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Facilitators and challenges experienced by nursing homes enrolling in the CDC national health care safety network

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Abstract

Background: Standardized measurement of health care-associated infections is essential to improving nursing home (NH) resident safety, however voluntary enrollment of NHs in Centers for Disease Control and Prevention's National Healthcare Safety Network (NHSN) requires several steps. We sought to prospectively identify NH structural, process or staff characteristics that affect enrollment and data submission among a cohort of NHs receiving facilitated implementation.

Methods: The evaluation employed a mixed methods approach. The meta-theoretical Consolidated Framework for Implementation Research was used to analyze reported facilitators and challenges. Primary and secondary outcomes were time to NHSN enrollment and data submission, respectively.

Results: Of 36 participating NHs, 27 (75%) completed NHSN enrollment and 21 (58%) submitted 1 or more months of infection data during the 8-month study period. Mean days to complete enrollment was 82 (standard deviation [SD] = 24, range = 51–139) and days to first data submission was 112 (SD = 45, range = 71–245). Characteristics of NH staff liaisons associated with shorter time to enrollment included infection prevention and control knowledge, personal confidence, and responsibility for infection prevention and control activities. Facility characteristics were not associated with outcomes.

Discussion: Time to NHSN enrollment and submission related more to characteristics of the person leading the process than to characteristics of the NH.

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SUPPLEMENTARY MATERIALS

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Conclusions: External partnerships that provide real-time support and resources are important assets in promoting successful NH participation in NHSN.

Keywords

Nursing home; Long-term care; Infection prevention; National Healthcare Safety Network

Standardized measurement of health care-associated infection (HAIs) is essential to improving nursing home (NH) resident safety and reducing morbidity and mortality, as demonstrated in acute care settings.[1] Standardized HAI measurement and reporting in NHs at the national level helps to estimate the overall burden of HAIs, establish national benchmarks, and evaluate the impact of HAI prevention efforts within NHs and across collaborative improvement initiatives.[2,3] However, monitoring of HAI rates in NHs across the United States (U.S.) lacks consistency in both HAI surveillance and reporting.

In the U.S., the largest surveillance system for HAI reporting is the Centers for Disease Control and Prevention's (CDC's) National Healthcare Safety Network (NHSN). In September 2012, CDC launched the NHSN long-term care facility (LTCF) component to provide a reporting infrastructure for tracking HAIs in NHs.[2,4] Subsequently, the U.S. Department of Health and Human Services identified NH participation in NHSN as a priority area of the National Action Plan to Prevent Health Care-Associated Infections and a first step to understanding the burden of HAIs and establishing benchmarks to evaluate HAI prevention efforts in this setting.[2] Ideally, all NHs would be expected to submit data to NHSN, similar to the Centers for Medicare & Medicaid Services (CMS) requirements for acute and long-term acute care hospitals.[5]

For the first few years, NH enrollment in NHSN was slow. From 2013 to 2015, only 277 (2% of U.S. NHs) enrolled in NHSN.[6] The early enrollees were not representative of the general NH provider community and were geographically clustered in certain states, raising the possibility that early NHSN adoption may have been influenced by both internal facility factors as well as external state programs supporting NH participation in NHSN.

In 2016, CMS funded a large scale initiative to promote HAI reporting into the NHSN LTCF component through partnerships with Quality Innovation Network-Quality Improvement Organizations (QIN-QIOs).[5,7,8] Though this initiative led to a significant increase in participation in the NHSN LTCF component, challenges to enrollment and reporting in NHSN were identified, including high rate of staff turnover, time constraints, staff limitation with technology, and competing priorities.[9,10] Results of a recent national survey found that QIN-QIO involvement strongly influenced an increase in NHSN enrollment. By 2017–2018, approximately 18.7% of U.S. NHs enrolled in NHSN (Fu 2020).[11]

Few studies have evaluated the readiness of nursing homes to engage in standardized measurement and reporting of infection rates independent of external CMS-supported initiatives.[9] In this study, we sought to recruit approximately 25 facilities willing to enroll in NHSN and prospectively identify facilitators and challenges that influence the time required to complete NHSN enrollment and time to first data submission among a cohort of NHs and

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determine which structural, process or staff characteristics were related to successful NHSN enrollment.

METHODS

Design

We performed a prospective, mixed methods evaluation of NHs enrolling and submitting data into the NHSN LTCF component over an 8 month period (January 25, 2017 to September 20, 2017). A facilitated implementation approach was used to guide NH staff liaisons through the NHSN enrollment and data submission processes for the *Clostridioides* (previously *Clostridium*) *difficile* infections LabID Event module. Facilitated implementation has been described as a multifaceted process of enabling and supporting individuals, groups and organizations in their efforts to adopt and incorporate clinical innovations into routine practices.[12] An independent institutional review board, Ethical & Independent Review Services, determined this research qualified for an exemption from human subjects review.

Subjects

The first 3 months of this 1-year study focused on developing materials, recruiting and enrolling NHs. Nursing homes were recruited using email, direct mail, social media and personal invitation. In December 2016, all 680 Joint Commission accredited NHs were sent a letter inviting participation. Joint Commission accreditation is voluntary and all accredited nursing homes continue to undergo annual CMS state surveys for Medicare and Medicaid certification. Inquiries from non-accredited sites were accepted since the study was unrelated to accreditation. Facilities were excluded if they were already enrolled and submitting data to NHSN. Leaders from interested facilities signed a letter of agreement and named a primary and backup staff liaison responsible for implementation. Staff liaisons were not required to be infection preventionists, but it was recommended that they have familiarity with infection prevention and control (IPC) activities. All facilities received a $500 honorarium at study end.

Staff liaisons were invited to 3 training webinars on NHSN enrollment and reporting protocols and received a step-by-step enrollment worksheet with corresponding links to pre-existing training materials and videos developed by an external group.[13] Liaisons were encouraged to participate in a series of 6 monthly coaching calls and access real-time support from the study team via telephone, email, and a dedicated website. The study team comprise three research (BB, BAL, RT) and data analysis staff (DM, YS), a consulting infection preventionist (DB), and two CDC project advisors (JB, AA).

Measurements

The primary outcome of interest was time to completion of the multistep NHSN enrollment process. The secondary outcome of interest was time to first submission of infection data. Time to completion of NHSN enrollment was defined as the number of days from the study start date (first training webinar) to completion of all requirements necessary to submit data into the NHSN LTCF component. Time to data submission was defined as the number of

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days from the study start date to first data submission in NHSN. Unlike the CMS QIO initiative, the study team did not have access to facility-submitted NHSN data and the length of time for tracking the outcomes was truncated at 12 months from the study start date.

Enrollment in the NHSN comprised 5 steps: (1) complete the LTCF enrollment training, (2) register the facility with NHSN, (3) complete identity proofing through CDC's Secure Access Management Services (SAMS), a federal system that verifies an individual's identity to give these authorized individuals secure access to NHSN using the information on their SAMS grid card, (4) complete the NHSN Facility Contact and Annual Facility Survey, and (5) accept the NHSN Agreement to Participate and Consent.[14,15]

To evaluate structural, process and staff characteristics, NH liaisons were asked to complete 2 implementation surveys: a preimplementation questionnaire measuring NH demographic characteristics, staff liaison perception of interest, experience, and training related to IPC, and perceived confidence in successful implementation and a postimplementation questionnaire to assess liaison satisfaction with the experience. Staff liaisons were also asked to complete 7 monthly activity logs to document NHSN enrollment and data collection facilitators and challenges.

Analysis

Descriptive statistics were used to summarize NH demographics, staff liaison characteristics, facilitators and challenges, and primary outcomes. A bivariate generalized linear model for each characteristic was used to determine significance based on the 95% confidence interval (CI) associated with each outcome. Due to the small sample size, multivariate methods were not employed. All calculations were performed in Statistical Analysis Software version 9.4 (Cary, NC).

The conceptual framework used to organize analysis of facilitators and challenges was derived from the meta-theoretical Consolidated Framework for Implementation Research (CFIR).[16] The CFIR comprises 5 major domains and associated measurable dimensions: (1) Intervention Characteristics (8 dimensions), (2) Inner Setting (12 dimensions), (3) Outer Setting (4 dimensions), (4) Characteristics of Individuals (5 dimensions), and (5) Process by which implementation is accomplished (8 dimensions). Facilitators and challenges identified from activity log comments were coded using the CFIR codebook data analysis tool.[17] Multiple comments included in single statements that required different codes were coded separately.

RESULTS

Thirty-six NHs, located in 14 states, enrolled in the study. Most facilities were Joint Commission accredited (n = 33 [92%]) and non-profit or government owned (n = 22 [61%]) (Table 1). Two sites interested in this study, but not accredited were included. Online Appendix 1 presents information on aggregate facility infection prevention and control structure and processes.

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Most NH staff liaisons were professionally trained in nursing: 25 (69%) were registered nurses, 5 (14%) were licensed practical nurses and 7 (19%) had advanced degrees (Table 2). The primary roles of staff liaisons were nurse managers, including assistant director of nursing, and staff development coordinator (n = 18, 50%); facility leaders, including administrators and director of nursing (n = 9, 25%); and the person responsible for IPC, known as the infection preventionist (n = 9, 25%). Of the liaisons who reported their primary role was infection preventionist, 2 (6%) were certified in infection control. Most staff liaisons (83%) had 2 or more responsibilities in addition to their primary role. The average number of responsibilities was 4.2 (standard deviation [SD] = 2.4, range = 1–10). Table 3 presents staff liaison opinions regarding knowledge, training and self-perceptions of their ability to successfully implement NHSN.

Regarding the primary outcomes, 27 facilities (75%) completed NHSN enrollment and 21 (58%) submitted at least 1 month of infection data (Online Appendix 2) over the 8-month period. The mean number of days from the study start date to completing NHSN enrollment was 82 (SD = 24, range = 51–139). As shown in Figure 1, the greatest proportion of time was spent on completing enrollment. Within the enrollment process, the most time-consuming step was obtaining the SAMS grid card. The mean number of days to compile and notarize identity (ID) proofing documents for SAMS was 20 days (SD = 12, range = 11–55) and the mean number of days from the time the liaison submitted their ID proofing documents until they received their SAMS grid card was 25 (SD = 12.1, range = 10–64).

Using the activity logs, liaisons recorded 177 comments related to implementation facilitators and 260 comments related to implementation challenges (Online Appendix 3). The most frequent facilitators related to the NH's readiness for NHSN implementation included access to knowledge and information (n = 57) (eg, NHSN training handouts and video links) and availability of support personnel (n = 37), (eg, study team facilitating NHSN help desk support). Most reported challenges also related to the NH's readiness for NHSN implementation included problems with insufficient time (n = 58), internal staffing (n = 56), specifically staff turnover or lack of motivation, and access to training information (n = 21). Additional challenges related to the complexity of NHSN (n = 32), such as difficulty completing the NHSN enrollment documents, as well as design quality and packaging (n = 23) (eg, issues with NHSN website functionality). Many liaisons expressed that the SAMS grid card process took longer than they expected. Challenges included problems with the quality of ID proofing documents, difficulty using the SAMS portal, long wait times for the SAMS help desk, and confusing steps.

Characteristics associated with time to enrollment

The bivariate generalized linear model analysis identified several liaison characteristics associated with less time to enrollment (Table 4). Liaisons who were responsible for IPC enrolled 37.9 days (95% CI [−60.2, −15.5]) less than liaisons who were leaders (defined as administrators or directors of nursing), and nurse managers enrolled 21.9 days (95% CI [−41.5, −2.2]) less than leaders. Less time to enrollment was also associated with 3 liaison perception-related characteristics: perceived high level of IPC knowledge (55.7 days, 95% CI [−100.0, −11.4]), perceived high level of confidence in being able to report by June 1

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(28.6 days, 95% CI [−54.6, −2.6]), and perceived sufficient time to devote to this project (24.0 days, 95% CI [−42.8, −5.1]).

Longer time to enrollment was associated with reporting more challenges related to the Outer Setting (18.7 days, 95% CI [1.6, 35.8]) such as external policies, introduction of new CMS standards and increased facility needs and resources during an outbreak or high facility census. Longer time to enrollment was also associated with reporting more facilitators related to characteristics of the intervention, such as having instructions that were detailed and an easy to navigate NHSN database (10.9 days, 95% CI [−0.2, 22.0]). However, none of the facility demographic, structure and process characteristics were independently associated with time to enrollment.

Characteristics associated with time to data submission

The mean number of days from the study start date to first data submission was 112 (SD = 45, range = 71–245). Liaisons responsible for IPC submitted data 58.1 days (95% CI [−110.8, −5.4]) less than those who were leaders (Table 4). Similarly, those responsible for IPC who had received formal IPC training submitted 45.5 days (95% CI [−84.3, −6.7]) less than other liaisons without formal IPC training.

Longer time to submission was associated with reporting more challenges related to the Outer Setting (52.1 days, 95% CI [23.0, 81.3]) and reporting more total challenges related to the Inner Setting (4.2 days, 95% CI [0.0, 8.5]). It was also associated with reporting a greater total number of facilitators associated with the intervention (31.0 days, 95% CI [9.8, 52.2]), Inner Setting facilitators (5.8 days, 95% CI [−0.1, 11.5]), and the overall total number of facilitators (4.4 days, 95% CI [0.1, 8.9]). As with time to enrollment, none of the facility demographic, structure and process characteristics were associated with time to submission.

DISCUSSION

This study sought to prospectively identify facilitators and challenges to nursing home enrollment and data submission into the CDC’s NHSN LTCF component. Using a facilitated implementation approach, most nursing homes in this study completed NHSN enrollment and submitted HAI event data within 8 months. We observed that the staff liaison’s role, training, and self-perceived capabilities were associated with shorter time to NHSN enrollment and data submission. Characteristics associated with delays in enrollment and submission were implementation challenges related to insufficient staff time and resources. Facility demographic characteristics were not associated with NHSN enrollment or data submission. The process for gaining secure access to NHSN was identified as the most time-consuming step in the enrollment process.

The staff liaisons’ self-perceptions of ability to implement and IPC training were associated with the achievement of timely NHSN enrollment and data submission. This demonstrates the importance of understanding staff perceptions regarding the adoption of new infection prevention activities or practices within a NH. Moreover, some staff liaisons were able to complete all study tasks assigned despite the competing priorities of various job responsibilities. This finding corroborates other NH qualitative studies that showed the

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presence of a liaison or designated staff lead facilitated NHSN adoption and reporting.[18,19] We found that both implementation facilitators and challenges reported by staff liaisons were independently associated with more days to completing enrollment and submission; it is possible that staff liaisons reporting facilitators and challenges were more engaged in the study and more descriptive of both positive and negative experiences when completing their activity logs.

Liaisons frequently acknowledged the importance of training and real-time support provided by the study team. This underscores the value of a facilitated implementation approach in order to support NH staff in standardized HAI surveillance and reporting initiatives. In health care, facilitation as both a role and a process is increasingly recognized as a mechanism to expedite and strengthen the use of evidence-based practices in the field.[20] This facilitation function may be even more advantageous for NHs where insufficient staffing and time are limitations.[9,18,21–23] Sutherland and Meyer described a successful collaboration between NHs, the Tennessee Department of Health and QIO, Qsource, to increase NH enrollment and reporting in NHSN. They reported a mean length of time to enrollment for 45 sites of 125 days, longer than the 82 days reported in our study.[9] They identified key facilitators including access to knowledge and information on NHSN infection surveillance and the support from partners serving as assistants to obtaining information from the NHSN help desk. These findings, in addition to our results, underscore the benefit of external supports to facilitate NHSN participation.

This study has several limitations. Nursing homes in this study may not be representative given the small number of volunteer sites, most of which were Joint Commission accredited. Identification of facilitators and challenges was limited by how much detail the liaisons put into documenting activity logs. While real-time documentation helped overcome recall bias, not all liaisons submitted logs regularly. In-depth qualitative interviews with liaisons might have identified other characteristics not measured in survey items or mentioned in comments which may have influenced the outcomes. Given the facilitated implementation approach, one should not assume the experience of facilities independently enrolling in NHSN will be similar. Future studies should consider directly measuring other liaison characteristics such as interpersonal skills and motivation. Longitudinal studies are also needed to evaluate the facility and staff characteristics associated with sustained NHSN data submission, the perceived value of NHSN enrollment and data submission, and the impact of NHSN participation on NH HAI rates and resident outcomes.

CONCLUSIONS

Successful NHSN enrollment related more to the characteristics of the person leading the process than to structural characteristics of the nursing home. The use of a facilitated implementation approach served as an important driver of successful NH participation in NHSN. Given the importance of NHSN reporting as a means to identify HAIs, measure facility HAI trends, establish national HAI benchmarks, and track the impact of nursing home HAI prevention efforts, the investments made by CDC, CMS, state public health and quality improvement partners to help facilities overcome barriers will be critical to advance infection prevention activities in this setting.

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Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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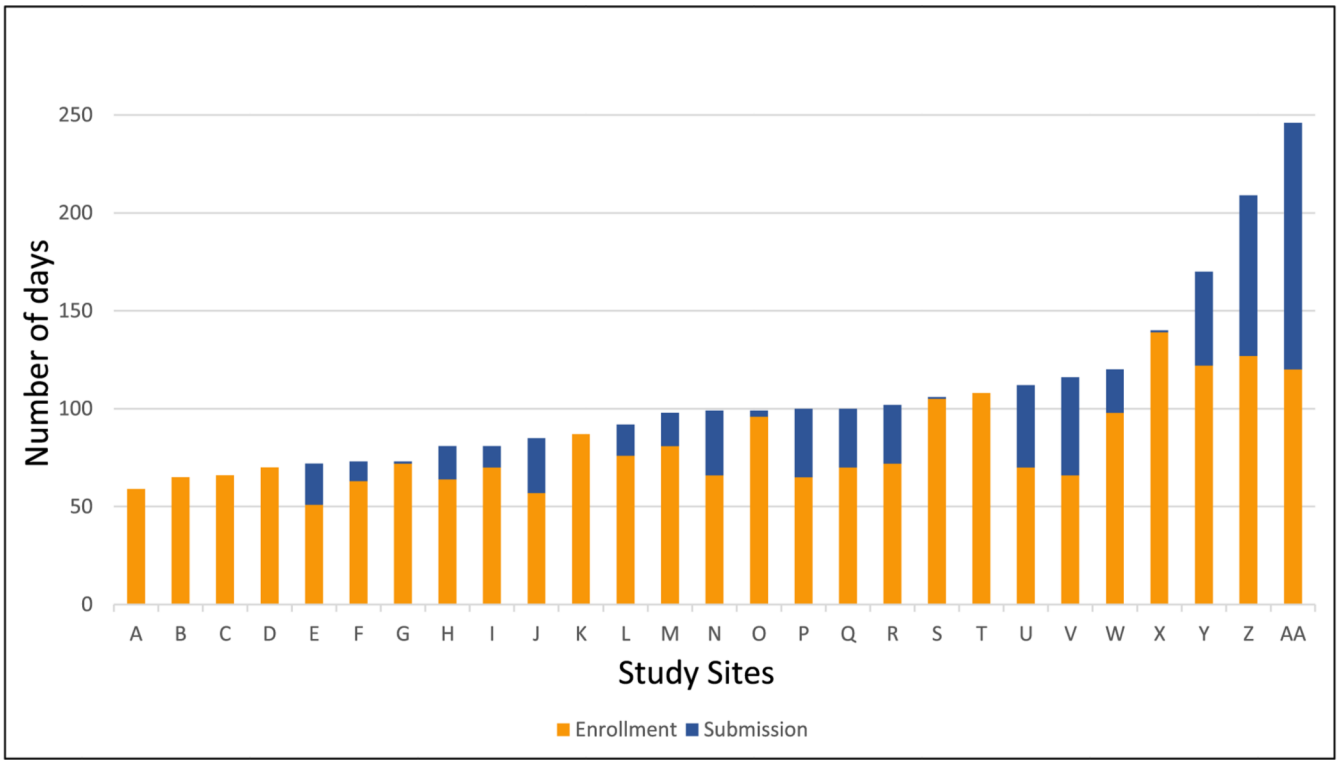

Fig 1.
Days to NHSN enrollment and data submission for 27 sites.

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Table 1

Facility characteristics (n = 36)

Number of beds, mean (SD)	110.6(51.6)
Number of short-stay residents (missing = 2), mean (SD)	274.7 (396.6)
Number of long-stay residents (missing = 2), mean (SD)	127.3(240.7)
Facility ownership, n (%)	
For profit	14(38.9)
Not for profit, including church	16(44.4)
Government, including VA	6(16.7)
Affiliation, n (%)	
Independent	11 (30.6)
Multifacility organization (chain)	13(36.1)
Hospital system, attached or free standing	8 (22.2)
Geographic region*, n (%)	
(CT, ME, MA, NH, RI, VT)	6 (16.7)
(NJ, NY, PR, VI)	3 (8.3)
(DE, DC, MD, PA, VA, WV)	4(11.1)
(al, FL, GA, KY, MS, NC, SC, TN)	4(11.1)
(iL, IN, MI, MN, OH, WI)	16(44.4)
(ar, LA, NM, OK, TX)	16(2.8)
(co,mt,nd, SD,UT,WY)	1 (2.8)
(AZ, CA, HI, NV, including U.S. territories)	1 (2.8)
Skilled nursing facility accreditation, n (%)	
The Joint Commission	33(91.7)
Commission on Accreditation of Rehabilitation Facilities (CARF)	2(5.6)
Other (eg, Long-Term Care Institute)	1 (2.8)

*U.S. Department of Health and Human Services State by Region.

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Table 2

Staff liaison characteristics (n = 36)

	n (%)
Position that best describes primary role	
Leader	9 (25.0)
Administrator	3 (8.3)
Director of nursing	6 (16.7)
Nurse Manager	18(50.0)
Assistant director of nursing	8 (22.2)
Other (eg, staffdevelopment, employee health nurse, patient safety manager)	10(27.8)
Infection preventionist	9 (25.0)
Liaison reported having the following responsibilities (including primary role)	
Leader	15(41.7)
Administrator	11 (30.5)
Director of nursing	4(11.1)
Nurse Manager	11 (30.5)
Assistant director of nursing	3 (8.3)
Other (eg, staff development, patient safety manager, medical director)	8 (22.2)
Infection preventionist	2(5.6)
Corporate/system leader	8 (22.2)
Number of responsibilities the liaison has including primary role, Mean (SD)	4.2 (2.4)
1	6 (16.7)
2–4	14(38.9)
5–6	12(33.3)
7–10	4(11.1)
Role of person who initiated the decision to enroll in the study	
Leader	15(41.6)
Administrator	11 (30.6)
Director of nursing	4(11.1)
Nurse Manager	11 (30.6)
Assistant director of nursing	3 (8.3)
Other (eg, staff development, patient safety manager, medical director)	8 (22.2)
Infection preventionist	2(5.6)
Corporate/system leader	8 (22.2)
Professional credentials and certifications	
Licensed practical nurse	5 (13.9)
Registered nurse	25 (69.4)
Bachelor of Science	13(36.1)
Licensed nursing home administrator	2 (6.0)
Masters prepared	7(19.4)
Number of years worked in the nursing home setting (both current facility and elsewhere)	
<5 years	7(19.4)

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	n (%)
6–10 years	7(19.4)
11 years or more	22(61.1)
Number of years worked in current nursing home	
≤2 years	14(38.9)
3–5 years	10(27.8)
6–10 years	6 (16.7)
11 years or more	6 (16.7)
Liaison has led a quality improvement (QI) project, Mean (SD)	7.0 (7.2)
No	9 (25.0)
Yes	27(75.0)

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Table 3

Staff liaison opinions and perceptions (n = 36)

	n (%)
Prior to this project, the liaison had substantial knowledge of or experience with the CDC NHSN	%
Yes	5(13.9)
No	31 (86.l)
Prior to joining this project, liaison had actual or perceived sense ofworkload involved with NHSN implementation	
Yes	5 (13.9)
No	31 (86.1)
Perceived interest in the topic of infection control *	
Low	0
Medium	9(25)
High	27(75)
Perceived amount of infection control training *	
Low	5 (13.9)
Medium	22(61.l)
High	9(25)
Perceived level of knowledge on the topic of infection control *	
Low	1 (2.8)
Medium	24(66.7)
High	11 (30.6)
Perceived selfas an innovator *	
Low	1 (2.8)
Medium	14(38.9)
High	21 (58.3)
Perceived sufficient amount of time for study activities *	
Low	6(17.1)
Medium	19(54.2)
High	10(28.6)
Perceived amount of additional stress from participating in this project *	
Low	10(27.8)
Medium	17(47.2)
High	9(25)
Perceived confidence to submit data in NHSN before June 1st *	
Low	2 (6.9)
Medium	6 (20.7)
High	21 (72.4)

* On a scale from 1 to 10; scores 1–3 are indicated as low, 4–7 as medium, 8–10 as high.

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Table 4

Bivariate associations between time to implementation of the National Healthcare Safety Network (NHSN) and nursing home characteristics

Outcomes		Estimate (in days)	Standard error	Confidence interval limits	
				Lower	Upper
Time to enrollment	**Organizational or liaison characteristic**				
	Liaison characteristic				
	Liaison is a nurse manager	−21.9	9.5	−41.5	−2.2
	Liaison in role of IP	−37.9	10.9	−60.2	−15.5
	Perceived high level ofknowledge regarding IPC	−55.7	21.5	−100.0	−11.4
	Perceived high level of confidence to submit in NHSN beforeJune 1st	−28.6	12.5	−54.6	−2.6
	Perceived sufficient time for project	−24.0	9.1	−42.8	−5.1
	Implementation facilitators or challenges reported				
	Total number of facilitators associated with intervention characteristics	10.9	5.4	−0.2	22.0
	Total number of challenges associated with Outer Setting	18.7	8.2	1.6	35.8
Time to submission	**Organizational or liaison characteristic**				
	Liaison characteristics				
	Liaison in role of IP	−58.1	25.1	−110.8	−5.4
	Person responsible for IPC received formal training	−45.5	18.5	−84.3	−6.7
	Implementation facilitators or challenges reported				
	Total number of facilitators associated with Inner Setting	5.8	2.7	0.1	11.5
	Total number of facilitators associated with intervention characteristics	31.0	10.1	9.8	52.2
	Total number of facilitators reported	4.4	2.1	−0.1	8.9
	Total number of challenges associated with Inner Setting	4.2	2.0	0.0	8.5
	Total number of challenges associated with Outer Setting	52.1	13.9	23.0	81.3

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