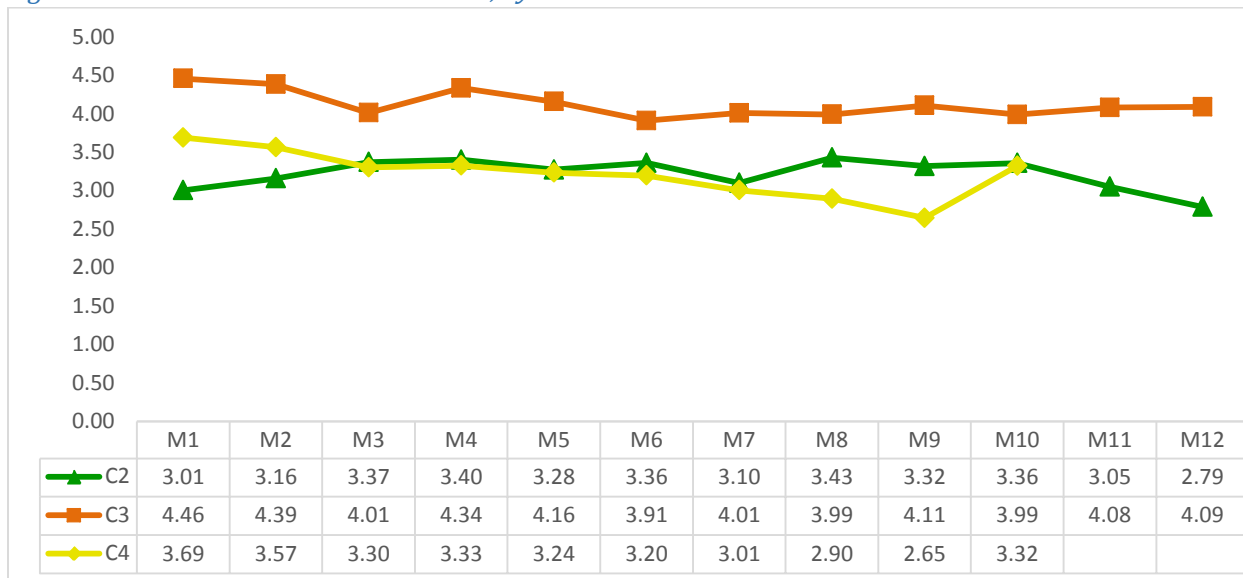
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
C2	3.01	3.16	3.37	3.40	3.28	3.36	3.10	3.43	3.32	3.36	3.05	2.79
C3	4.46	4.39	4.01	4.34	4.16	3.91	4.01	3.99	4.11	3.99	4.08	4.09
C4	3.69	3.57	3.30	3.33	3.24	3.20	3.01	2.90	2.65	3.32		

Cohort 1 M1: May 2014; Cohort 2 M1: November 2014; Cohort 3 M1: June 2015; Cohort 4 M1: September 2015. Data illustrating facilities that met inclusions criteria for modeling analysis. As discussed above, the higher urine culture collection rate in Cohort 3 is driven by the higher urine culture collection rate among the 55 included VA facilities, which make up 40 percent of Cohort 3.

Source: CDS; urine culture orders and resident days submitted as of July 25, 2016.

Appendix E. Cohort 5 Results

Cohort 5 was excluded from the main analysis because of differences in the implementation model and a compressed intervention period. Cohort 5 crude outcome and process data are illustrated in Figures 27–30. Note: M8 is not shown because of a dropoff in data submission.

Figure 27. NHSN CAUTI Rate (CAUTIs per 1,000 Catheter Days), Cohort 5
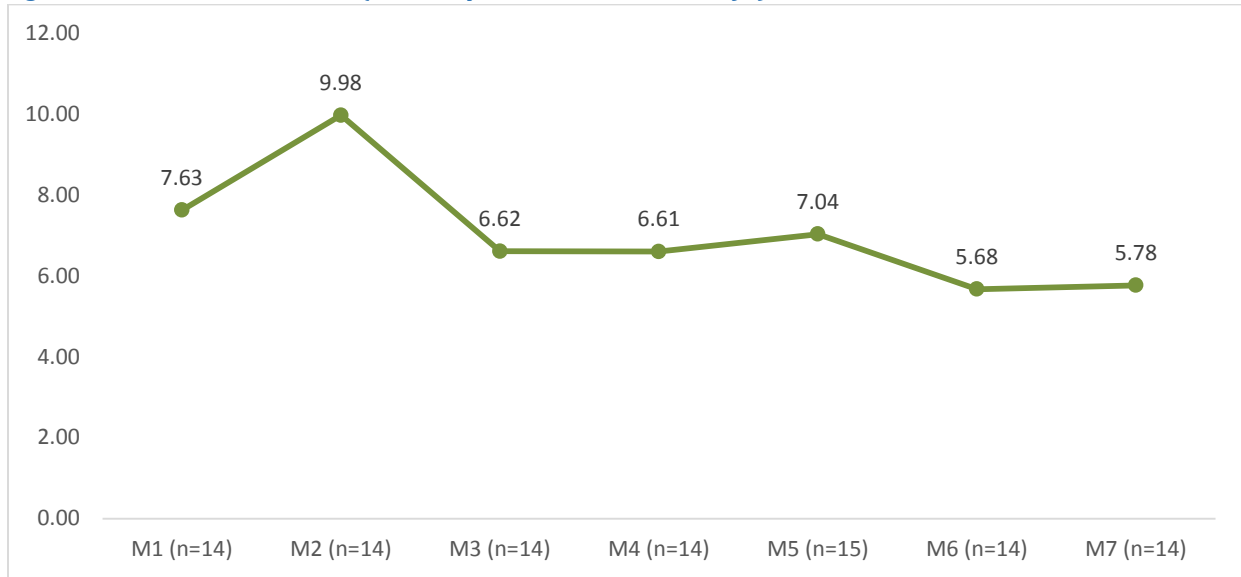
Cohort 5 M1: November 2015. Data illustrating facilities that met inclusion criteria for modeling analysis. Note: M8 is not shown because of a dropoff in data submission.

Source: CDS; CAUTIs and catheter days submitted as of July 25, 2016.

Figure 28. Population CAUTI Rate (CAUTIs per 10,000 Resident Days), Cohort 5
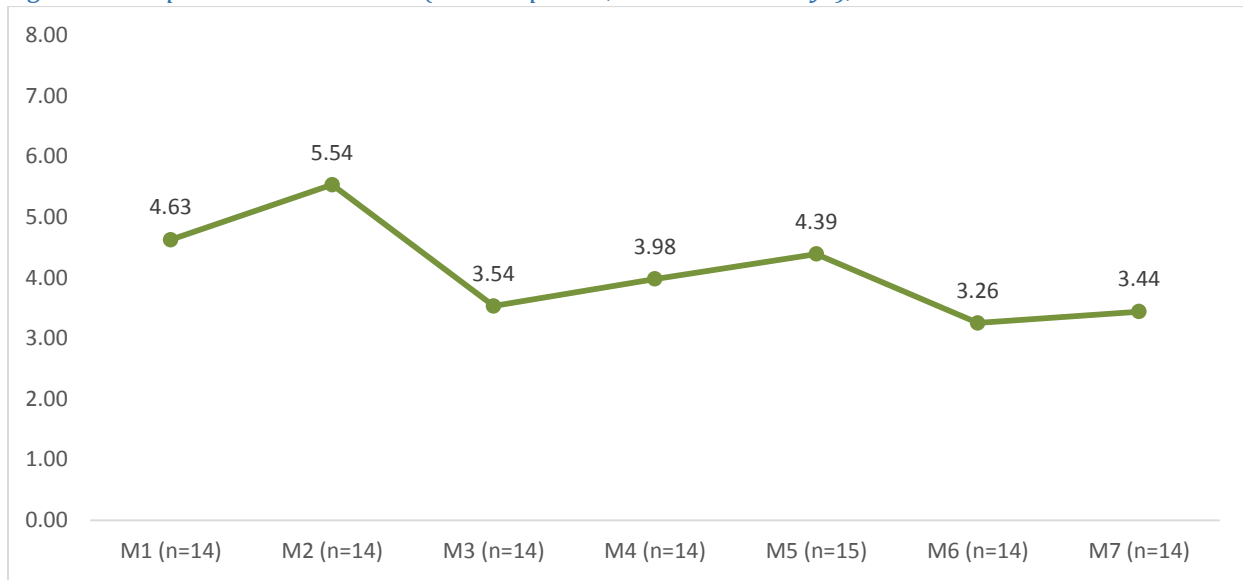
Cohort 5 M1: November 2015. Data illustrating facilities that met inclusion criteria for modeling analysis. Note: M8 is not shown because of a dropoff in data submission.

Source: CDS; CAUTIs and resident days submitted as of July 25, 2016.

Figure 29. Catheter Utilization, Cohort 5
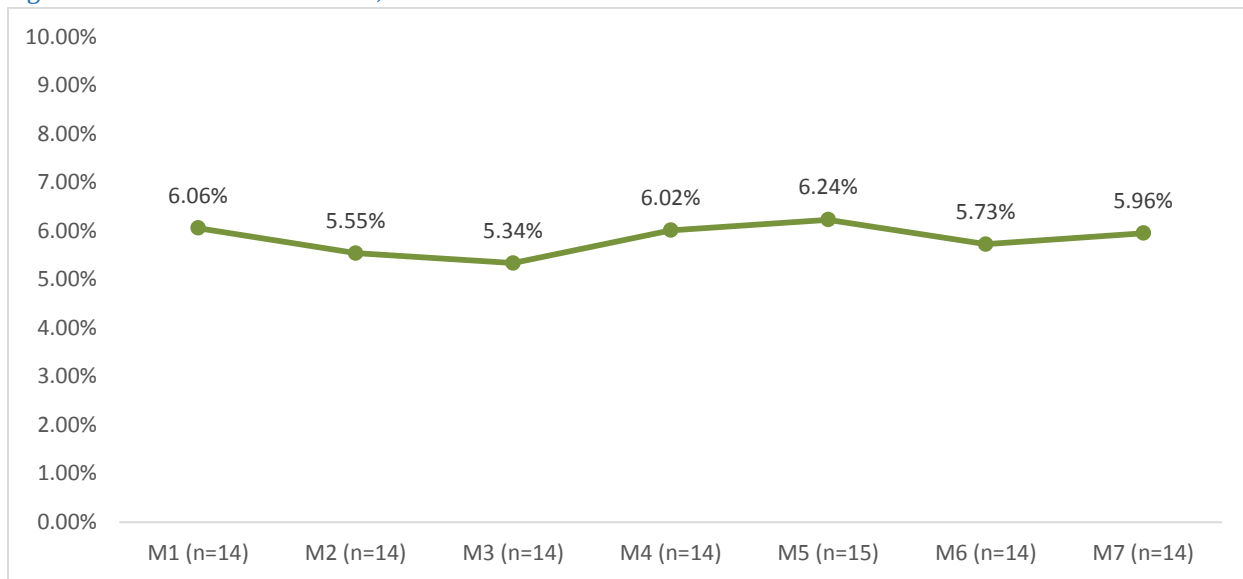
Cohort 5 M1: November 2015. Data illustrating facilities that met inclusions criteria for modeling analysis. Note: M8 is not shown because of a dropoff in data submission.

Source: CDS; catheter days and resident days submitted as of July 25, 2016.

Figure 30. Urine Culture Order Rate, Cohort 5
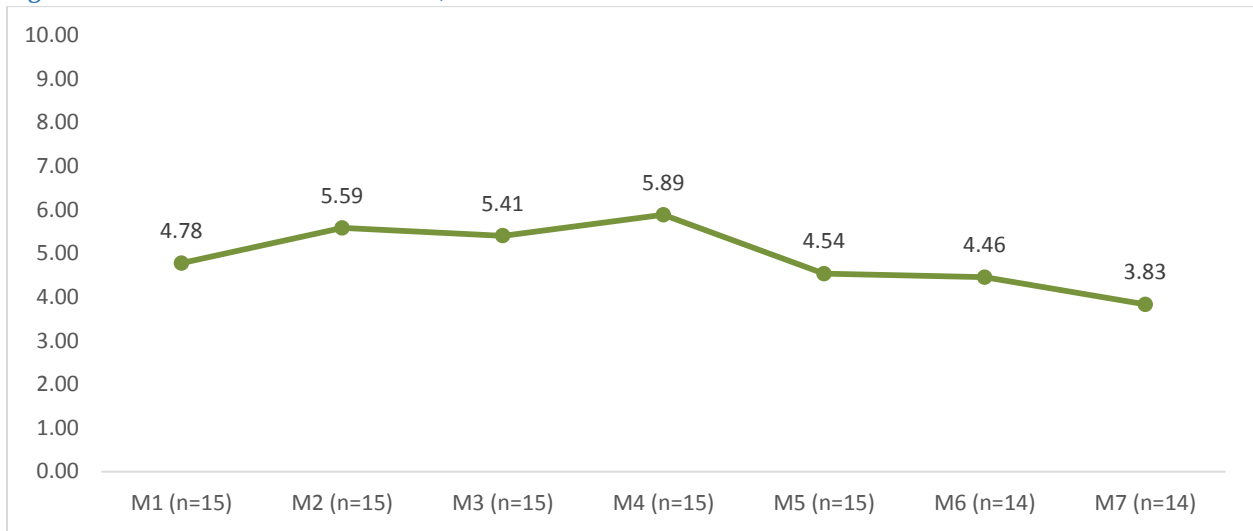
Cohort 5 M1: November 2015. Data illustrating facilities that met inclusion criteria for modeling analysis. Note: M8 is not shown because of a dropoff in data submission.

Source: CDS; urine cultures and resident days submitted as of July 25, 2016.

Appendix F. Webinar and Module Topics

Onboarding Webinars

This series of Webinars at the beginning of each cohort launch reviewed the program collaborative model, the technical and socioadaptive interventions, and data and measurement. Webinar topics are listed in Table 29.

Table 29. Onboarding Webinar Topics

Onboarding	Topic
Onboarding 1	Building Your Team to Enhance Resident Safety
Onboarding 2	CAUTI Definitions and Reporting
Onboarding 3	Data Collection, Submission, and the AHRQ Nursing Home Survey on Patient Safety Culture
Onboarding 4	Infection Prevention: Surveillance Essentials in Preventing Healthcare-Associated Infections

Training Modules

This four-part series of educational bundles was intended to strengthen knowledge and infection prevention skills related to catheter-associated urinary tract infection (CAUTI) reduction and healthcare-associated infection (HAI) prevention. These modules were delivered via live Webinars for Cohorts 1 and 2. For Cohorts 3, 4, and 5, each bundle followed a train-the-trainer format and included a video for core team members outlining how facility team leaders should teach and engage frontline staff with the content; a video for all staff to watch; activities such as skills practice, quizzes, or discussion guides; and an evaluation and certificate of completion. Module topics are listed in Table 30.

Table 30. Training Module Topics

Module	Topic
Module 1	Exploring Hand Hygiene: Knowledge and Practice
Module 2	Clean Equipment and Environment: Knowledge and Practice
Module 3	Personal Protective Equipment and Standard and Transmission-Based Precautions
Module 4	How To Avoid the Harms of Antibiotic Overuse

Long-Term Care Safety Toolkit

The Long-Term Care Safety Toolkit was developed specifically for the long-term care population with input from content experts. The purpose of the toolkit is to improve safety culture in LTC facilities, support quality improvement and safety initiatives in LTC facilities, and supplement the technical interventions to reduce HAIs, including CAUTIs. The toolkit has six modules focused on socioadaptive intervention elements. Toolkit module topics are listed in Table 31.

Table 31. Long-Term Care Safety Toolkit Module Topics

Module	Topic
Module 1	Using the Comprehensive Long-Term Care Safety Toolkit
Module 2	Senior Leader Engagement
Module 3	Staff Empowerment
Module 4	Teamwork and Communication
Module 5	Resident and Family Engagement
Module 6	Sustainability

National Content Webinars

In this series of monthly Webinars, the national project team, faculty, coaches, and resident advocates presented on technical, socioadaptive, and coaching topics to teach on the program interventions. Webinar topics are listed in Table 32.

Table 32. National Content Webinar Topics, by Month

Month	Topic
July 2014	Resident- and Family-Centered Services: Maximizing Your Team
August 2014	Interpreting and Using Your Results From the Nursing Home Survey on Patient Safety Culture
September 2014	Demystifying CAUTI: When To Culture and When To Treat
October 2014	Identifying and Overcoming Barriers to Staff Engagement in the CAUTI-LTC Program
November 2014	Engaging Residents and Families in CAUTI Prevention and Catheter Care
December 2014	Care Transitions and Handoffs: How Hospital and LTC Staff Can Partner With Patients and Residents To Reduce CAUTI Together
January 2015	Communication Strategies To Promote Resident Safety
February 2015	Leave Well Enough Alone: Avoiding Unnecessary Urine Cultures
March 2015	A Farewell to Harms: Turbocharged Walking Rounds
April 2015	Long-Term Care Safety Toolkit: Building a Culture of Safety
May 2015	Engaging Residents and Families in CAUTI Prevention
June 2015	Training LTC Facility Staff on Catheter Insertion and Maintenance To Prevent CAUTIs
July 2015	Applying the NHSN CAUTI Criteria to Case Studies
August 2015	Overcoming Challenges To Reduce CAUTI and Improve Safety Culture
September 2015	Hydration Practices and Urinary Incontinence Care Planning
October 2015	The Culture of Culturing: The Importance of Knowing When To Order Urine Cultures
November 2015	A Farewell to Harms: Turbocharged Walking Rounds
December 2015	Communicating Changes in Resident Condition
January 2016	Engaging Residents and Families in HAIs/CAUTI Prevention
February 2016	Catheter Care and Maintenance
March 2016	Viewing HAI Prevention Through the Lens of Quality Assurance and Performance Improvement
April 2016	NHSN Case Studies: Focusing on Changes in Mental Status and Activities of Daily Living
May 2016	Antibiotic Stewardship
June 2016	Hydration Practices and Urinary Incontinence Care Planning
July 2016	Care Transitions and Handoffs: How LTC Staff Can Partner With Hospitals To Improve Care
August 2016	Using the CDC's National Healthcare Safety Network To Collect Data and Sustain Your Gains

Appendix G. Assessments
Facility Demographics

AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Facility Demographics

Before beginning the questionnaire, please take a moment to read the following clarifications.

1. This questionnaire covers topics that pertain to both clinical knowledge and infection control. Therefore, it is best to have a staff member with knowledge of both areas on hand to complete this questionnaire.
2. Shared data WILL NOT include identifiers. All facility and individual data are confidential
3. This is not the Nursing Home Survey on Patient Safety (NHSOPS)

Demographics

Your Information

Name: _____

E-mail: _____

Credentials: _____

Facility information

1. State: _____

2. Facility/CLC name: _____

AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Facility Demographics

3. **Select your lead organization:**

    ○ Advancing Excellence

    ○ Alabama Quality Assurance Foundation

    ○ Arizona Health and Hospital Association

    ○ CAHF (California Association of Health Facilities)

    ○ Foundation for Healthy Communities (NH)

    ○ Genesis HealthCare

    ○ Grace Living Centers (OK)

    ○ Healthcare Association of New York State

    ○ Healthcentric Advisors (RI)

    ○ HealthInsight (NV, NM, UT)

    ○ Information & Quality Healthcare (MS)

    ○ The Joint Commission

    ○ Louisiana eQHealth Solutions, Inc.

    ○ Massachusetts Senior Care Association

    ○ Minnesota Hospital Association

    ○ Missouri Hospital Association

    ○ New Jersey Hospital Association

    ○ North Dakota Quality Health Care Association

    ○ Oregon Patient Safety Commission

    ○ Pennsylvania Patient Safety Authority

    ○ Presbyterian Manors of Mid-America (KS & MO)

    ○ Professional Nursing Solutions, LLC (AR)

    ○ Qualidigm (CT)

    ○ Quality Health Associates of North Dakota

    ○ South Carolina Hospital Association

    ○ South Dakota Association of Healthcare Organizations

    ○ South Florida Hospital & Healthcare Association

    ○ Spectrum Health (MI)

    ○ Telligen (IL & IA)

    ○ Tennessee Healthcare Association

    ○ Veteran's Health Administration

    ○ Other (Please Specify)
    _____

AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Facility Demographics

4. **Please select your primary role in the facility/CLC (select only one):**

   ○ Facility administrator

   ○ Assistant Director of Nursing (ADON)

   ○ Director of Nursing (DON)

   ○ Staff development/education

   ○ Infection prevention/control program coordinator (non-VHA only)

   ○ Infection prevention/control program managed by a dedicated CLC coordinator (VHA only)

   ○ Infection prevention/control program managed as part of/within the Acute Care infection control program (VHA only)

   ○ Quality manager

   ○ Other (Please specify)

   _____

5. **It is important to have a back-up team lead to ensure success of this program. Please select primary role of the program team lead back-up in the facility/CLC (select only one):**

   ○ Facility administrator

   ○ Assistant Director of Nursing (ADON)

   ○ Director of Nursing (DON)

   ○ Staff development/education

   ○ Infection prevention/control program coordinator (non-VHA only)

   ○ Infection prevention/control program managed by a

   dedicated CLC coordinator (VHA only)

   ○ Infection prevention/control program managed as part of/within the Acute Care infection control program (VHA only)

   ○ Quality manager

   ○ No back-up identified

   ○ Other (Please specify)

   _____

6. **Facility Ownership (Select all that apply)**

   ☐ Government – Department of Veterans Affairs - VHA

   ☐ Government - non - VA

   ☐ For profit

   ☐ Non profit

   ☐ Other (Specify)_____

7. **Basic facility/CLC information:**

   Number of units: _____ (count of skilled nursing units in the facility/CLC)

   Number of sub-acute beds: _____ (count of short-term beds)

   Current number of residents: _____

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AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Facility Demographics

8. **Indicate the current number of staff (ie. FTEs) in your facility/CLC:**

   Physicians: _____

   Registered Nurses (RNs): _____

   Licensed Practical Nurses (LPNs): _____

   Certified Nursing Assistants (CNAs): _____

9. **Which of the following resident services are currently being delivered in your facility/CLC? (Check all that apply)**

   ☐ 24-hour a day on-site supervision by an RN

   ☐ Access to laboratory services only available on weekdays

   ☐ Blood draws only available on weekdays

   ☐ Central-line insertions

   ☐ IV infusions using central or peripheral lines

   ☐ Management of residents on a ventilator

   ☐ Management of residents with a tracheostomy

   ☐ Skilled nursing/short-term(sub-acute) rehabilitation

   ☐ Wound care

   ☐ X-ray services only available on weekdays

   ☐ Access to laboratory services available on weekdays and weekends

   ☐ Blood draws available on weekdays and weekends

   ☐ Care for residents with dementia in specialized unit

   ☐ Glucose monitoring

   ☐ Long-term custodial care

   ☐ Management of residents with a Foley catheter

   ☐ Respiratory therapy

   ☐ Whirlpool or therapeutic bathing

   ☐ X-ray services available on weekdays and weekends

Infection Prevention

10. **How many full-time employees (FTEs) are currently dedicated to your facility/CLC's infection control program?**

    _____ FTEs

11. **In your facility/CLC, what level of professional training does the main point of contact for infection prevention related issues have?**

    ○ Physician (MD)

    ○ Licensed Practical Nurse (LPN)

    ○ Registered Nurse (RN)

    ○ Other (Please specify)

    _____

AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Facility Demographics

12. How many years of experience does the main point of contact for infection prevention-related issues have?

Number of years in that position in this facility/CLC:

○ Less than 1 year   ○ 5-10 years

○ 1-3 years   ○ More than 10 years

○ 3-5 years

Number of years with infection prevention experience:

○ Less than 1 year   ○ 5-10 years

○ 1-3 years   ○ More than 10 years

○ 3-5 years

13. Has the main point of contact for infection prevention-related issues received any specific infection prevention training? (Select all that apply)

☐ Certified in Infection Control (CIC)   ☐ State or local training course

☐ APIC EPI 101 or 201   ☐ Other (Please specify)

☐ No specific infection control training

_____

14. Are any of the activities listed below also are performed by main point of contact for infection prevention-related issues? (Select all that apply)

☐ Facility administration   ☐ Director of Nursing (DON)

☐ Direct resident care   ☐ Resident assessment coordinator (RAC)

☐ Wound/treatment nurse

☐ Staff education/staff development   ☐ N/A

☐ Quality manager   ☐ Other (Please specify)

☐ Employee health

☐ Resident services and training   _____

15. On average, during a normal (40 hour) work week, how many hours per week are spent performing all infection prevention-related activities?

_____ hours

AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Facility Demographics

16. Who provides infection prevention-related training to the rest of the staff at your facility/CLC? (Check one answer)

○ The main point of contact for infection prevention-related activities

○ Medical Director

○ Director of Nursing (DON)

○ Education Coordinator

○ External consultants

○ There is no designated person to provide infection prevention-related trainings

○ Other (Please specify)

_____

17. Is there a committee in your facility/CLC that reviews Healthcare Acquired Infections (HAIs) including CAUTI (e.g. reports, policies and procedures, etc.)?

○ Yes   ○ No

17.1. If Yes, indicate the members represented in the committee: (Select all that apply)

☐ Environmental services

☐ Medical director

☐ Nursing staff

☐ Physician staff

☐ Unit managers or supervisors

☐ Resident/Family Council member

☐ Facility board members

☐ Nursing administrators

☐ Quality department

☐ Pharmacy department

☐ Other (Please specify)

_____

18. For each statement below, please select "YES" or "NO": "Our facility/CLC provides …"

	Yes	No	Don't Know
a. Education to staff on the Science of Safety	☐	☐	☐
b. Assessment of teamwork and safety culture (e.g. Safety Attitude Questionnaire, Nursing Home Survey on Patient Safety)	☐	☐	☐
c. Readily available supplies necessary for aseptic urinary catheter insertion (i.e. supplies are available on your unit/floor in an unlocked location)	☐	☐	☐
d. Patient education material in a language other than English	☐	☐	☐

AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Facility Demographics

Catheter Management

19. Who inserts indwelling urinary catheters in your facility/CLC? (Select all that apply)

☐ Physicians (MD)   ☐ Registered Nurse (RN)

☐ Licensed Practical Nurse (LPN)   ☐ Certified Nursing Assistant (CNA)

☐ Other (Please specify)

_____

20. For each item below, please check the answer that best applies on a scale from "Never" to "Always"

		Never	Rarely	Sometimes	Often	Always
a.	Urinary catheters used for management of incontinence	☐	☐	☐	☐	☐
b.	Urinary catheters removed within 24-48 hours of admission unless there are appropriate indications (e.g. HICPAC) for continued use	☐	☐	☐	☐	☐
c.	Alternatives to indwelling catheters (e.g. urinals, bedpans, bedside commodes, intermittent catheters, condom catheters) used when appropriate	☐	☐	☐	☐	☐
d.	Urinary catheters inserted using aseptic technique and sterile equipment	☐	☐	☐	☐	☐
e.	Portable bladder (scanner) ultrasound used to assess urine volume	☐	☐	☐	☐	☐
f.	Use of urinary drainage systems with pre-connected, sealed catheter-tubing junctions used	☐	☐	☐	☐	☐
g.	Catheters changed at routine, fixed intervals (e.g. every 30 days)	☐	☐	☐	☐	☐
h.	Systemic anti-microbial prophylaxis for urinary catheters used	☐	☐	☐	☐	☐
i.	Urinary drainage bags kept below level of bladder	☐	☐	☐	☐	☐
j.	Urinary catheters disconnected from collecting systems (e.g. irrigations, leg bag attachment)	☐	☐	☐	☐	☐
k.	Screening for asymptomatic bacteriuria (ASB) performed	☐	☐	☐	☐	☐
l.	Measuring adherence to proper aseptic insertion of urinary catheters	☐	☐	☐	☐	☐
m.	Measuring adherence to documentation of catheter insertion and removal dates	☐	☐	☐	☐	☐
n.	Measuring adherence to documentation of indication for urinary catheter placement	☐	☐	☐	☐	☐
o.	Measuring adherence to hand hygiene policies	☐	☐	☐	☐	☐

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AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Facility Demographics

Surveillance

21. Is surveillance for CAUTI performed at your facility/CLC?

○ Yes   ○ No

21.1.   If yes, where is surveillance data entered: (Select all that apply)
☐ MDS
☐ NHSN
☐ Other (Please specify)_____

22. Do you know your facility/CLC's catheter-associated urinary tract infection rate?

○ Yes   ○ No

23. For each statement below, please select YES or NO: "Our facility/CLC …"

	Yes	No	Don't Know	N/A
a. Collects CAUTI data using an Electronic Health Records (HER) or Electronic Medical Records (EMR) system	☐	☐	☐	☐
b. Keeps records of residents with healthcare-associated CAUTI in an electronic spreadsheet, database, logbook	☐	☐	☐	☐
c. Uses standard definitions to determine if a resident has CAUTI (McGeer criteria or CDC NHSN definitions)	☐	☐	☐	☐
d. Uses new antibiotic prescriptions to determine if a resident has CAUTI	☐	☐	☐	☐
e. Reviews provider notes to determine if a resident has CAUTI	☐	☐	☐	☐
f. Tracks rates of CAUTI over time to identify trends	☐	☐	☐	☐
g. Creates summary reports of healthcare associated CAUTIs	☐	☐	☐	☐
h. Shares CAUTI surveillance data with facility board members	☐	☐	☐	☐
i. Shares CAUTI surveillance data with facility leadership	☐	☐	☐	☐
j. Shares CAUTI surveillance data with facility managers	☐	☐	☐	☐
k. Shares CAUTI surveillance data with all facility nursing staff	☐	☐	☐	☐
l. Shares CAUTI surveillance data with residents and family members	☐	☐	☐	☐

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AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Facility Demographics

CAUTI Prevention

24. Are any quality improvement (QI) programs for CAUTI prevention in place? (Select all that apply)

☐ Electronic alerts or reminders for removing unnecessary catheters

☐ Multidisciplinary urinary catheter "rounds"

☐ Stop orders for urinary catheters

☐ Nurse initiated discontinuance of urinary indwelling catheter

☐ Other (Please specify)_____

☐ None

25. Please indicate if and when training is offered for the following topics. These trainings may be provided by facility/CLC staff members or external organizations.

	Not offered	Offered to new staff	Offered annually	Offered as needed
a. Appropriate antibiotic use	☐	☐	☐	☐
b. Hand hygiene	☐	☐	☐	☐
c. Catheter insertion	☐	☐	☐	☐
d. Catheter maintenance	☐	☐	☐	☐
e. Reporting requirements to the health department	☐	☐	☐	☐

26. For each statement below, please select YES or NO: "Our facility/CLC has a policy on…"

	Yes	No	Don't Know
a. Appropriate indications for catheter use	☐	☐	☐
b. Urinary catheter insertion	☐	☐	☐
c. Urinary catheter maintenance	☐	☐	☐
d. Prevention of CAUTI	☐	☐	☐
e. Perineal care	☐	☐	☐
f. Fluid monitoring	☐	☐	☐
g. Assessment, observation and documentation of residents on urinary catheters	☐	☐	☐
h. Require a Physician order for the placement of a Foley catheter with documentation of reason	☐	☐	☐
i. Appropriate antibiotic use	☐	☐	☐
j. Education regarding infection risk-reduction behavior for vendors or contractual staff	☐	☐	☐
k. Education regarding infection risk-reduction behavior for visitors	☐	☐	☐

AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Facility Demographics

27. Which aspects of infection prevention are the top challenges for your facility/CLC at this time? (Select all that apply)

☐ Blood borne pathogen exposure control compliance

☐ Employee hand hygiene compliance

☐ Handling linens, equipment and medical waste

☐ Influenza vaccine to staff

☐ Preventing spread of MRSA

☐ Preventing spread of VRE

☐ Staff turnover

☐ Tracking infections

☐ Resident and family engagement

☐ Other (Please specify)

_____

☐ Communication between facilities

☐ Environmental cleaning compliance

☐ Identifying or managing outbreaks/clusters

☐ Preventing spread of *C. difficile*

☐ Preventing spread of Resistant gram-negative organisms (e.g. ESBLs)

☐ Providing sufficient education and training

☐ Standard precautions compliance

☐ Transmission-based precautions compliance

☐ There are no infection prevention challenges

28. Indicate how well you think important changes in infection prevention-related definitions, policies procedures or regulations are communicated to your facility/CLC from the following agencies

	No communication	Poorly	Neither poorly nor well	Well
a. Centers for Disease Control and Prevention (CDC)	☐	☐	☐	☐
b. Centers for Medicare and Medicaid Services (CMS)	☐	☐	☐	☐
c. State office of Licensure and Certification	☐	☐	☐	☐
d. State or local health department	☐	☐	☐	☐

29. Indicate how your facility/CLC currently maintains infection prevention-related activities during times of staff turnover or when personnel resources are limited: (Select all that apply)

☐ Cross-train staff members about infection prevention-related issues

☐ Designate a chain of command so that it is clear who will oversee infection

☐ Include an infection prevention-related component in the orientation of new employees

☐ Make infection prevention-related trainings and resources accessible as needed

☐ Make written and updated policies and procedures easily available

☐ Other (Please specify)_____

☐ No specific policy

AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Facility Demographics

30. How are CAUTIs communicated when transferring residents in and out of your facility/CLC? (Select all that apply)

☐ Discharge orders   ☐ E-mail
☐ Phone call   ☐ Transfer sheet
☐ Uniform Assessment Instrument   ☐ Other (Please specify)
☐ No communication

_____

Comments on resident transfer process including barriers:

_____
_____
_____

31. What type of infection prevention related information would be useful for you? (Select all that apply)

☐ Antibiotic duration   ☐ Antibiotic indication
☐ Antibiotic type   ☐ Colonization with *C. diff*
☐ Colonization with MDROs   ☐ Need for barrier precautions
☐ Presence and indication for feeding tubes   ☐ Presence and indication for PICC lines
☐ Presence and indication of a urinary catheter   ☐ Other (Please specify)

_____

Additional Comments:

_____
_____
_____
_____

**Thank you for your time in completing this questionnaire.
Results of this questionnaire will be sent to your organizational leads**

V6_06.08.2015   11

Nursing Home Survey on Patient Safety

> Participation in this survey is completely **_voluntary_**.
> Your responses are **_anonymous_** and will remain **_confidential_**.

> ➤ In this survey, **"resident safety"** means preventing resident injuries, incidents, and harm to residents in the nursing home.

This survey asks for your opinions about resident safety issues in your nursing home. It will take about 15 minutes to complete.

To mark your answer, just put an X or a √ in the box: ☒ or ☑.

If a question does not apply to your job or you do not know the answer, please mark the box in the last column. If you do not wish to answer a question, you may leave your answer blank.

SECTION A: Working in This Nursing Home

How much do you agree or disagree with the following statements?	Strongly Disagree ▼	Disagree ▼	Neither Agree nor Disagree ▼	Agree ▼	Strongly Agree ▼	Does Not Apply or Don't Know ▼
1. Staff in this nursing home treat each other with respect	☐1	☐2	☐3	☐4	☐5	☐9
2. Staff support one another in this nursing home	☐1	☐2	☐3	☐4	☐5	☐9
3. We have enough staff to handle the workload	☐1	☐2	☐3	☐4	☐5	☐9
4. Staff follow standard procedures to care for residents	☐1	☐2	☐3	☐4	☐5	☐9
5. Staff feel like they are part of a team	☐1	☐2	☐3	☐4	☐5	☐9
6. Staff use shortcuts to get their work done faster	☐1	☐2	☐3	☐4	☐5	☐9
7. Staff get the training they need in this nursing home	☐1	☐2	☐3	☐4	☐5	☐9
8. Staff have to hurry because they have too much work to do	☐1	☐2	☐3	☐4	☐5	☐9
9. When someone gets really busy in this nursing home, other staff help out	☐1	☐2	☐3	☐4	☐5	☐9
10. Staff are blamed when a resident is harmed	☐1	☐2	☐3	☐4	☐5	☐9

Participation in this survey is completely **_voluntary_**.
Your responses are **_anonymous_** and will remain **_confidential_**.

SECTION A: Working in This Nursing Home (continued)

	Strongly Disagree ▼	Disagree ▼	Neither Agree nor Disagree ▼	Agree ▼	Strongly Agree ▼	Does Not Apply or Don't Know ▼
11. Staff have enough training on how to handle difficult residents.................................	☐1	☐2	☐3	☐4	☐5	☐9
12. Staff are afraid to report their mistakes	☐1	☐2	☐3	☐4	☐5	☐9
13. Staff understand the training they get in this nursing home..	☐1	☐2	☐3	☐4	☐5	☐9
14. To make work easier, staff often ignore procedures..	☐1	☐2	☐3	☐4	☐5	☐9
15. Staff are treated fairly when they make mistakes..	☐1	☐2	☐3	☐4	☐5	☐9
16. Residents' needs are met during shift changes	☐1	☐2	☐3	☐4	☐5	☐9
17. It is hard to keep residents safe here because so many staff quit their jobs	☐1	☐2	☐3	☐4	☐5	☐9
18. Staff feel safe reporting their mistakes	☐1	☐2	☐3	☐4	☐5	☐9

SECTION B: Communications

How often do the following things happen in your nursing home?	Never ▼	Rarely ▼	Some-times ▼	Most of the time ▼	Always ▼	Does Not Apply or Don't Know ▼
1. Staff are told what they need to know before taking care of a resident for the first time...	☐1	☐2	☐3	☐4	☐5	☐9
2. Staff are told right away when there is a change in a resident's care plan.....................	☐1	☐2	☐3	☐4	☐5	☐9
3. We have all the information we need when residents are transferred from the hospital.....	☐1	☐2	☐3	☐4	☐5	☐9
4. When staff report something that could harm a resident, someone takes care of it......	☐1	☐2	☐3	☐4	☐5	☐9
5. In this nursing home, we talk about ways to keep incidents from happening again.............	☐1	☐2	☐3	☐4	☐5	☐9

Participation in this survey is completely ___voluntary___.
Your responses are ___anonymous___ and will remain ___confidential___.

SECTION B: Communications (continued)

		Never ▼	Rarely ▼	Some-times ▼	Most of the time ▼	Always ▼	Does Not Apply or Don't Know ▼
6.	Staff tell someone if they see something that might harm a resident.............................	$\square_1$	$\square_2$	$\square_3$	$\square_4$	$\square_5$	$\square_9$
7.	Staff ideas and suggestions are valued in this nursing home...............................	$\square_1$	$\square_2$	$\square_3$	$\square_4$	$\square_5$	$\square_9$
8.	In this nursing home, we discuss ways to keep residents safe from harm........................	$\square_1$	$\square_2$	$\square_3$	$\square_4$	$\square_5$	$\square_9$
9.	Staff opinions are ignored in this nursing home...	$\square_1$	$\square_2$	$\square_3$	$\square_4$	$\square_5$	$\square_9$
10.	Staff are given all the information they need to care for residents	$\square_1$	$\square_2$	$\square_3$	$\square_4$	$\square_5$	$\square_9$
11.	It is easy for staff to speak up about problems in this nursing home	$\square_1$	$\square_2$	$\square_3$	$\square_4$	$\square_5$	$\square_9$

SECTION C: Your Supervisor

How much do you agree or disagree with the following statements?		Strongly Disagree ▼	Disagree ▼	Neither Agree nor Disagree ▼	Agree ▼	Strongly Agree ▼	Does Not Apply or Don't Know ▼
1.	My supervisor listens to staff ideas and suggestions about resident safety.................	$\square_1$	$\square_2$	$\square_3$	$\square_4$	$\square_5$	$\square_9$
2.	My supervisor says a good word to staff who follow the right procedures	$\square_1$	$\square_2$	$\square_3$	$\square_4$	$\square_5$	$\square_9$
3.	My supervisor pays attention to resident safety problems in this nursing home	$\square_1$	$\square_2$	$\square_3$	$\square_4$	$\square_5$	$\square_9$

Participation in this survey is completely *voluntary*.
Your responses are *anonymous* and will remain *confidential*.

SECTION D: Your Nursing Home

How much do you agree or disagree with the following statements?	Strongly Disagree ▼	Disagree ▼	Neither Agree nor Disagree ▼	Agree ▼	Strongly Agree ▼	Does Not Apply or Don't Know ▼
1. Residents are well cared for in this nursing home...	☐1	☐2	☐3	☐4	☐5	☐9
2. Management asks staff how the nursing home can improve resident safety..................	☐1	☐2	☐3	☐4	☐5	☐9
3. This nursing home lets the same mistakes happen again and again................................	☐1	☐2	☐3	☐4	☐5	☐9

SECTION D: Your Nursing Home (continued)

	Strongly Disagree ▼	Disagree ▼	Neither Agree nor Disagree ▼	Agree ▼	Strongly Agree ▼	Does Not Apply or Don't Know ▼
4. It is easy to make changes to improve resident safety in this nursing home	☐1	☐2	☐3	☐4	☐5	☐9
5. This nursing home is always doing things to improve resident safety	☐1	☐2	☐3	☐4	☐5	☐9
6. This nursing home does a good job keeping residents safe	☐1	☐2	☐3	☐4	☐5	☐9
7. Management listens to staff ideas and suggestions to improve resident safety	☐1	☐2	☐3	☐4	☐5	☐9
8. This nursing home is a safe place for residents	☐1	☐2	☐3	☐4	☐5	☐9
9. Management often walks around the nursing home to check on resident care........	☐1	☐2	☐3	☐4	☐5	☐9
10. When this nursing home makes changes to improve resident safety, it checks to see if the changes worked......................................	☐1	☐2	☐3	☐4	☐5	☐9

SECTION E: Overall Ratings

1. I would tell friends that this is a safe nursing home for their family.
   - ☐ a. Yes
   - ☐ b. Maybe
   - ☐ c. No

2. Please give this <u>nursing home</u> an overall rating on resident safety.

Poor ▼	Fair ▼	Good ▼	Very good ▼	Excellent ▼
☐1	☐2	☐3	☐4	☐5

Participation in this survey is completely ***voluntary***.
Your responses are ***anonymous*** and will remain ***confidential***.

SECTION F: Background Information

1. What is your job in this nursing home? Check ONE box that best applies to your job. If more than one category applies, check the highest level job.

☐ a. **Administrator/Manager**
Executive Director/Administrator
Medical Director
Director of Nursing/Nursing Supervisor
Department Head
Unit Manager/Charge Nurse
Assistant Director/Assistant Manager
Minimum Data Set (MDS) Coordinator/
    Resident Nurse Assessment
    Coordinator (RNAC)

☐ b. **Physician (MD, DO)**

☐ c. **Other Provider** Nurse
Practitioner Clinical
Nurse Specialist
Physician Assistant

☐ d. **Licensed Nurse**
Registered Nurse (RN)
Licensed Practical Nurse (LPN)
Wound Care Nurse

☐ e. **Nursing Assistant/Aide**
Certified Nursing Assistant (CNA)
Geriatric Nursing Assistant (GNA)
Nursing Aide/Nursing Assistant

☐ f. **Direct Care Staff**
Activities Staff Member
Dietitian/Nutritionist
Medication Technician
Pastoral Care/Chaplain
Pharmacist
Physical/Occupational/Speech/
    Respiratory Therapist
Podiatrist
Social Worker

☐ g. **Administrative Support Staff**
Administrative Assistant
Admissions
Billing/Insurance
Secretary
Human Resources
Medical Records

☐ h. **Support Staff**
Drivers
Food Service/Dietary
Housekeeping
Laundry Service
Maintenance
Security

☐ i. **Other** (Please write the title of your job):

_____

2. How long have you worked in this nursing home?
☐ a. Less than 2 months
☐ b. 2 to 11 months
☐ c. 1 to 2 years
☐ d. 3 to 5 years
☐ e. 6 to 10 years
☐ f. 11 years or more

3. How many hours per week do you usually work in this nursing home?
☐ a. 15 or fewer hours per week
☐ b. 16 to 24 hours per week
☐ c. 25 to 40 hours per week
☐ d. More than 40 hours per week

Participation in this survey is completely ***voluntary***.
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SECTION F: Background Information (continued)

4. When do you work most often? Check ONE answer.
   - ☐ a. Days
   - ☐ b. Evenings
   - ☐ c. Nights

5. Are you paid by a staffing agency when you work for this nursing home?
   - ☐ a. Yes
   - ☐ b. No

6. In your job in this nursing home, do you work directly with residents most of the time? Check ONE answer.
   - ☐ a. YES, I work directly with residents most of the time.
   - ☐ b. NO, I do NOT work directly with residents most of the time.

7. In this nursing home, where do you spend most of your time working? Check ONE answer.
   - ☐ a. Many different areas or units in this nursing home / No specific area or unit
   - ☐ b. Alzheimer's / Dementia unit
   - ☐ c. Rehab unit
   - ☐ d. Skilled nursing unit
   - ☐ e. Other area or unit (Please specify): _____

SECTION G: Your Comments

Please feel free to write any comments about resident care and safety in this nursing home.

THANK YOU FOR COMPLETING THIS SURVEY.

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Knowledge Questionnaire—Licensed Staff

AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Knowledge Questionnaire (formerly Skills Questionnaire) –
Licensed care providers

Before beginning the questionnaire, please take a moment to read the following information.

1. This questionnaire covers topics about resident safety culture and infection prevention and should be completed prior to each Learning Session (e.g. Kick-off, Mid-Year, Final)

2. Shared data WILL NOT include identifiers. All facility and individual data are confidential

Demographics

1. Today's Date: ___/___/____

<u>Facility information</u>

2. State: _____

3. Facility Name: _____

4. Select your lead organization:

- ○ Advancing Excellence
- ○ Alabama Quality Assurance Foundation
- ○ Arizona Health and Hospital Association
- ○ CAHF (California Association of Health Facilities)
- ○ Foundation for Healthy Communities (NH)
- ○ Genesis HealthCare
- ○ Grace Living Centers (OK)
- ○ Healthcare Association of New York State
- ○ Healthcentric Advisors (RI)
- ○ HealthInsight (NV, NM, UT)
- ○ Information & Quality Healthcare (MS)
- ○ The Joint Commission
- ○ Louisiana eQHealth Solutions, Inc.

- ○ Massachusetts Senior Care Association
- ○ Minnesota Hospital Association
- ○ Missouri Hospital Association
- ○ New Jersey Hospital Association
- ○ North Dakota Quality Health Care Association
- ○ Oregon Patient Safety Commission
- ○ Pennsylvania Patient Safety Authority
- ○ Presbyterian Manors of Mid-America (KS & MO)
- ○ Professional Nursing Solutions, LLC (AR)
- ○ Qualidigm (CT)
- ○ South Carolina Hospital Association
- ○ South Dakota Association of Healthcare Organizations

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AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Knowledge Questionnaire (formerly Skills Questionnaire) –
Licensed care providers

○ South Florida Hospital & Healthcare Association

○ Spectrum Health (MI)

○ Telligen (IL & IA)

○ Tennessee Healthcare Association

○ Veteran's Health Administration

○ Other (Please Specify)
_____

5. **Please select the title that best describes you:**

○ Physician

○ Advanced Registered Nurse Practitioner (ARNP)

○ Registered Nurse (RN)

○ Licensed Practical Nurse (LPN)

6. **How many years have you worked in healthcare?**

○ 0-5 yrs.

○ 5-10 yrs.

○ 10-15 yrs.

○ 15-20 yrs.

○ > 20 yrs.

7. **How many years have you been in your current position?**

○ 0-5 yrs.

○ 5-10 yrs.

○ 10-15 yrs.

○ 15-20 yrs.

○ > 20 yrs.

Team Building

8. **Nursing home resident safety is increased by which of the following steps:**

○ Identifying situations when residents may be harmed

○ Forming a safety team

○ Analyzing how safety concerns can be prevented

○ Discussing with residents how they are kept safe

○ All of the above

9. **Safety teams should contain staff with different job responsibilities:**

○ True   ○ False

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AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Knowledge Questionnaire (formerly Skills Questionnaire) –
Licensed care providers

10. **Teamwork can result in improved resident safety by:**

○ Facilitating better communication.

○ Motivating employees.

○ Creating mutual respect and trust.

○ Developing problem-solving skills.

○ All of the above

11. **Team building can improve the group's outcomes by all of the following statements EXCEPT:**

○ Creating a safe environment for topics to be discussed openly.

○ Making sure all members think alike.

○ Clearly defining roles and responsibilities.

○ Respecting diversity and differences of perspective.

○ Help members to learn more about themselves and how they work best.

12. **Teams will be motivated to meet set goals by:**

○ Frequent feedback on progress towards the goal.

○ Identification of barriers to goals being achieved.

○ A pizza party.

○ Recognition of successful steps taken towards the goal.

○ All of the above.

13. **A safety team working in nursing homes to prevent resident harms should include the following as either core and/or ad hoc members (check all that apply):**

☐ Director of Nursing   ☐ Certified Nursing Assistant
☐ Family members of residents   ☐ Medical Director
☐ Housekeeper   ☐ Resident
☐ Registered Nurse   ☐ Infection Control and Prevention
☐ Pharmacist   ☐ Licensed Practical Nurse

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AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Knowledge Questionnaire (formerly Skills Questionnaire) –
Licensed care providers
<u>**CAUTI Definitions**</u>

14. **Which of the following criteria would confirm a CAUTI in a nursing home resident with a urinary catheter?**
    (Select all that apply)

    ☐ The resident's oral temp.is 100° F and the indwelling catheter specimen is positive for *Staph. aureus* 10^5 CFU/ml

    ☐ The resident has pus-filled discharge around the suprapubic catheter and the catheter specimen is positive for *Staph. aureus* 10^5 CFU/ml

    ☐ The resident has a new change in mental status with inattentiveness, disorganized thinking, and a voided specimen positive for 10^2 CFU/ml *Staph. aureus* 4 days after the catheter was removed

    ☐ The resident has multiple oral temps of 99.8 ° F, costovertebral angle pain, and the indwelling catheter specimen is positive for *Staph. aureus* 10^5 CFU/ml

15. **Which one of the following dates would be considered the "date of the event"?**

    ○ April 1 - The resident has a urinary catheter in place and has documentation of new suprapubic pain.

    ○ April 2 – The resident has gross hematuria

    ○ April 3 - The resident has a temp of 100^0 F. A catheter urine specimen was collected and sent for culture.

    ○ April 5 - The culture is positive for 10^5 *Staph. aureus*.

16. **Which of the following scenarios indicates that the CAUTI was present on admission? (Select all that apply)**

    ☐ The resident was admitted with a catheter and had multiple oral temps of 99.2^0F – 99.8^0F on the third day after admission.

    ☐ The resident's catheter was removed at the hospital the day of discharge and his/her oral temperature was 100^0F the next day.

    ☐ The resident was admitted with a catheter and developed pus-filled discharge around the catheter the day after admission.

    ☐ The resident's catheter was removed the day of admission and s/he developed rigors the third day after admission.

17. **A change in a resident's mental status is considered new or worse than usual if: (select all that apply)**

    ☐ Resident's behavior change comes and goes or changes in severity

    ☐ Resident is combative and confused

    ☐ Resident's thinking doesn't make sense; hard to follow

    ☐ Resident is sleepy, lethargic, un-arousable

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AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Knowledge Questionnaire (formerly Skills Questionnaire) –
Licensed care providers
Case Studies – Identifying CAUTIs

Case 1:
Day 1: The resident has a urinary catheter inserted in the nursing home for a bladder outlet obstruction.

Day 2: The indwelling urinary catheter remains in place

Day 3: The resident's indwelling urinary catheter remains in place .The resident has a single oral temp of 100.2 F. A urine culture is ordered and collected from an indwelling catheter specimen.

Day 4: The indwelling urinary catheter remains in place. No symptoms documented

Day 5: The urine culture is positive for *Staphylococcus Aureus* > 100, 000 CFU/ml.

Is this a CAUTI or a non- catheter associated symptomatic UTI (SUTI)?

      ○ CAUTI   ○ SUTI

Case 2:

Day 1: 85-year-old male is admitted to the NH for rehab after hospitalization with a GI bleed. A foley catheter was inserted three days ago during his hospitalization and remains in place.

Day 2: Resident spikes temp of 38.6°C. Indwelling catheter remains in place. Urine specimen is sent.

Day 3: Culture results: 100,000 CFU/ml *Pseudomonas aeruginosa*. Resident is afebrile and asymptomatic. Antibiotics were started.

Day 4 and 5: Resident is asymptomatic and afebrile.

Does this resident have a CAUTI?

      ○ Yes, Present on Admission (POA)

      ○ Yes, not POA

      ○ No

Case 3:
Aug 25: 73-y.o. resident was admitted to NH following hospitalization for a cerebrovascular accident. A Foley catheter and tracheostomy are in place on admission. The resident reacts only to painful stimuli.

Sept 2: WBCs slightly elevated, at 12,000/mm^3, temp maximum 37.4°C, urine cloudy. Lungs clear to auscultation.

Sept 3: WBC 15,800/mm^3, Temperature maximum: 37.6°C. Breath sounds slightly coarse, minimal clear sputum. Urine unchanged in appearance. A urine specimen was collected for UA and culture. No suprapubic or CVA pain noted.

Sept 4: Urinalysis positive for leukocyte esterase, nitrites and WBC too numerous to count. Urine culture results: 100,000 CFU/ml *E. faecium*.

Does this resident have a CAUTI?

    ○ Yes, Present on Admission (POA)

    ○ Yes, not POA

    ○ No

Case 4:
March 1: A 70 year old male was admitted for rehabilitation with a foley catheter in place.

March 4: The resident was starting on a voiding trial and the catheter was removed.

March 5: Resident states he has been having trouble voiding and has not felt that he has been emptying his bladder. He is catheterized post-void and 600 ml of residual urine collected. The foley catheter is left in place.

March 6: Resident complains of tenderness upon suprapubic palpation. Urine is sent for culture and is reported positive for > 100,000 CFU/ml of *E. faecium*.

Does this resident have a CAUTI?

    ○ Yes, Present on Admission (POA)

    ○ Yes, not POA

    ○ No

AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Knowledge Questionnaire (formerly Skills Questionnaire) –
Licensed care providers

Case 5:
April 5: 76-year-old woman is re-admitted to NH after surgical debridement of sacral decubitus. Medical history notable for severe rheumatoid arthritis, CHF and atrial fibrillation. Routine admission U/A performed, positive for leukocyte esterase, and 3 WBC by HPF of spun urine. Resident is afebrile, denies urinary urgency, frequency or pain. No suprapubic or CVA pain. Foley catheter present on admission, and in place since surgery on 4/01.

April 6: Wound care specialist documents wound clean. Temperature 37.4°C. Foley draining cloudy urine.

April 7: Temp of 37.9°C. Foley removed for voiding trial. Urine specimen sent to lab for culture and sensitivity.

April 8: Resident complains of dysuria and pain with palpation to suprapubic area. Bactrim was started.

April 9: Urine specimen sent on 04/07 results are positive for 100,000 CFU/ml *E. coli*. Resident is afebrile.

Does this resident have a CAUTI?

○ Yes, Present on Admission (POA)

○ Yes, not POA

○ No

Surveillance, Epidemiology, Reporting

18. **Surveillance activities include (select all that apply):**
☐ Observing residents for signs and symptoms of infection
☐ The responsibility of the Infection Preventionist/Control
☐ Analyzing data to track trends over time
☐ Sharing the information with front-line staff

19. **To prevent infection in a resident with a urinary catheter which of the following is necessary (select all that apply)?**
☐ Removing the catheter as soon as possible
☐ Changing the catheter at routine fixed intervals to reduce biofilm formation on the catheter
☐ Using a catheter only when necessary
☐ Performing hand hygiene and wearing gloves when touching the catheter

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20. **Asymptomatic bacteriuria (i.e. bacteria present in the urine but the person has no signs or symptoms of an infection) is common in residents with a urinary catheter:**

  ○ True   ○ False

21. **The presence of pyuria (white blood cells) in a urine specimen helps to distinguish asymptomatic bacteriuria from a symptomatic urinary tract infection in residents with indwelling urinary catheters:**

  ○ True   ○ False

Resident Safety Culture

22. **Work culture is made up of values, attitudes and beliefs:**

  ○ True   ○ False

23. **Resident safety culture is enhanced in all the ways below EXCEPT:**

  ○ Everyone providing care for residents with an indwelling urinary catheter in the same way.

  ○ Alignment of resident safety with the organizational goals and strategies.

  ○ Management firing staff when they make an error.

  ○ Including residents and their family members in planning for their safety.

  ○ The Safety Team provides updates to the staff about how the work is progressing.

24. **When talking about work being done in teams to improve outcomes, psychological safety (i.e. how group members think they are viewed by others in the group) is:**

  ○ Teams preventing injury to others.

  ○ Being aware of one's surroundings when with a team.

  ○ A shared belief that each team member is safe to speak-up

25. **What is the best way of improving resident safety culture?**

  ○ Teamwork

  ○ Disciplinary processes put into place by managers, directors or physicians

  ○ Education about the best way to do things

  ○ Team of frontline staff performing process evaluations with improvements tried using small tests of change

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AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Knowledge Questionnaire (formerly Skills Questionnaire) –
Licensed care providers

Hand Hygiene

26. **How long should you rub your hands with soap when you are hand washing?**

    ○ At least 5 seconds   ○ At least 30 seconds

    ○ At least 15 seconds   ○ At least 60 seconds

27. **Alcohol-based hand rub is not recommended for hand hygiene when:**

    ○ Touching the resident's bedrail   ○ Sneezing into a tissue

    ○ Giving the resident a high-five   ○ Hands are visibly soiled

28. **One should perform hand hygiene before and after wearing gloves when touching the urinary catheter or collecting system:**

    ○ True   ○ False

29. **Which type of hand hygiene product is most effective at killing most types of germs on your hands (select one)?**

    ○ Alcohol-based hand rub

    ○ Plain soap

    ○ Antimicrobial soap

Equipment & Environment

30. After emptying urine from a Foley drainage bag into a measuring cup, it is OK to rinse it out and use the same cup to measure urine output from the next resident who has a Foley catheter:

    ○ True   ○ False

31. Important elements of Foley catheter care include observing to assure that:

    ○ The catheter is secured to leg or abdomen

    ○ There are no kinks in the catheter tubing

    ○ The collecting bag and tubing are not on the floor

    ○ The collecting bag is below the level of the bladder

    ○ All of the above

32. The doctor at your skilled nursing facility ordered a urine culture for one of your residents. Which of the following should be used when collecting a urine specimen for culture?

    ○ A. Collect the urine when you come on shift at 8:00am and then leave it in the pick-up spot for the lab courier who will be at your facility at 12:00 noon because the Lab only comes once/day.

    ○ B. Obtain the urine specimen from the sampling port of the Foley – not the drainage bag.

    ○ C. Clean your hands before and after you obtain the specimen.

    ○ D. If the resident has had a Foley for > 2 weeks you should ask the nurse about replacing the Foley before you obtain the urine specimen for culture from the newly inserted Foley.

    ○ B, C, and D only

    ○ None of the above

33. There is no need to read the instructions for use for the disinfectant used in your facility as your co-worker already provided key tips on how and when to use it:

    ○ True   ○ False

34. Each resident should have his or her own blood glucose meter to avoid a need to share between residents:

    ○ True   ○ False

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AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Knowledge Questionnaire (formerly Skills Questionnaire) –
Licensed care providers

Standard & Transmission-based Precautions

35. Which of the following statements about gown use are TRUE? (select all that apply)

- ☐ Gowns should be worn when splashing or sprays of blood or body fluids could occur during resident care
- ☐ When removing a gown, it should be turned in-side out by a peeling motion and then held away from the body until discarded.
- ☐ Gowns can reduce contamination of healthcare personnel clothes

36. Personal Protective Equipment (PPE) include(s) which of the following (select all that apply):

- ○ Gloves   ○ Gowns
- ○ Face wear   ○ Goggles

37. The following statements are TRUE about glove use EXCEPT:

- ○ Gloves should be worn when contact with blood or body fluids is expected
- ○ Gloves should be changed if moving from a contaminated body site such as a wound or pressure sore to a clean body site
- ○ Gloves should be used on all residents in the same room as long as they are not visibly soiled
- ○ Gloves should not be washed and reused

38. When deciding what type of PPE to wear for Standard Precautions, all of the following must be considered EXCEPT:

- ○ Degree of contact with infectious substances
- ○ Infection status of the resident
- ○ Nature of the task
- ○ Fluid penetration prevention

39. Preventing the spread of multidrug resistant organisms (MDROs) requires (select all that apply):

- ☐ Hand hygiene by all staff
- ☐ Reducing the use of indwelling devices
- ☐ Use of personal protective equipment
- ☐ Reducing the use of antibiotics
- ☐ Keeping the environment clean

Antibiotic Stewardship

40. **Which of the following signs and symptoms means that you should send a urine culture? (Select One)**

    ○ Cloudy urine   ○ Temperature of 101F

    ○ Foul smelling urine   ○ Change in urine color

41. **All residents with urinary catheters should have a screening urine culture sent on admission to your facility:**

    ○ True   ○ False

42. **Which patient should be treated with antibiotics?**

    ○ Patient with fever and bacteria in the urine (a positive urine culture).

    ○ Patient with normal temperature and normal activity and cloudy urine.

    ○ Patient with normal temperature and normal activity and bacteria in the urine.

    ○ Patient with normal temperature and normal activity and elevated white blood cells in the urine.

**Thank you for your time in completing this knowledge assessment
The results of this assessment will be sent to your Organizational Leads**

Knowledge Questionnaire—Nonlicensed Staff

AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Knowledge Questionnaire (formerly Skills Questionnaire) —
Unlicensed care providers

Before beginning the questionnaire, please take a moment to read the following information.

1. This questionnaire covers topics about resident safety culture and infection prevention and should be completed prior to each Learning Session (e.g. Kick-off, Mid-Year, Final)

2. Shared data WILL NOT include identifiers. All facility and individual data are confidential

Demographics

1. Today's Date: ___/___/____

Facility information

2. State: _____

3. Facility Name: _____

4. Select your lead organization:

- ○ Advancing Excellence
- ○ Alabama Quality Assurance Foundation
- ○ Arizona Health and Hospital Association
- ○ CAHF (California Association of Health Facilities)
- ○ Foundation for Healthy Communities (NH)
- ○ Genesis HealthCare
- ○ Grace Living Centers (OK)
- ○ Healthcare Association of New York State
- ○ Healthcentric Advisors (RI)
- ○ HealthInsight (NV, NM, UT)
- ○ Information & Quality Healthcare (MS)
- ○ The Joint Commission
- ○ Louisiana eQHealth Solutions, Inc.

- ○ Massachusetts Senior Care Association
- ○ Minnesota Hospital Association
- ○ Missouri Hospital Association
- ○ New Jersey Hospital Association
- ○ North Dakota Quality Health Care Association
- ○ Oregon Patient Safety Commission
- ○ Pennsylvania Patient Safety Authority
- ○ Presbyterian Manors of Mid-America (KS & MO)
- ○ Professional Nursing Solutions, LLC (AR)
- ○ Qualidigm (CT)
- ○ South Carolina Hospital Association
- ○ South Dakota Association of Healthcare Organizations

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AHRQ Safety Program for Long-Term Care: HAIs/CAUTI
Knowledge Questionnaire (formerly Skills Questionnaire) –
Unlicensed care providers

○ South Florida Hospital &   ○ Tennessee Healthcare
   Healthcare Association   Association

○ Spectrum Health (MI)   ○ Veteran's Health Administration

○ Telligen (IL & IA)   ○ Other (Please Specify)
                                 _____

5. **Please select the title that best describes you:**

○ Certified Nursing Assistant

○ Other (Please Specify):_____

6. **How many years have you worked in healthcare?**

○ 0-5 yrs.   ○ 15-20 yrs.

○ 5-10 yrs.   ○ > 20 yrs.

○ 10-15 yrs.

7. **How many years have you been in your current position?**

○ 0-5 yrs.

○ 5-10 yrs.

○ 10-15 yrs.

Team Building

8. **Nursing home resident safety is increased by which of the following steps:**

○ Identifying situations when   ○ Discussing with residents how
   residents may be harmed   they are kept safe

○ Forming a safety team   ○ All of the above

○ Analyzing how safety concerns
   can be prevented

9. **Safety teams should contain staff with different job responsibilities:**

○ True   ○ False

10. **Teamwork can result in improved resident safety by:**

○ Facilitating better   ○ Developing problem-solving
   communication.   skills.

○ Motivating employees.   ○ All of the above

○ Creating mutual respect and
   trust.

AHRQ Safety Program for Long-Term Care: CAUTI
Skills Assessment Questionnaire – Unlicensed care providers

11. Team building can improve the group's outcomes by all of the following statements EXCEPT:

○ Creating a safe environment for topics to be discussed openly.

○ Making sure all members think alike.

○ Clearly defining roles and responsibilities.

○ Respecting diversity and differences of perspective.

○ Help members to learn more about themselves and how they work best.

12. Teams will be motivated to meet set goals by:

○ Frequent feedback on progress towards the goal.

○ Identification of barriers to goals being achieved.

○ A pizza party.

○ Recognition of successful steps taken towards the goal.

○ All of the above.

13. A safety team working in nursing homes to prevent resident harms should include the following as either core and/or ad hoc members (check all that apply):

☐ Director of Nursing   ☐ Certified Nursing Assistant
☐ Family members of residents   ☐ Medical Director
☐ Housekeeper   ☐ Resident
☐ Registered Nurse   ☐ Infection Control and Prevention
☐ Pharmacist   ☐ Licensed Practical Nurse

CAUTI Definitions

14. An indwelling urinary catheter is:

○ A drainage tube that is inserted into the urinary bladder through the urethra and is connected to a closed collection system.

○ A drainage tube that is attached to a condom for bladder control in a male resident.

○ A drainage tube that is left in the kidney and is connected to a closed collection system.

○ A drainage tube that is inserted into the resident's bladder in the suprapubic area.

15. Which of the following would NOT indicate that your resident has a fever?

○ A single oral temperature of 100.8^0F

○ Repeated oral temperatures of 99.2° F

○ Repeated rectal temperatures of 99.0 °F

○ A single temperature >2°F over the resident's usual temperature from any site (oral, tympanic, axillary)

16. A change in a residents mental status is considered new or worse than usual if: (select all that apply)

☐ Resident's behavior change comes and goes or changes in severity

☐ Resident is combative and confused

☐ Resident's thinking doesn't make sense; hard to follow

☐ Resident is sleepy, lethargic, un-arousable

17. Which of the following activities of daily living is NOT used to determine the resident's level of function?

○ Bed mobility and transfers

○ Reading and writing

○ Dressing and eating

○ Personal hygiene and toileting

Surveillance, Epidemiology, Reporting

18. When a resident is incontinent of urine, use of indwelling urinary catheter is encouraged:

○ True   ○ False

19. You should routinely culture cloudy, smelly urine:

○ True   ○ False

20. If you noticed that your resident has a fever and is more confused than normal, which steps do you take: (Select one)

○ Tell the nurse

○ Document in chart and do nothing else

○ Wait to see if this goes away

○ Do nothing

Resident Safety Culture

21. Work culture is made up of values, attitudes and beliefs:

○ True   ○ False

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22. Resident safety culture is enhanced in all the ways below EXCEPT:

○ Everyone providing care for residents with an indwelling urinary catheter in the same way

○ Alignment of resident safety with the organizational goals and strategies

○ Management firing staff when they make an error

○ Including residents and their family members in planning for their safety

○ The Safety Team provides updates to the staff about how the work is progressing

23. When talking about work being done in teams to improve outcomes, psychological safety (i.e. how group members think they are viewed by others in the group) is:

○ Teams preventing injury to others

○ Being aware of one's surroundings when with a team

○ A shared belief that each team member is safe to speak-up

24. What is the best way of improving resident safety culture?

○ Teamwork

○ Disciplinary processes put into place by managers, directors or physicians

○ Education about the best way to do things

○ Team of frontline staff performing process evaluations with improvements tried using small tests of change

Hand Hygiene

25. How long should you rub your hands with soap when you are hand washing?

○ At least 5 seconds   ○ At least 30 seconds

○ At least 15 seconds   ○ At least 60 seconds

26. Alcohol-based hand rub is not recommended for hand hygiene when:

○ Touching the resident's bedrail   ○ Sneezing into a tissue

○ Giving the resident a high-five   ○ Hands are visibly soiled

27. One should perform hand hygiene before and after wearing gloves when touching the urinary catheter or collecting system:

○ True   ○ False

28. Which type of hand hygiene product is most effective at killing most types of germs on your hands (select one)?

    ○ Alcohol-based hand rub

    ○ Plain soap

    ○ Antimicrobial soap

Equipment & Environment

29. After emptying urine from a Foley drainage bag into a measuring cup, it is OK to rinse it out and use the same cup to measure urine output from the next resident who has a Foley catheter:

    ○ True   ○ False

30. Important elements of Foley catheter care include observing to assure that:

    ○ The catheter is secured to leg or abdomen

    ○ There are no kinks in the catheter tubing

    ○ The collecting bag and tubing are not on the floor

    ○ The collecting bag is below the level of the bladder

    ○ All of the above

31. The doctor at your skilled nursing facility ordered a urine culture for one of your residents. Which of the following should be used when collecting a urine specimen for culture?

    ○ A. Collect the urine when you come on shift at 8:00am and then leave it in the pick-up spot for the lab courier who will be at your facility at 12:00 noon because the lab only comes once/day.

    ○ B. Obtain the urine specimen from the sampling port of the Foley – not the drainage bag.

    ○ C. Clean your hands before and after you obtain the specimen.

    ○ D. If the resident has had a Foley for > 2 weeks you should ask the nurse about replacing the Foley before you obtain the urine specimen for culture from the newly inserted Foley

    ○ B, C, and D only

    ○ None of the above

32. There is no need to read the instructions for use for the disinfectant used in your facility as your co-worker already provided key tips on how and when to use it:

    ○ True   ○ False

33. Each resident should have his or her own blood glucose meter to avoid a need to share between residents:

    ○ True   ○ False

Standard & Transmission-based Precautions

34. Which of the following statements about gown use are TRUE? (select all that apply)

    ☐ Gowns should be worn when splashing or sprays of blood or body fluids could occur during resident care

    ☐ When removing a gown, it should be turned in-side out by a peeling motion and then held away from the body until discarded.

    ☐ Gowns can reduce contamination of healthcare personnel clothes

35. Personal Protective Equipment (PPE) include(s) which of the following (select all that apply):

    ☐ Gloves   ☐ Gowns
    ☐ Face wear   ☐ Goggles

36. The following statements are TRUE about glove use <u>EXCEPT</u>:

    ○ Gloves should be worn when contact with blood or body fluids is expected

    ○ Gloves should be changed if moving from a contaminated body site such as a wound or pressure sore to a clean body site

    ○ Gloves should be used on all residents in the same room as long as they are not visibly soiled

    ○ Gloves should not be washed and reused

37. When deciding what type of PPE to wear for Standard Precautions, all of the following must be considered <u>EXCEPT</u>:

    ○ Degree of contact with infectious substances

    ○ Infection status of the resident

    ○ Nature of the task

    ○ Fluid penetration prevention

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38. **Preventing the spread of multidrug resistant organisms (MDROs) requires (select all that apply):**
    ☐ Hand hygiene by all staff
    ☐ Reducing the use of indwelling devices
    ☐ Use of personal protective equipment
    ☐ Reducing the use of antibiotics
    ☐ Keeping the environment clean

Antibiotic Stewardship

39. **Which of the following signs and symptoms means that you should send a urine culture? (Select One)**

    ○ Cloudy urine   ○ Temperature of 101F

    ○ Foul smelling urine   ○ Change in urine color

40. **Treating bacteria in the urine of a resident who has no symptoms of urinary tract infection can lead to a multi-drug resistant organism (MDRO)**

    ○ True   ○ False

**Thank you for your time in completing this knowledge assessment
The results of this assessment will be sent to your Organizational Leads**

Appendix H. Contract Deliverables Table

Date of Award: 19 September 2013			
Task	**Deliverable**	**Due Date**	**Status**
Base Contract Period			
Task 1. Design CUSP for CAUTI-LTC Module			
Subtask 1.1.2	Draft Evidence Report Meeting	19 November 2013	Completed
Subtask 1.1.2.1	Final Evidence Report	17 December 2013	Completed
Subtask 1.1.3	TEP Meeting Report	17 December 2013	Completed
Subtask 1.2.4	Draft Course Design Guide	19 December 2013	Completed
Subtask 1.2.4.1	Final Course Design Guide	16 January 2014	Completed
Task 2. Produce CUSP for CAUTI-LTC Module			
*Subtask 2.2	Submit Prototype for AHRQ Approval	19 March 2014	Completed
Subtask 2.2.1	Submit Final Prototype Materials	16 April 2014	Completed
Task 3. Recruitment Plan			
Subtask 3.1	Draft Recruitment Plan	19 December 2013	Completed
Subtask 3.1.1	Final Recruitment Plan	16 January 2013	Completed
Subtask 3.2	State Operating Plan	19 March 2014	Completed
Subtask 3.3.1	Draft State Sustainability Plan	19 April 2014	Completed
Subtask 3.3.2	Final State Sustainability Plan	16 May 2014	Completed
Task 4. Implement CUSP for CAUTI-LTC			
Subtask 4.1	Submit Stakeholder Meeting Report	16 June 2014	Completed
Subtask 4.2	Submit Master Trainers Report	16 July 2014	Completed
Subtask 4.4	Submit State Coordinators Meeting Report	16 July 2014	Completed
Task 5. Assess Adoption of CUSP for CAUTI-LTC			
*Subtask 5.3	Submit Draft Annual Report	19 August 2014	Completed
*Subtask 5.3.1	Submit Final Annual Report	16 September 2014	Completed
Task 6. Project Administration			
Subtask 6.2	Final Work Plan	13 November 2013	Completed
Subtask 6.3	Project Summary for Posting on the ACTION II Extranet	13 November 2013	Completed

Option Year One			
Task 1. Revision Plan for CUSP for CAUTI-LTC Modules			
Subtask 1.1A	Submit Draft Revision Plan	19 January 2015	Completed
Subtask 1.1A	Final Revision Plan	16 February 2015	Completed
Task 2A. Revise CUSP for CAUTI-LTC Modules			
Subtask 2.1A	Submit Draft Revised Materials	19 March 2015	Completed
Subtask 2.1.1A	Submit Final Revised Materials	16 April 2015	Completed
Task 3A. Recruit States and LTCs Within States			
Subtask 3.1A	Submit Recruitment Plan	19 October 2014	Completed
Subtask 3.3A	Submit State Operation Plan	19 December 2014	Completed
Subtask 3.4A	Submit Sustainability Plan	19 December 2014	Completed
Task 4A. Implement CUSP for CAUTI-LTC			
Subtask 4.1A	Stakeholder Meeting Report	16 May 2015	Completed
Subtask 4.2A	Submit Master Trainer Training Report	16 April 2015	Completed
Task 5A. Assessment			
Subtask 5.1A	Draft Annual Report	19 August 2015	Completed
Subtask 5.1A	Final Annual Report	16 September 2015	Completed
Task 6A. Project Administration			
Subtask 6.2A	Progress Report	Monthly	Completed

Option Year Two			
Task 1B. Plan Revisions to CUSP for CAUTI-LTC			
Subtask 1B	Revision Plan	19 January 2016	Completed
Task 2B. Revise CUSP for CAUTI-LTC Module			
*Task 2B	Submit Revised Materials	19 March 2016	Completed
Task 3B. Recruit States and LTCs Within States			
Subtask 3.1B	Submit Recruitment Plan	19 October 2014	Completed
Subtask 3.3B	Submit State Operation Plan	19 December 2014	Completed
Subtask 3.4B	Submit Sustainability Plan	19 December 2014	Completed
Task 4B. Implement CUSP for CAUTI-LTC			
Subtask 4.1B	Stakeholder Meeting Report	17 May 2016	Completed
Subtask 4.2B	Submit Master Trainer Training Report	16 January 2016	Completed
Task 5B. Assessment			
Subtask 5.1B	Draft Final Report	19 August 2016	Completed
Subtask 5.2B	Submit Final Report	16 September 2016	Completed

 * Deliveries must be 508 compliant

Appendix I. NHSN Long-Term Care Facility Component: Urinary Tract Infection

CDC

Urinary Tract Infection (UTI) Event for Long-term Care Facilities

Background: The urinary tract is one of the most common sites of healthcare-associated infections, accounting for up to 20% of infections reported by long-term care facilities (LTCFs)[1]. In the LTC resident, risk factors for developing bacteriuria and UTI include age-related changes to the genitourinary tract, comorbid conditions resulting in neurogenic bladder, and instrumentation required to manage bladder voiding. The point prevalence of asymptomatic bacteriuria in LTC residents can range from 20-50%. Although the incidence of symptomatic UTI is lower, it still comprises a significant proportion of infections manifesting in LTCFs and results in a large amount of antibiotic use.

Though prevalence of indwelling urinary catheter use in LTCFs is lower than in the acute care setting, catheter-associated UTI (CAUTI) can lead to such complications as cystitis, pyelonephritis, bacteremia, and septic shock. These complications associated with CAUTI can result in decline in resident function and mobility, acute care hospitalizations, and increased mortality. Prevention of CAUTIs is discussed in the CDC/HICPAC document, *Guideline for Prevention of Catheter-associated Urinary Tract Infections*[2].

Efforts to examine antibiotic use practices for UTI have demonstrated a discrepancy between the number UTI events identified through the application of evidence-based surveillance criteria with the numbers of clinically identified and treated UTI[3,4]. Consistent tracking and reporting symptomatic UTIs using surveillance criteria identify opportunities to examine, understand and address larger differences between surveillance events and clinically identified events.

References:

1. Genao L, Buhr GT. Urinary tract infections in older adults residing in long-term care facilities. Annals of Long-term Care. 2012;20 (4):33-38.

2. Healthcare Infection Control Practices Advisory Committee (HICPAC) approved guidelines for the Prevention of catheter-associated urinary tract infections, 2009. Available at www.cdc.gov/hicpac/pdf/CAUTI/ CAUTIguideline2009final.pdf

3. Juthani-Mehta M et al. Diagnostic Accuracy of Criteria for Urinary Tract Infection in a Cohort of Nursing Home Residents. Journal of the American Geriatrics Society. 2007; 55: 1072-77.

4. Wang L. et al. Infection rate and colonization with antibiotic-resistant organisms in skilled nursing facility residents with indwelling devices. European Journal of Clinical Microbiology & Infectious Diseases. 2012. 31(8):1797-804).

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Settings: UTI Event reporting is currently available for certified skilled nursing facilities/nursing homes (LTC:SKILLNURS), and intermediate/chronic care facilities for the developmentally disabled (LTC:DEVDIS). Surveillance for UTIs should be performed facility-wide.

Only UTI events presenting > **2 calendar days** after admission (where date of admission= day 1) are considered facility onset events.

Example: NHSN Classification of reportable LTCF UTI Events				
Admission date June 4ᵗʰ	June 5ᵗʰ	June 6ᵗʰ	June 7ᵗʰ	June 8ᵗʰ
day 1	day 2	day 3	day 4	day 5
Not a LTCF reportable UTI event		**LTCF reportable UTI event**		

NOTE: If a resident is transferred from an acute care facility and develops signs/symptoms of a UTI within the first 2 calendar days of admission to the LTCF, it would be considered present at the time of transfer to the LTCF. An event present at the time of transfer should be reported back to the transferring facility and not reported to NHSN as a LTCF UTI event.

Requirements: Facilities must indicate their surveillance for UTI in the *Monthly Reporting Plan for LTCF* (CDC 57.141). UTI surveillance must be reported for at least 6 consecutive months to provide meaningful measures.

Definitions:

Date of Event is defined as the date when the *first clinical evidence (signs/symptoms) of the UTI appeared* or the *date the specimen was collected* that was used to make or confirm the diagnosis, **whichever comes first**.

Urinary tract infections (UTI) are defined using a combination of clinical signs and symptoms and laboratory criteria (See Figure 1 and Table 2).

Symptomatic UTI (SUTI) events occur when the resident manifests signs and symptoms such as acute dysuria, new and/or marked increase in urinary frequency, suprapubic tenderness, etc., which localize the infection to the urinary tract. These events can occur in residents without urinary devices or those managed with urinary devices other than indwelling urinary catheters, such as suprapubic catheters, straight in-and-out catheters and condom catheters. Events occurring in residents with indwelling urinary catheters (defined below) are a sub-set of SUTIs referred to as catheter-associated SUTI (CA-SUTI) events.

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Catheter-associated SUTIs (CA-SUTI) events occur when a resident develops signs and symptoms localizing to the urinary tract while having an indwelling urinary catheter in place or removed within the 2 calendar days prior to the date of event (where day of catheter removal = day 1).

> NOTE: An indwelling urinary catheter should be in place for a minimum of 2 calendar days before infection onset (where day of catheter insertion = day 1) in order for the SUTI to be catheter-associated

> NOTE: If a resident is transferred to your facility with an indwelling urinary catheter and you replace that catheter with a new one while the resident is in your care, then the date of insertion of the device corresponds to the date the new catheter was placed in your facility.

Indwelling urinary catheter: a drainage tube that is inserted into the urinary bladder *through the urethra*, is left in place, and is connected to a closed collection system; also called a Foley catheter. Indwelling urinary catheters do not include straight in-and-out catheters or suprapubic catheters.

> NOTE: UTIs in residents managed with suprapubic, in and out, or condom (males only) catheters will be captured as SUTIs, not CA-SUTIs.

Asymptomatic Bacteremic UTI (ABUTI) events occur when the resident has NO signs or symptoms localizing to the urinary tract but has matching *urine and blood cultures positive* for at least one organism (See Table 1) regardless of whether a catheter is in place or not.

Table 1. Examples of ''sameness'' by organism speciation		
Culture	**Companion Culture**	**Report as…**
S. epidermidis	Coagulase-negative *staphylococcus*	*S. epidermidis*
Klebsiella oxytoca	*Klebsiella* spp.	*K. oxytoca*
S. salivarius	*Streptococcus viridans*	*S. salivarius*

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Numerator and Denominator Data:

Numerator Data: The *Urinary Tract Infection (UTI) for LTCF* form (CDC 57.140) is used to collect and report each SUTI, CA-SUTI, or ABUTI that is identified during the month selected for surveillance. The *Table of Instructions* includes information on how to complete this form.

The UTI form includes resident demographic information and information on whether or not a catheter (or other urinary device) was present. Additional data include the specific clinical criteria evidence (signs and symptoms) and laboratory and diagnostic testing that were used for identifying the UTI; whether the resident developed a secondary bloodstream infection; whether the resident was transferred to an acute care facility for any reason or died from any cause within 7 days of the UTI event; and the organisms isolated from cultures and their antimicrobial susceptibilities.

NOTE: When a urine specimen is being collected from a resident with a chronic indwelling urinary catheter (in place >14 days), it is recommended that the original catheter be changed prior to specimen collection.

Denominator data: Catheter-days, resident-days, and new antibiotic starts for UTI indication are used for denominators. *Catheter-days*, defined as the number of residents with an indwelling urinary (Foley) catheter, are collected daily for all residents in the facility using the *Denominators for LTCF* form *(CDC 57.142)*. The *Table of Instructions* includes information on how to complete this form.

NOTE: None of the following urinary management devices should be included when counting indwelling catheter-days: suprapubic catheters, straight in-and-out catheters or condom catheters.

NOTE: If a resident is transferred to an acute care facility for a suspected UTI, no additional indwelling catheter-days are reported after the day of transfer.

Resident-days are calculated using the daily census of residents in the facility each day of the month. These daily counts are summed and only the total for the month is entered into NHSN, under Summary Data.

New antibiotic starts for UTI indication may be collected daily or summarized at the end of each month. A "new antibiotic start" refers to a new prescription for an antibiotic ordered for a resident who is suspected or diagnosed with having a urinary tract infection (both catheter-associated and not catheter associated) regardless of whether that UTI meets the NHSN event definition. There is no minimum number of doses or days of therapy which define a new antibiotic start—count all new orders. Include only antibiotics which are started while the resident is receiving care in your facility, either by clinical providers working in the facility or by outside physicians who see the resident in an outpatient clinic or Emergency department. Do not include antibiotic courses started by another healthcare facility prior to the resident's admission

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or readmission back to your facility even if the resident continues to take that antibiotic while in the facility.

Data Analyses:

Line lists of UTI events and UTI events by catheter status are available as part of the UTI event within the NHSN LTCF component. Below are measures and calculations which are incorporated into the analytics output.

Calculated UTI Rates and Metrics
Data will be stratified by time (e.g., month, quarter) and aggregated across the entire facility.

Total UTI incidence rate/1,000 resident-days = Number of UTI Events (i.e., SUTI+CA-SUTI+ABUTI) / Total resident-days x 1,000.

> *Percent* that is SUTI = Number of SUTI Events / Total number of UTI Events x 100.

> *Percent* that is CA-SUTI = Number of CA-SUTI Events / Total number of UTI Events x 100.

> *Percent* that is ABUTI = Number of ABUTI Events / Total number of UTI Events x 100.

SUTI incidence rate/1,000 resident-days = Number of SUTI Events / (Total resident-days – catheter-days) x 1,000.

> NOTE: Only SUTIs which are NOT catheter-associated will be included in the SUTI incidence rate.

CA-SUTI incidence rate/1,000 catheter-days = Number of CA-SUTI events/ Catheter-days x 1,000

> NOTE: Only symptomatic events which develop at the time an indwelling catheter is in place or recently removed (within last 2 calendar days) will contribute to the CA-SUTI rate.

Urinary Catheter Utilization Ratio = Total urinary catheters-days / Total resident-days.

UTI treatment ratio = New antibiotic starts for UTI / Total UTI Count (SUTI + ABUTI + CA-SUTI)

> NOTE: When the UTI treatment ratio is <1, there are fewer reported antibiotic starts for UTI than symptomatic UTI events submitted; when the UTI treatment ratio equals 1,
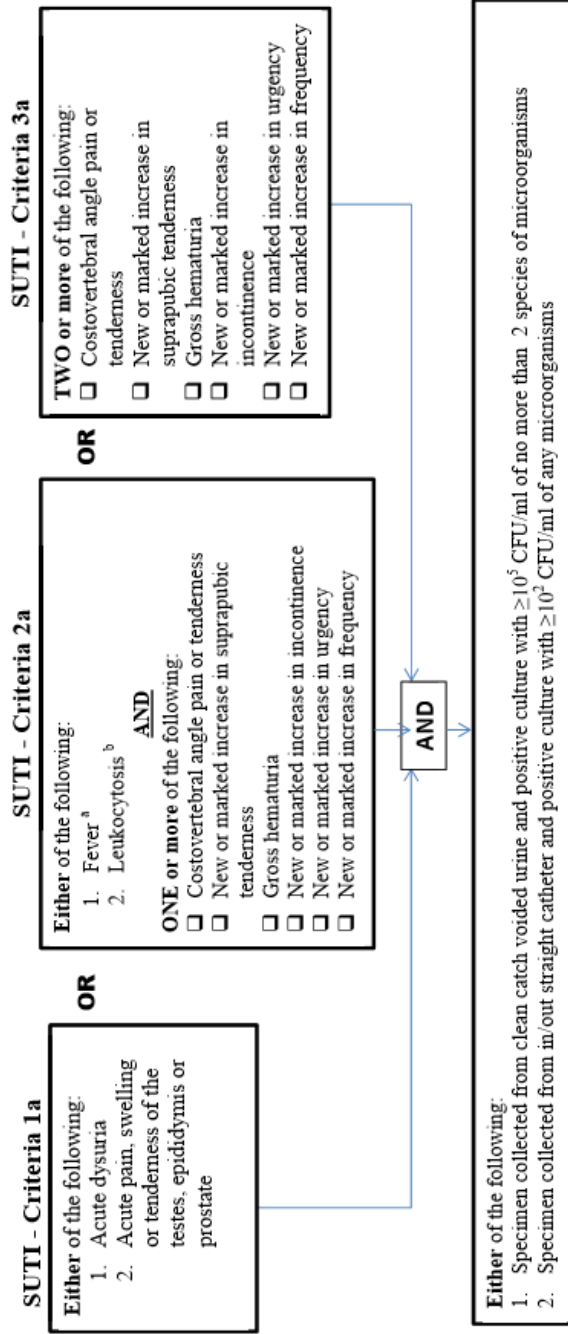
CDC

there are the same number of new antibiotic starts for UTI and symptomatic UTI events submitted; when the UTI treatment ratio is >1, there are more reported antibiotic starts for UTI than symptomatic UTI events submitted.

Figure 1: Criteria for Defining UTI Events in NHSN LTCF Component.

Resident *without* an indwelling catheter (Meets criteria 1a **OR** 2a **OR** 3a):

SUTI - Criteria 1a

Either of the following:
1. Acute dysuria
2. Acute pain, swelling or tenderness of the testes, epididymis or prostate

OR

SUTI - Criteria 2a

Either of the following:
1. Fever [a]
2. Leukocytosis [b]

AND

ONE or more of the following:
☐ Costovertebral angle pain or tenderness
☐ New or marked increase in suprapubic tenderness
☐ Gross hematuria
☐ New or marked increase in incontinence
☐ New or marked increase in urgency
☐ New or marked increase in frequency

OR

SUTI - Criteria 3a

TWO or more of the following:
☐ Costovertebral angle pain or tenderness
☐ New or marked increase in suprapubic tenderness
☐ Gross hematuria
☐ New or marked increase in incontinence
☐ New or marked increase in urgency
☐ New or marked increase in frequency

AND

Either of the following:
1. Specimen collected from clean catch voided urine and positive culture with $\geq 10^5$ CFU/ml of no more than 2 species of microorganisms
2. Specimen collected from in/out straight catheter and positive culture with $\geq 10^2$ CFU/ml of any microorganisms

SUTI

[a] Fever: Single temperature $\geq 37.8°C$ (>100°F), or > 37.2°C (>99°F) on repeated occasions, or an increase of >1.1°C (>2°F) over baseline
[b] Leukocytosis: >14,000 cells/mm³, or Left shift (> 6% or 1,500 bands/mm³)

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Figure 1: Criteria for Defining UTI Events in NHSN LTCF Component.

Resident *with* an indwelling catheter:

CA-SUTI – Criteria

ONE or more of the following with no alternate source:[a]

- ☐ Fever[a]
- ☐ Rigors
- ☐ New onset hypotension, with no alternate site of infection.
- ☐ New onset confusion/functional decline **AND** Leukocytosis [b]
- ☐ New costovertebral angle pain or tenderness
- ☐ New or marked increase in suprapubic tenderness
- ☐ Acute pain, swelling or tenderness of the testes, epididymis or prostate
- ☐ Purulent discharge from around the catheter

AND

Any of the following:

If urinary catheter removed within last 2 calendar days:

1. Specimen collected from clean catch voided urine and positive culture with ≥10^5 CFU/ml of no more than 2 species of microorganisms
2. Specimen collected from in/out straight catheter and positive culture with ≥10^2 CFU/ml of any microorganisms

If urinary catheter in place:

3. Specimen collected from indwelling catheter and positive culture with ≥ 10^5 CFU/ml of any microorganisms [c]

CA-SUTI

[a] Fever: Single temperature ≥ 37.8°C (≥100°F), or > 37.2°C (>99°F) on repeated occasions, or an increase of >1.1°C (>2°F) over baseline
[b] Leukocytosis: >14,000 cells/mm³, or Left shift (> 6% or 1,500 bands/mm³)
[c] Indwelling urinary catheters which have been in place for >14 days should be changed prior to specimen collection

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Figure 1: Criteria for Defining UTI Events in NHSN LTCF Component.

Resident *with or without* an indwelling catheter:

ABUTI Criteria

Resident has **no localizing urinary signs or symptoms** (i.e., no urgency, frequency, acute dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness). *If no catheter is in place, fever as only sign would not exclude ABUTI if other positive culture criteria are met.*

↓

AND

↓

Any of the following:

1. Specimen collected from clean catch voided urine and positive culture with $\geq 10^5$ CFU/ml of no more than 2 species of microorganisms
2. Specimen collected from in/out straight catheter and positive culture with $\geq 10^2$ CFU/ml of any microorganisms
3. Specimen collected from indwelling catheter and positive culture with $\geq 10^5$ CFU/ml of any microorganisms

↓

AND

↓

Positive blood culture with at least 1 matching organism in urine culture

↓

ABUTI

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Table 2. Criteria for Defining UTI Events in NHSN LTCF Component.

Criterion	Symptomatic Urinary Tract Infection (SUTI) *For residents **without** an indwelling catheter:*
1a	**Either** of the following (Signs & Symptoms): 1. Acute dysuria 2. Acute pain, swelling, or tenderness of the testes, epididymis, or prostate **AND** **Either** of the following (Laboratory and Diagnostic Testing): 1. Specimen collected from clean catch voided urine and positive culture with $\geq 10^5$ CFU/ml of no more than 2 species of microorganisms 2. Specimen collected from in/out straight catheter and positive culture with $\geq 10^2$ CFU/ml of any microorganisms
2a	**Either** of the following: 1. Fever (Signs and Symptoms) [Single temperature $\geq 37.8°C$ (>100°F), or >37.2°C (> 99°F) on repeated occasions, or an increase of >1.1°C (>2°F) over baseline] 2. Leukocytosis (Laboratory and Diagnostic Testing) [>14,000 cells/mm^3] or Left shift (>6% or 1,500 bands/mm^3) **AND** **One or more** of the following (New and/or marked increase): 3. Costovertebral angle pain or tenderness, 4. Suprapubic tenderness, 5. Visible (Gross) hematuria, 6. New or marked increase incontinence 7. New or marked increase urgency 8. New or marked increase frequency **AND** **Either** of the following (Laboratory and Diagnostic Testing): 1. Specimen collected from clean catch voided urine and positive culture with $\geq 10^5$ CFU/ml of no more than 2 species of microorganisms 2. Specimen collected from in/out straight catheter and positive culture with $\geq 10^2$ CFU/ml of any microorganisms

3a	**Two** or **more** of the following (New and/or marked increase): 1. Costovertebral angle pain or tenderness, 2. New or marked increase incontinence 3. New or marked increase urgency 4. New or marked increase frequency 5. Suprapubic tenderness 6. Visible (gross) hematuria **AND** **Either** of the following (Laboratory and Diagnostic Testing): 1. Specimen collected from clean catch voided urine and positive culture with $\geq 10^5$ CFU/ml of no more than 2 species of microorganisms 2. *Specimen collected from in/out straight catheter and positive culture with $\geq 10^2$ CFU/ml of any microorganisms*
Criterion	**Cather-associated Symptomatic Urinary Tract Infection (SUTI) – CA-SUTI** *For residents* **with** *an indwelling catheter in place or removed within 2 calendar days prior to event onset*
	One or **more** of the following (Signs and Symptoms and Laboratory and Diagnostic Testing): 1. Fever 2. Rigors 3. New onset hypotension, with no alternate site of infection. 4. New onset confusion/functional decline with no alternate diagnosis **_AND_** leukocytosis 5. New onset suprapubic pain or costovertebral angle pain or tenderness 6. Acute pain, swelling, or tenderness of the testes, epididymis, or prostate. 7. Purulent discharge from around the catheter **AND** **Any** of the following: *If urinary catheter removed within last 2 calendar days:* 1. Specimen collected from clean catch voided urine and positive culture with $\geq 10^5$ CFU/ml of no more than 2 species of microorganisms 2. Specimen collected from in/out straight catheter and positive culture with $\geq 10^2$ CFU/ml of any microorganisms *If urinary catheter in place:* 3. Specimen collected from indwelling catheter and positive culture with $\geq 10^5$ CFU/ml of any microorganisms.

CDC

Criterion	Asymptomatic Bacteremic Urinary Tract Infection (ABUTI) *Resident **with or without** an indwelling urinary catheter*
1	**No** signs or symptoms (i.e., no urgency, frequency, acute dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness). *If no catheter is in place, fever alone would not exclude ABUTI if other criteria are met.* **AND** **One** of the following: 1. Specimen collected from clean catch voided urine and positive culture with $\geq 10^5$ CFU/ml of no more than 2 species of microorganisms 2. Specimen collected from in/out straight catheter and positive culture with $\geq 10^2$ CFU/ml of any microorganisms 3. Specimen collected from indwelling catheter and positive culture with $\geq 10^5$ CFU/ml of any microorganisms. **AND** A positive blood culture with at least 1 matching organism in urine culture.

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Appendix J. Lead Organizations by Cohort

Cohort	Lead Organization	State(s)
1	Foundation for Healthy Communities	New Hampshire
1	Healthcare Association of New York State	New York
1	South Florida Hospital and Healthcare Association	Florida
1	Spectrum Health	Michigan
1	South Carolina Hospital Association	South Carolina
1	South Dakota Association of Healthcare Organizations	South Dakota
2	Grace Living Centers	Oklahoma
2	Healthcentric Advisors	Rhode Island
2	Massachusetts Senior Care Association	Massachusetts
2	Missouri Center for Patient Safety	Missouri
2	Oregon Patient Safety Commission	Oregon
2	Pennsylvania Patient Safety Authority	Pennsylvania
2	Professional Nursing Solutions, LLC	Arkansas
2	Qualidigm	Connecticut
2	Tennessee Health Care Association	Tennessee
3	Alabama Quality Assurance Foundation	Alabama
3	Arizona Hospital and Healthcare Association	Arizona
3	Genesis HealthCare	Multiple
3	HealthInsight	New Mexico, Nevada, Utah
3	Information & Quality Healthcare	Mississippi
3	Presbyterian Manors of Mid-America	Kansas and Missouri
3	Telligen	Iowa and Illinois
3	Veterans Health Administration	Multiple
4	Advancing Excellence	Multiple
4	California Association of Health Facilities	California
4	eQ Health Solutions	Louisiana
4	Minnesota Hospital Association	Minnesota
4	New Jersey Hospital Association	New Jersey
4	Quality Health Associates of North Dakota	North Dakota
4	The Joint Commission	Multiple