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Comparing Catheter-associated Urinary Tract Infection Prevention Programs Between VA and Non-VA Nursing Homes

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Abstract

OBJECTIVE—The impact of healthcare system integration on infection prevention programs is unknown. Using catheter-associated urinary tract infection (CAUTI) prevention as an example, we hypothesize that U.S. Department of Veterans Affairs (VA) nursing homes have a more robust infection prevention infrastructure due to integration and centralization compared with non-VA nursing homes.

SETTING—VA and non-VA nursing homes participating in the “AHRQ Safety Program for Long-term Care” collaborative.

METHODS—Nursing homes provided baseline information about their infection prevention programs to assess strengths and gaps related to CAUTI prevention.

RESULTS—A total of 353 (71%; 47 VA, 306 non-VA) of 494 nursing homes from 41 states responded. VA nursing homes reported more hours/week devoted to infection prevention-related activities (31 vs. 12 hours, $P<.001$), and were more likely to have committees that reviewed healthcare-associated infections. Compared with non-VA facilities, a higher percentage of VA nursing homes reported tracking CAUTI rates (94% vs. 66%, $P<.001$), sharing CAUTI data with leadership (94% vs. 70%, $P=.014$) and nursing personnel (85% vs. 56%, $P=.003$). However, fewer VA nursing homes reported having policies for appropriate catheter use (64% vs. 81%, $P=.004$) and catheter insertion (83% vs. 94%, $P=.004$).

CONCLUSIONS—Among nursing homes participating in an AHRQ-funded collaborative, VA and non-VA nursing homes differed in their approach to CAUTI prevention. Best practices from both settings should be applied universally to create an optimal infection prevention program within emerging integrated healthcare systems.

Keywords

catheter-associated urinary tract infection; CAUTI; infection prevention programs; nursing homes; VA

INTRODUCTION

In the United States, approximately 1.4 million people reside in over 15,700 community-based nursing homes.¹ The U.S. Department of Veterans Affairs (VA) nursing homes, also referred to as Community Living Centers, serve nearly 50,000 Veterans each year. Nursing homes are crucial for meeting the post-acute and long-term care needs of older adults. With the burgeoning post-acute care population, many of these individuals are recovering from serious events and are at high risk of complications, including infections, leading to substantial morbidity and mortality.^{2,3} Urinary tract infection is the most commonly reported infection, although this may be due in part to overtreatment and misclassification of asymptomatic bacteriuria as an infection.⁴

To reduce the incidence of infections, nursing homes must have individualized infection control programs.^{5,6} Furthermore, in 2013, the U.S. Department of Health and Human

Services approved a plan to enhance nursing home resident safety by reducing healthcare-associated infections (HAIs), with particular emphasis on reducing indwelling urinary catheter use and catheter-associated urinary tract infection (CAUTI).⁷ However, unlike infection preventionists working in acute care hospitals, infection preventionists in nursing homes commonly have responsibilities other than infection control, such as employee health or staff education, and many receive no formal training in infection prevention.⁸

The “Agency for Healthcare Research and Quality (AHRQ) Safety Program for Long-term Care: HAIs/CAUTI”⁹ aimed to reduce CAUTIs, enhance frontline healthcare professional knowledge about infection prevention, and improve the safety culture in nursing homes. This national collaborative builds on an AHRQ funded national project in acute care hospitals (“AHRQ Safety Program to Reduce Catheter-associated UTI in Hospitals”),¹⁰ expanding to the long term care setting.¹¹ Both VA and non-VA nursing homes participated in the national collaborative. Participating nursing homes were asked to complete a needs assessment questionnaire designed to assess the general characteristics of the facility, as well as the structure and process of their infection prevention program, including strengths and gaps related to CAUTI prevention. We hypothesized that VA nursing homes would have a more robust infection prevention infrastructure and better CAUTI surveillance practices due to the centralized organizational structure of the VA healthcare system and the fact that many VA nursing homes are co-located with acute care medical centers.

METHODS

Study Design

Between January 2014 and June 2015, at the start of each cohort of nursing homes participating in the “AHRQ Safety Program for Long-term Care: HAIs/CAUTI” collaborative,⁹ a needs assessment questionnaire was sent by email to the organizational leads, who were responsible for managing project activities among a group of nursing home facilities. The needs assessment questionnaire was made available to participating facilities (63 VA and 431 non-VA) electronically by weblink or by paper. Team leaders were asked to complete the online or hard-copy questionnaire within one month, with reminders included in weekly newsletters. The national project team developed weekly dashboards for the organizational leads to monitor questionnaire submissions. A cover letter providing assurance of confidentiality accompanied the questionnaire. The University of Michigan Institutional Review Board reviewed the study and determined that it did not meet the regulatory definition of research involving human subjects.

Questionnaire Content

The questionnaire included 30 items about the structure and process of infection prevention at the nursing home facility with a specific focus on CAUTI prevention (see Supplementary Material).^{12,13} Facilities provided the following nursing home-specific information: ownership (VA vs. non-VA), number of residents, number of sub-acute care beds, physical proximity to a VA hospital (VA nursing homes only), and the number of physicians, registered nurses, licensed practical nurses, and certified nursing aides per 100 beds. Information about the nursing home’s infection preventionists, including duration at current

position, hours spent on infection prevention-related activities, and training was also collected. For VA nursing homes, questions were included on whether the infection preventionist's area of responsibility was nursing home care only or if they had broader responsibilities as part of their affiliated medical center infection prevention program. Facilities were also asked about the following: (1) presence of a committee at the nursing home that routinely reviews HAIs; (2) types of resident services delivered, including 24-hour onsite supervision by a registered nurse, access to laboratory services including blood draws and urine tests, radiology services on both weekends and weekdays, and care provided for residents with intravenous infusions, wounds, tracheostomies, ventilators, and indwelling urinary catheters; and (3) whether sub-acute care and rehabilitation were available onsite. Questions assessing the presence of CAUTI prevention policies were asked, including appropriate indications for catheter use and catheter insertion documentation. A series of five-point Likert scale questions on catheter utilization and management practices were used to determine how regularly various CAUTI prevention practices were implemented. Responses of 4 (often) or 5 (always) were defined as "regular use" of the respective prevention practice, and responses of 3 (sometimes), 2 (rarely) or 1 (never) were defined as "not regular use". The CAUTI surveillance domain included questions on tracking changes in CAUTI rates over time, creating CAUTI rate reports, and sharing the reports with leadership and frontline personnel.

Statistical Methods

Descriptive statistics were generated to assess both general and infection prevention related characteristics of respondent nursing homes. Facility and infection prevention program characteristics of VA and non-VA nursing homes were compared using a two-sample *t*-test for continuous variables, and Pearson's chi-square test for categorical variables. Multivariable logistic regression was used to examine the associations between facility ownership type (VA vs. non-VA) and the presence of urinary catheter use policies, catheter management practices, and surveillance procedures. Models were adjusted for the number of residents in the facility, providing short-term sub-acute rehabilitation, presence of an HAI committee, infection prevention-specific training, and infection preventionist with three or more years of experience with infection prevention programs. All analyses were performed using Stata version 13.0 (StataCorp LP, College Station, TX).

RESULTS

Responding Facility Characteristics

A total of 353 of 494 facilities from 41 states completed the questionnaire (71% response rate), with a 75% response rate ($n = 47$ from 25 states) for VA and a 71% response rate ($n = 306$ from 28 states) for non-VA nursing homes. Respondents included directors of nursing ($n = 135$), infection preventionists ($n = 52$), facility administrators ($n = 41$), assistant directors of nursing ($n = 34$), nurse managers ($n = 17$), staff development/education coordinators ($n = 27$), quality managers ($n = 11$), MDS coordinators ($n = 8$), staff nurses ($n = 6$), advanced practice nurses/nurse practitioners ($n = 5$), and others including medical directors, pharmacists, and those with multiple clinical roles ($n = 17$).

The mean number of sub-acute beds and facilities providing sub-acute services were lower in VA nursing homes than in non-VA nursing homes (Table 1). Ten VA nursing homes reported that they provide care for residents with spinal cord injuries. VA nursing homes had higher physician to bed ratios than non-VA nursing homes (5.0 vs. 3.2 per 100 beds, $P = .003$), as well as higher registered nurse staffing to bed ratios (30.4 vs. 13.6 per 100 beds, $P < .001$). A higher percentage of VA nursing homes also reported having 24-hour registered nurse supervision compared to non-VA nursing homes (96% vs. 56%, $P < .001$). Eighty-five percent of VA nursing homes had an infection preventionist with more than three years of relevant experience and 94% reported having a formal committee that reviewed healthcare-associated infections compared with 72% and 79% of non-VA nursing homes, respectively (Table 2). VA nursing homes also reported more hours per week devoted to infection prevention-related activities (31 hours vs. 12 hours, $P < .001$). Over three-quarters (77%) of VA nursing homes were physically connected to an acute care hospital, and most VA nursing home infection prevention programs were part of their affiliated VA acute care hospital program (98%). Over 80% reported their infection preventionist was also responsible for infection prevention in the attached acute-care VA hospital.

Indwelling Urinary Catheter Utilization Policies and Management Practices

The percentage of nursing homes with specific indwelling urinary catheter utilization policies is shown in Table 2. Overall, a lower percentage of VA nursing homes reported having policies concerning appropriate catheter use or catheter insertion compared to non-VA nursing homes. For example, only 64% of VA nursing homes had policies specifying the appropriate indications for catheter use compared with 81% of non-VA nursing homes ($P = .004$). The percentage of VA nursing homes that reported a physician order was required to insert a urinary catheter (83% vs. 94%, $P = .06$) was also lower than in non-VA nursing homes.

With respect to CAUTI prevention practices, a higher percentage of VA nursing homes compared to non-VA nursing homes regularly use bladder scanners to assess urinary retention (89% vs. 26%, $P < .001$), and urinary catheter drainage systems with pre-connected, sealed catheter tubing junctions (81% vs. 60%, $P = .009$) (Table 3). Most nursing homes in both groups reported considering alternatives to indwelling catheters when appropriate, inserting catheters using aseptic technique, and keeping urinary drainage bags below the level of the bladder.

CAUTI Surveillance Activities

Sixty-nine percent of all responding nursing homes reported that they conducted CAUTI surveillance prior to joining the AHRQ Safety Program (Table 4). However, compared with non-VA nursing homes, the percentage of VA nursing homes conducting CAUTI surveillance was substantially higher (94% vs. 66%, $P < .001$). When evaluating specific CAUTI surveillance practices, more VA nursing homes reported keeping records of residents with CAUTIs using an electronic spreadsheet, database or logbook (85% vs. 53%, $P < .001$). Additionally, a higher percentage of VA nursing homes were aware of their CAUTI rate, collected data using an electronic health record system, and used standardized definitions to define CAUTI prior to the program (Table 4). A significantly higher percentage of VA

nursing homes, compared with non-VA nursing homes, also reported tracking CAUTIs over time (92% vs. 67%, $P = .014$), creating CAUTI summary reports (89% vs. 59%, $P = .002$), and sharing the results with facility leadership (94% vs. 70%, $P = .014$), nursing personnel (85% vs. 56%, $P = .003$), and physicians (81% vs. 49%, $P = .004$). Overall, 77% of VA nursing homes report their CAUTI rates to the VA Inpatient Evaluation Center.

DISCUSSION

In this national cohort of federally funded VA nursing homes and community-based, non-VA nursing homes, we found key differences in their overall approaches to infection prevention, resources allocated to infection prevention, and CAUTI prevention practices. First, VA nursing homes have substantially higher physician and nurse staffing to bed ratios when compared with non-VA nursing homes. Second, most VA nursing home infection prevention programs are integrated within their respective VA acute care infection prevention programs and have more infection prevention related resources. Third, while more non-VA nursing homes report having established catheter utilization policies, they were less likely to conduct CAUTI surveillance.

The VA healthcare system is the nation's largest integrated healthcare delivery system and provides comprehensive healthcare services to Veterans across the U.S. Prior research studies have shown that care provided by the VA system exceeds that of other healthcare providers in several areas.^{16–21} Studies comparing VA and non-VA patients have, for example, shown better performance on measures of chronic disease and preventive care,¹⁶ greater rates of evidence-based drug therapy,¹⁷ and better outcomes for older men who are hospitalized for several cardiac conditions.¹⁸ Research has also shown that VA hospitals are leaders in the use of key practices to prevent catheter-related blood stream infections.^{19–21} Consistent with these studies, we found better CAUTI surveillance practices within VA nursing homes. Most VA nursing homes (94%) conduct CAUTI surveillance and report their CAUTI rates to the VA Inpatient Evaluation Center (77%), emulating VA acute care surveillance practices.²² Moreover, use of standardized surveillance definitions is more common among the VA nursing homes compared to the non-VA nursing homes. We believe that the centralized infrastructure of the VA, increased numbers and training of staff, and using national VA benchmarks and leadership engagement likely account for these findings.²³

On the other hand, the non-VA nursing homes we surveyed report greater use of catheter utilization policies. Non-VA nursing homes were more likely than VA nursing homes to have a policy requiring documentation of appropriate indications for catheter use, appropriate catheter insertion and maintenance practices, as well as requiring a physician's order to place a urinary catheter. A higher percentage of non-VA nursing homes also report urinary catheters are removed within 24–48 hours of admission compared to VA nursing homes. This is likely, in part, because for non-VA nursing homes certification as a Medicare and/or Medicaid nursing home provider includes adhering to established regulatory guidance from CMS on appropriate use of indwelling urinary catheters and public reporting of the prevalence of indwelling urinary catheters.^{24–26} These regulations have enhanced several processes of care including reducing the use of indwelling catheters (from 9% to 5%) in

non-VA nursing homes.^{27–29} In contrast, in a nationwide sample of all VA nursing homes, 11% of 10,939 residents had an indwelling urinary catheter.³⁰ This high urinary catheter utilization within VA nursing homes may be due to the predominantly older male population with greater prevalence of urinary outlet obstruction, a higher percentage of residents with spinal cord injuries, as well as those receiving end-of-life care.

Our findings have important implications for both policy and practice as non-VA nursing homes become further integrated with acute care facilities under emerging Medicare Accountable Care Organization (ACO) programs. ACO programs are expected to provide better coordination and a higher quality of care, which could translate to financial benefits through, for example, reduced readmissions. Infections remain a major cause of readmission to acute care hospitals.³ Including nursing homes within the ACOs has the potential to improve continuity of care, quality of care, resident satisfaction and reduce inappropriate transfers, the spread of antimicrobial resistance,³¹ and infections. Furthermore, to control spending pertaining to infections for care spanning acute, post-acute, and long-term care settings, infection prevention programs between hospitals and partnering nursing homes could be aligned. This alignment would foster adoption of best practices from both VA and non-VA nursing homes, including surveillance for common infections, reducing device utilization, joint antimicrobial stewardship programs, and training to reduce infection-related hospitalizations and enhance outcomes.³²

Our study has important limitations. First, this study was conducted within a collaborative setting with voluntary participation of interested nursing homes, leading to a self-selection bias. Furthermore, there is a potential for reporting bias since we did not conduct actual observations or in-depth interviews to confirm the questionnaire findings. Second, we do not have information concerning resident demographics, their diagnoses, or comorbidities. Collecting individual resident characteristics was beyond the scope of this project. Some differences in reported resources and practices may be related to a difference in the populations served. Third, participating facilities were allowed to identify their own team leader, who was often a director or associate director of nursing, to coordinate program activities at the facility. Thus, while the facility team would likely include an infection preventionist, the survey respondent may or may not have been an infection preventionist. Finally, our findings suggest that future studies evaluating infection prevention personnel resources should be designed to further characterize time required in conducting hospital versus nursing home infection prevention activities.

Limitations notwithstanding, this study fills some important gaps in the literature. There have been no reported studies where infection prevention programs between VA and non-VA nursing homes have been compared. In our study, we identified the potential benefits of integrated healthcare systems such as the VA in implementing surveillance practices and the role of regulatory agencies such as the CMS in reducing catheter utilization in community-based nursing homes. Best practices from both of these settings should be universally adopted and promoted to reduce infections, enhance use of evidence based practices and improve resident safety in the nursing home setting.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Potential conflicts of interest. Dr. Saint has received fees for serving on advisory boards for Doximity and Jvion. Dr. Meddings has received honoraria for lectures and teaching related to prevention and value-based purchasing policies involving catheter-associated urinary tract infection and hospital-acquired pressure ulcers. She has also received honoraria from RAND Corporation/AHRQ for preparation of an AHRQ Chapter update on prevention of catheter-associated UTI. Dr. Trautner has received honoraria for speaking from Baylor Scott & White, TX A&M Health Sciences Center. She has provided consultation for Zambon Pharmaceuticals and Lasergen. All other authors report no conflicts of interest.

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TABLE 1

Characteristics of VA and Non-VA Nursing Home Respondents Enrolled in the “AHRQ Safety Program for Long-term Care: HAIs/CAUTI” Collaborative

Characteristic	All (N = 353)	VA (n = 47)	Non-VA (n = 306)	<i>p</i> ^b
Sub-acute beds	55.8 (55.8)	23.3 (39.5)	60.8 (56.3)	<.001
Current residents	97.1 (61.1)	77.2 (46.5)	100.2 (62.5)	.02
Physicians/100 beds	3.5 (3.8)	5.0 (4.2)	3.2 (3.7)	.003
Registered nurses/100 beds ^a	15.1 (9.21)	30.4 (10.3)	13.6 (7.6)	<.001
Licensed practical nurses/100 beds ^a	19.4 (8.8)	26.3 (11.0)	18.5 (8.0)	<.001
Certified nursing assistants/100 beds	50.4 (11.9)	49.4 (13.7)	50.6 (11.6)	.57
24-hour supervision by a registered nurse provided	217 (61.5)	45 (95.7)	172 (56.2)	<.001
Access to laboratory services, blood draws, and x-rays 7 days a week	343 (97.2)	42 (89.4)	301 (98.4)	.001
Skilled-nursing/short-term (sub-acute) rehabilitation	323 (91.5)	37 (78.8)	286 (93.5)	.001

NOTE. Data are presented as mean (SD).

^aFacilities reporting over 50 registered or licensed practical nurses per 100 beds were excluded as outliers (*n* = 51)

^b*P*-values represent comparisons between VA and non-VA nursing homes using Chi-square test for categorical variables and t-test for continuous variables. *P* < .05 were considered to be statistically significant.

TABLE 2

Infection Prevention Program Characteristics and Catheter Use Policies

	All (N = 353)	VA (n = 47)	Non-VA (n = 306)	<i>pa</i>
Program characteristics				
Leader has ≥ 3 years of infection prevention experience	259 (73.4)	40 (85.1)	219 (71.6)	.05
Hours per week spent on infection prevention-related activities, mean (SD)	14.4 (12.6)	31.3 (12.6)	11.8 (10.3)	<.001
Nursing home committee reviews healthcare-associated infections, including CAUTI	285 (80.7)	44 (94.0)	241 (78.8)	.06
Nursing home has a policy regarding				
Appropriate indications for catheter use	279 (79.0)	30 (63.8)	249 (81.4)	.004
Urinary catheter insertion	328 (92.9)	39 (83.0)	289 (94.4)	.004
Urinary catheter maintenance	321 (90.0)	37 (78.7)	284 (92.8)	.001
Requires a physician order for catheter placement with documentation of indication	325 (92.1)	39 (83.0)	286 (93.5)	.06

NOTE. Data are presented as No. (%) unless otherwise noted. CAUTI, catheter-associated urinary tract infection.

^a*P*-values in the final column represent significance value of the coefficient for the urinary catheter management strategy represented in each row that was estimated using multivariable logistic regression models adjusted for number of residents in facility, short-term sub-acute rehabilitation offered, presence of an HAI committee, infection prevention training, and infection preventionist with 3 or more years of experience. *P* < .05 were considered to be statistically significant.

TABLE 3**Indwelling Urinary Catheter Management at VA and Non-VA Nursing Homes**

Urinary catheter management strategy used regularly	All (N = 353)	VA (n = 47)	Non-VA (n = 306)	<i>P</i>^a
Urinary catheters removed within 24–48 hrs. of admission unless there are appropriate indications for continued use	322 (91.2)	35 (74.5)	287 (93.8)	<.001
Alternatives to indwelling catheters used when appropriate	331 (97.8)	42 (89.4)	289 (94.4)	.27
Portable bladder scanner used to assess urine volume	121 (34.3)	42 (89.4)	79 (25.8)	<.001
Use of urinary drainage systems with pre-connected, sealed catheter tubing junction	220 (62.3)	38 (80.9)	182 (59.5)	.009
Catheters changed at routine fixed intervals (e.g., every 30 days)	242 (68.6)	27 (57.5)	215 (70.3)	.36
Urinary catheter disconnected from collecting systems (e.g., for irrigations, leg bag attachments)	117 (33.1)	14 (29.8)	103 (33.7)	.94
Screening for asymptomatic bacteriuria performed	73 (20.7)	13 (27.7)	60 (19.6)	.38
Hand hygiene adherence measured	297 (84.1)	45 (95.7)	252 (82.4)	.07

NOTE. Data are presented as No. (%).

^a*P*-values in the final column represent significance value of the coefficient for the urinary catheter management strategy represented in each row that was estimated using multivariable logistic regression models adjusted for number of residents in facility, short-term sub-acute rehabilitation offered, presence of an HAI committee, infection prevention training, and infection preventionist with 3 or more years of experience. *P* < .05 were considered to be statistically significant.

TABLE 4

CAUTI Surveillance Activities at VA and Non-VA Nursing Homes

Facility surveillance activity performed	All (N = 353)	VA (n = 47)	Non-VA (n = 306)	<i>P</i> ^a
CAUTI surveillance performed	245 (69.4)	44 (93.6)	201 (65.7)	<.001
Aware of CAUTI rate	218 (61.8)	42 (89.4)	176 (57.5)	.001
Collected data using an electronic health record system	148 (41.9)	41 (87.2)	107 (35.0)	<.001
Uses standardized definitions to determine if a resident has CAUTI (McGeer ¹⁴ or CDC NHSN ¹⁵)	237 (67.1)	40 (85.1)	197 (64.4)	.056
Shares CAUTI surveillance data with facility leadership	259 (73.4)	44 (93.6)	215 (70.3)	.014
Shares CAUTI surveillance data with all facility nursing personnel	210 (59.5)	40 (85.1)	170 (55.6)	.003
Shares CAUTI surveillance data with all physicians providing care to residents	189 (53.5)	38 (80.9)	151 (49.4)	.004

NOTE. Data are presented as No. (%). CAUTI, catheter-associated urinary tract infection; CDC, Centers for Disease Control and Prevention; NHSN, National Healthcare Safety Network.

^a*P*-values represent significance value of the coefficient for the surveillance activity represented in each row that was estimated using multivariable logistic regression models adjusted for number of residents in facility, short-term sub-acute rehabilitation offered, presence of an HAI committee, infection prevention training, and infection preventionist with 3 or more years of experience. *P* < .05 were considered to be statistically significant.