*Original Article*

# Integration of Palliative Care and Infection Management at the End of Life in U.S. Nursing Homes



Patricia W. Stone, PhD, Mansi Agarwal, PhD, Feifei Ye, PhD, Mark Sorbero, MS, Susan C. Miller, PhD, MBA, and Andrew W. Dick, PhD

*Columbia University School of Nursing (P.W.S., M.A.), New York, New York; RAND Corporation (F.Y., M.S.), Pittsburgh, Pennsylvania; Brown University School of Public Health (S.C.M.), Providence, Rhode Island; and RAND Corporation (A.W.D), Boston, Massachusetts, USA*

## Abstract

**Context.** Infections in nursing home (NH) residents are often terminal illnesses. Integration of palliative care (PC) and infection management (IM) is a new concept that can help reduce burdensome treatments and improve quality of care for NH residents at the end of life.

**Objectives.** To develop measures of integration, describe the integration in U.S. NHs, and examine predictors of integration.

**Methods.** A nationally representative sample of NHs was surveyed. An instrument to measure integration was tested using factor analyses. Descriptive analyses of each integration factor were conducted, construct validity was examined using correlations between the integration factors and validated measures of PC and IM, and multivariable linear regression models were developed to identify NH characteristics associated with integration.

**Results.** A total of 892 NH surveys were returned (49% response rate), 859 with complete data. Three integration factors were identified: patient involvement in care planning (Involvement), formalized advance care planning (Advance Care Planning), and routine practices of integration (Routine Practices). The highest level of integration in NHs was reported for Involvement (mean ($\mu$) = 73.2, standard error [SE] = 1.57), with lower rates for Advance Care Planning and Routine Practices (respectively, $\mu = 34.1$, SE = 1.05; $\mu = 31.4$, SE = 1.48). Each integration measure was weakly, positively associated with the PC and IM measures ($r \leq 0.25$, $P \leq 0.01$). There were few associations between NH characteristics and integration.

**Conclusion.** Integration is a distinct concept that is associated with, but different from, PC and IM. Results serve as a baseline assessment of integration in NHs. Continued refinement of the integration instrument is recommended, as is studying if higher integration leads to better resident outcomes. J Pain Symptom Manage 2019;58:408–416. © *2019 American Academy of Hospice and Palliative Medicine. Published by Elsevier Inc. All rights reserved.*

***Key Words***

*Infection Management, end-of-life, palliative care, nursing homes, integration*

There are approximately 1.4 million residents living in more than 15,600 nursing homes (NHs) across the nation; 85% of those residents are aged at least 65 years.[1] Many residents have advanced illnesses, defined as having one or more conditions serious enough that general health and functioning decline and treatments begin to lose their impact.[2] Residents with advanced illnesses are at the stage at which care goals enter a gray area; that is, one in which therapy is no longer effective, and the point at which palliative care (PC) may take priority. Furthermore, many of these residents die of infections. There are an

*Address correspondence to:* Mansi Agarwal, PhD, Columbia University School of Nursing, 560 West 168th Street, Mail Code 6, New York, NY 10032, USA. E-mail: ma3204@cumc.columbia.edu

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estimated 1.1 to 2.7 million infection cases in NHs each year; furthermore, these infections happen often at the end of life and result in death.[3–5] Elderly NH residents with advanced illnesses are particularly susceptible to infections due to a variety of reasons including reduced immunity. Despite the advanced illness and terminal nature of many infections in residents, antibiotics are overused in NHs.[6,7] Antibiotic use may delay entry to hospice, reduce quality of life, prolong the dying process, and incur unnecessary costs with little or no benefit to the patient.[8] Inappropriate and/or overuse of antibiotics lead to increased incidence of multiple drug-resistant organisms as well as *Clostridium difficile* infections and may increase the risk of transmission to others.

There is limited evidence that antibiotics provide symptom relief for patients at the end of life.[9] A study found that NH residents with advanced dementia who were not treated with antibiotics had greater comfort, albeit slightly shorter survival, than those who were treated.[10] A notable finding in this study was that the survival benefit associated with antibiotic use vs. no treatment was similar regardless of the route of administration, whereas the most aggressive treatment approaches (i.e., intravenous therapy or hospitalization) were associated with the greatest discomfort.

To improve infection prevention and infection management (IM), there are national and regional initiatives in place. In 2012, the Centers for Disease Control and Prevention launched the Long-Term Care Facility Component in the National Healthcare Safety Network (NHSN) that enables enrolled NHs to monitor infection-prevention processes and track infections. In 2016, the Centers for Medicare & Medicaid Services (CMS) funded the *C. difficile* Infection Reporting and Reduction Project that promotes antibiotic stewardship in NHs through regional learning collaboratives established through the Quality Innovation Network-Quality Improvement Organizations. The most recent conditions for participation for long-term care facilities final rule by CMS require NHs to have an infection-control program that includes antibiotic stewardship as well as a designated infection preventionist (IP) (Section §483.80).[11] This rule also requires each facility to provide a comprehensive person-centered care plan (Section §483.25).

The 2015 National Academy of Medicine publication, "Dying in America", recommends that all NHs provide end of life care consistent with PC goals.[12] Implemented at the state level, the national Physician Orders for Life-Sustaining Treatment (POLST) paradigm aims to improve end-of-life advanced care planning by documenting patients' and families' preferences for care.[13] Some state POLST forms have preferences for antibiotic usage.[14]

For many long-stay NH residents, even those with infection, the main goal of care is palliation as residents and their families value dignity and quality of life, not prolongation of life.[1,15] Integration is a new concept, which we define as the merging of goals of care for PC and IM at the end of life. It has been recommended that PC and IM be integrated in end-of-life care by 1) discussing decisions about IM as part of advanced care planning with documented treatment preferences about antibiotic use and hospitalization due to infection and 2) improving antibiotic stewardship protocols and incorporating resident treatment preferences.[7,16] To date, we are aware of no measures of integration of PC with IM at the end of life in NHs. The purposes of this nationally representative NH study were to develop measures of integration, describe the current state of integration in U.S. NHs, and examine predictors of integration.

## Methods

### Sample

A cross-sectional facility-level survey (available upon request) of a stratified, random sample of U.S. NHs was conducted. NHs were identified from 2016 Certification and Survey Provider Enhanced Reporting (CASPER) data and were eligible if they were nonspecialized, free-standing facilities with at least 30 beds and a CASPER assessment date of 2014 or later. Random sampling was stratified by Quality Innovation Network-Quality Improvement Organizations region (an equal number of NHs across each of the 14 regions), NHSN enrollment (30% of all sampled NHs were enrolled in NHSN), and participation in our previous study (988 NHs that completed surveys in 2013–2014).[17]

### Data Collection

Data collection occurred from November 2017 through October 2018. Using previously successful methods, recruitment occurred in waves of 200–300 NHs each.[18] The Director of Nursing (DON) at each NH was mailed an invitation letter with instructions for survey completion. Respondents were given the option to respond via Web or mail. Incentives included $25 gift cards for completed surveys and inclusion in $250 lotteries for those who returned the survey within one month. Paper-based surveys were entered into an electronic database, and data quality was checked through double data entry of a random sample of 10% of the surveys. Web and paper-based survey data were combined into a single analytical data set.

### Measures

The survey included previously used items relating to characteristics of the infection-control program in

the facility, demographics and training of the person in charge of the program (i.e., the IP), workforce stability and staffing, and measures of PC and IM practices.[17,19] Nine items of integration were also developed through review of recommended guidelines as well as adapted items from published PC and IM surveys used in NHs.[20–25] The integration items asked a series of questions on policies and procedures an NH would follow given a suspected infection in a patient considered to be near the end of life (Appendix). A panel of 7 experts established content validity. Cognitive interviews were conducted with 5 DONs, which resulted in refinement of some items. Two integration items were scored on a 4-point Likert scale ranging from "Rarely" to "Almost Always", and 7 items were from vignettes describing an advanced-stage Alzheimer's patient with a suspected infection near the end of life. The latter were care practices or orders that would be in place scored on a 3-point Likert scale ranging from "Not at all Likely" to "Very Likely". All integration items were coded so that higher scores represent higher integration.

The validated PC and IM measures that separately reflected best practices included 1) the End-of-Life Culture Change, a 6-item scale of PC practice in NHs;[26] 2) the Antibiotic Stewardship scale, 7 items regarding antibiotic use and stewardship;[27] and 3) Urinary Tract Infection (UTI) Prevention, 7 items representing evidence-based practices for UTI prevention in NHs.[25] For the PC measure, consistent with Schwartz et al., we included only NHs that had at least 4 nonmissing responses in our sample and imputed the one or two missing responses based on the means of the nonmissing responses by the facility.[26] We then standardized the measure to range from 0 to 100, with higher scores representing greater intensity of best practices in PC. Standardized measures for Antibiotic Stewardship and UTI Prevention were calculated by summing the number of items present in each NH, dividing by the number of items possible, and multiplying by 100, resulting in a range from 0 to 100, with higher scores representing greater intensity of best practices for IM.

The survey also included characteristics of the IP including education (i.e., licensed practical nurse, registered nurse, or other) and training (i.e., certification, participation in a training course, or none). Staff turnover of IPs, DONs, and NH administrators was measured as the count of persons in the role in the past three years.

The survey was linked to the most recent CASPER data and September 2018 Nursing Home Compare Five-Star Quality Rating System data. CASPER is a comprehensive source of NH facility-level information. NH characteristics derived from CASPER included bed size, percent occupancy, payer mix, staffing, ownership (i.e., for profit, government, nonprofit), region (i.e., Midwest, Northeast, South, West), setting (i.e., metropolitan, rural remote, rural adjacent), multifacility organization, and regulatory compliance (i.e., infection control and quality of care deficiency citations in the past year) collected by surveyors during the inspection of NHs for CMS certification. Staffing measures derived from CASPER included hours worked per resident day for nursing staff and an indicator for high social worker hours per resident data based on the top quartile across all NHs. The Nursing Home Compare Five-Star Rating system was used to assess overall NH quality.[27]

### *Statistical Analyses*

Survey respondents and nonrespondents were compared on the NH characteristics using Chi-squared, Fisher's exact, *t*, or Wilcoxon-Mann-Whitney tests as appropriate. Weights to adjust for differential probabilities of inclusion and participation in the study were constructed based on the sampling strata and nonresponse predictors, including ownership type (i.e., for profit, nonprofit, government) and urban rural indicators (i.e., metropolitan, rural adjacent, rural remote). Weighted descriptive statistics, population mean intensity scores (μ), and standard errors (SEs) were computed.

To evaluate the underlying constructs of the 9 newly developed items measuring integration, we performed factor analysis using promax (oblique) rotation and compared 1-, 2-, and 3-factor solutions. Then, similar to our PC and IM measures, for each identified integration factor, an intensity score was calculated as the number of items that received the highest possible response divided by the number of questions in each index and multiplied by 100. Each integration factor, therefore, represents a normalized intensity percentage ranging from 0 to 100, with a higher score representing greater integration. We computed Cronbach alphas as a measure of internal consistency.

Construct validity of the integration factors was examined using Pearson correlations between each integration factor and the PC and IM measures. Separate, weighted, multivariable linear regression models were estimated to evaluate the association between each of the integration measures and NH characteristics, IP characteristics, and staff turnover. All statistical analyses were conducted using SAS 9.4 (SAS Institute Inc., Cary, North Carolina).

## *Results*

We sampled 1820 NHs, and 892 surveys were returned (39.7% through mail and 60.3% through Web) for a 49% response rate. Owing to missing data in key variables, our final sample included 859 NHs. Sample characteristics stratified by respondents and

*Table 1*
**Nursing Home Characteristics by Respondents and Nonrespondents**

| Characteristics | All, $n = 1787$ | Nonrespondents, $n = 928$ | Respondents, $n = 859$ | $P$ value |
|---|---|---|---|---|
| CMS five-star overall rating, mean (SD) | 3.39 (1.37) | 3.35 (1.37) | 3.43 (1.37) | 0.15 |
| Facility bed size, mean (SD) | 115.66 (65.32) | 117.77 (62.77) | 113.39 (67.93) | 0.01 |
| Percent occupancy, mean (SD) | 80.03 (16.10) | 80.42 (15.54) | 79.61 (16.68) | 0.57 |
| % Payer, mean (SD) | | | | |
| Medicare residents | 13.64 (12.23) | 14.20 (12.53) | 13.04 (11.89) | 0.02 |
| Medicaid residents | 59.22 (22.31) | 59.92 (22.34) | 58.46 (22.26) | 0.13 |
| Resident care hours by staff, mean (SD) | | | | |
| CNA HRD | 2.51 (0.82) | 2.50 (0.92) | 2.53 (0.69) | 0.13 |
| LPN HRD | 0.83 (0.43) | 0.84 (0.39) | 0.82 (0.47) | 0.07 |
| RN HRD | 0.83 (0.54) | 0.83 (0.58) | 0.83 (0.49) | 0.38 |
| High staffing of social workers, % | 25.93 | 23.81 | 26.14 | 0.26 |
| Ownership, % | | | | |
| For profit | 67.62 | 72.41 | 62.43 | <0.01 |
| Government | 7.06 | 5.60 | 8.63 | |
| Nonprofit | 25.32 | 21.98 | 28.94 | |
| Region, % | | | | |
| Midwest | 30.25 | 28.13 | 32.56 | 0.02 |
| Northeast | 20.00 | 18.53 | 21.59 | |
| South | 29.64 | 32.00 | 27.07 | |
| West | 20.11 | 21.34 | 18.79 | |
| Setting, % | | | | |
| Metropolitan | 71.26 | 74.46 | 67.79 | <0.01 |
| Rural remote | 16.58 | 15.73 | 17.50 | |
| Rural adjacent | 12.16 | 9.81 | 14.70 | |
| Multifacility organization, % | 57.69 | 60.34 | 54.96 | 0.02 |
| Infection control citation in past year, % | 38.61 | 39.76 | 37.46 | 0.32 |
| Quality of care citation in past year, % | 64.75 | 66.59 | 62.89 | 0.10 |

CMS = Centers for Medicare and Medicaid Services; SD = standard deviation; CNA = certified nursing assistant; HRD = hours worked per resident day; LPN = licensed practical nurse; RN = registered nurse.

nonrespondents are shown in Table 1. Responding NHs were relatively smaller ($P = 0.01$), had a greater percentage of Medicare residents ($P = 0.02$), were less likely to be for-profit organization ($P < 0.01$), and were less likely to be a part of a multifacility organization ($P = 0.02$) than nonrespondents. Respondents were also more likely to be located in the Midwest or Northeast regions of the U.S. ($P = 0.02$) as well as in rural remote or rural adjacent areas ($P < 0.01$). There were no differences between respondents and nonrespondents in overall quality rating, occupancy, staffing levels, or in having received an infection-control or quality-of-care citation in the past year.

From the principal component factor analysis, we selected the 3-factor solution because 1) it had significantly better fit than the 1- and 2-factor solution and 2) it provided excellent fit to the data ($\chi^2 = 8.12$, $P = 0.78$, Comparative Fit Index = 1.00, root mean square error of approximation = .00). The three factors identified including the percentage of responses in the "Almost Always" or "Very Likely" response categories as well as the Cronbach's $\alpha$, $\mu$, and SE for each measure are described in Table 2. Based on the items included, we labeled the integration measures as follows: 1) patient/caregiver involvement in care planning (Involvement), 2 items; 2) formalized advance care planning in place (Advance Care Planning), 5 items; and 3) routine practices of integration (Routine Practices), 2 items.

The Involvement and Advance Care Planning measures were internally consistent (Cronbach's $\alpha$'s $\geq 0.70$). Routine Practice had a lower internal consistency. For Involvement, most respondents (70.81%) indicated their NH almost always considered residents' goals of care in managing suspected infections and included residents and proxies in decision-making. The weighted intensity mean was high ($\mu = 73.17$, SE = 1.57), indicating that on average, 73% of NHs responded "almost always" to the patient Involvement measure. There was more variation in the Advance Care Planning items, ranging from 7.14% of respondents indicating they were very likely to have a do not administer antibiotics order and 57.35% of respondents having a do not resuscitate order. About a third of respondents indicated that residents in their NH were very likely to have the Routine Practices items. The weighted intensity means for Advance Care Planning and Routine Practices were low (respectively, $\mu = 34.1$, SE = 1.05; $\mu = 31.37$, SE = 1.48).

Table 3 presents the PC and IM indices and the measures included in each. PC had the highest intensity of practices ($\mu = 76.61$, SE = 0.72) followed by the IM indices of Antibiotic Stewardship and UTI Prevention ($\mu = 65.81$, SE = 0.90; $\mu = 55.70$, SE = 0.76, respectively). More than 50% of NHs reported that they "almost always" discussed residents' spiritual needs, documented end-of-life care plans, sent sympathy cards to significant others, and provided emotional support to roommates

*Table 2*
**Prevalence of Integration of Palliative Care and Infection Management Policies Among U.S. NHs (Unweighted $n = 859$, Weighted $n = 14,828$)**

| Integration Measures | Weighted % | Intensity Index | | |
|---|---|---|---|---|
| | | Cronbach's α | Weighted μ | SE |
| 1. Patient/caregiver involvement in care planning[a] | | 0.70 | 73.17 | 1.57 |
| Consider residents' goals of care in managing suspected infections near the end of life. | 70.81 | | | |
| Include residents and resident proxies in treatment decisions for suspected infections near the end of life. | 76.01 | | | |
| 2. Formalized advance care planning[b] | | 0.72 | 34.11 | 1.05 |
| Ms. Davis would already have a "Do Not Resuscitate" order | 57.35 | | | |
| Ms. Davis would already have a "Do Not Hospitalize" order | 23.98 | | | |
| Ms. Davis would already have a "Do Not Administer Antibiotics" order | 7.14 | | | |
| Ms. Davis would already have an order reflecting "Palliative/Comfort Measures" only | 26.85 | | | |
| A proxy for Ms. Davis would be asked how to manage the suspected infection | 55.91 | | | |
| 3. Routine practices of integration[b] | | 0.63 | 31.37 | 1.48 |
| A straight catheter would be used to collect a urine sample[c] | 30.77 | | | |
| Ms. Davis would be treated with antibiotics[c] | 32.39 | | | |

NH, nursing home; SE, standard error.
[a]Policies were considered present if answered as "Almost Always" on Likert scale.
[b]Both the formalized advance care planning and routine practices of integration items came from a vignette stating, "Ms. Davis has been in your facility for 4 months. On admission, she was ambulatory and needed total assistance with feeding. She was admitted with advanced heart disease, osteoporosis, a right hip fracture, and Alzheimer's disease. She takes oxycodone 10 mg every 6 hours for pain. In the past month, you notice she is eating less, has lost 10 pounds, and coughs when drinking. Ms. Davis no longer recognizes her family." The formalized advance care planning items also stated, "Over the past 24 hours, Ms. Davis developed a fever, cough, and shortness of breath and the clinical exam suggested aspiration pneumonia. In your facility, how likely is it that …". The routine practices of integration also stated, "Over the past 24 hours, Ms. Davis appears more confused and her family mentions to the nurse that her urine looks dark and asks if she has a urinary tract infection. She has not developed a fever. In your facility, how likely is it that …". All policies were considered present if answered as "Very Likely" on Likert scale.
[c]These questions were reverse coded so that a positive response was a higher value.

and friends after the resident passes away. Fewer NHs honored resident deaths in a public way (36% reporting that they "rarely" or "sometimes" did this) and 46% of NHs "rarely" or "sometimes" honored the resident's body. In regard to Antibiotic Stewardship practices, the majority (>50%) of NHs had 6 of the 7 policies in place; however, only 19% restricted the use of specific antibiotics. The prevalence of UTI Prevention practices was more varied, ranging from 13% using condom catheters for men instead of indwelling catheters to 97% of NHs providing staff education of perineal care.

Table 4 presents the results of the construct validity analyses, the Pearson correlation coefficients of the PC and IM indices with the integration measures. All pairwise correlations were weakly and positively associated (all $P \leq 0.01$). PC and Antibiotic Stewardship were the most correlated with Involvement ($r = 0.23$ and 0.25, respectively) and Advanced Care Planning ($r = 0.18$ and 0.17, respectively) compared with UTI Prevention ($r = 0.17$ for Involvement and $r = 0.15$ for Advance Care Planning). PC, Antibiotic Stewardship, and UTI Prevention were similarly correlated with Routine Practices ($r = 0.11$ to 0.12).

Table 5 presents results of the multivariate regressions examining the integration measures as a function of NH characteristics. Relatively few NH characteristics predicted integration. Being part of a multichain organization was negatively associated with Involvement ($P = 0.01$). NHs that had a higher proportion of Medicaid residents ($P = 0.03$), were located in the South ($P = 0.02$), and had a registered nurse in charge of infection control ($P = 0.01$) were more likely to have lower scores of Advance Care Planning. Higher scores in Routine Practices were associated with a higher CMS five-star overall rating ($P = 0.02$), high staffing of social workers ($P = 0.01$), and greater turnover of IPs ($P < 0.01$). NHs in the Midwest were also more likely to have higher Routine Practice scores ($P = 0.03$).

## *Discussion*

Integration of PC and IM at the end of life in NHs is a new concept that has not been previously measured. This nationally representative study is the first to develop a measure of the concept of integration, psychometrically test its properties, and describe the state of integration at the end of life in U.S. NHs. Three factors were identified: Involvement, Advance Care Planning, and Routine Practice. The Involvement and Advance Care Planning factors were internally consistent, but the Routine Practice factor had less internal consistency. All 3 factors were weakly and positively associated with validated measures of PC and IM, which supports the construct validity of our new integration measure. Measurement of integration is

*Table 3*
**Survey Items for Palliative Care and Infection Management**

| | Weighted μ | SE | Range |
|---|---|---|---|
| Palliative Care | | | |
| End-of-Life Culture Change Scale | 76.61 | 0.72 | 7.78–100 |
| How often does your facility: | *% Rarely/Sometimes* | *% Often* | *% Almost Always* |
| 1. Discuss a resident's spiritual needs at care planning conferences when the resident has a terminal illness? | 11.46 | 17.09 | 71.45 |
| 2. Document in the care plan what is important to the individual, such as the presence of family or religious or cultural practices? | 9.14 | 17.66 | 73.20 |
| 3. Honor in some public way (either at the facility or in the community) a resident who has died? | 36.11 | 17.33 | 46.55 |
| 4. Honor the resident's body in some manner upon its removal from the facility? | 46.30 | 11.17 | 42.53 |
| 5. Send a sympathy card to family members or significant others after a resident has died? | 19.17 | 14.08 | 66.74 |
| 6. Follow up with roommate(s) or friend(s) in the facility to provide emotional support after a resident has died? | 14.02 | 22.66 | 63.31 |
| Infection Management | | | |
| Antibiotic Stewardship Policies | 65.81 | 0.90 | 0–100 |
| Which of the following policies or programs are in place at your facility? | *% Present* | | |
| 1. Collect data on antibiotic use | 91.74 | | |
| 2. Use antibiotic prescribing guidelines or therapeutic formularies | 65.39 | | |
| 3. Restrict the use of specific antibiotics | 18.97 | | |
| 4. Communicate antibiotic use information when residents are transferred | 81.20 | | |
| 5. Review cases to assess appropriateness of antibiotic administration and/or indication | 69.16 | | |
| 6. Provide feedback to clinicians for antibiotic use and prescribing them | 71.20 | | |
| 7. Provide education resources for improving antibiotic use | 63.01 | | |
| Urinary Tract Infection Prevention Policies | 55.70 | 0.76 | 0–100 |
| Which of the following policies does your facility have in place related to prevention of urinary tract infections? | *% Present* | | |
| 1. Hydration protocols | 77.50 | | |
| 2. Staff education on perineal care | 97.71 | | |
| 3. Urinary catheter reminder/stop-order or nurse-initiated urinary catheter discontinuation | 65.92 | | |
| 4. Leg bag cleaning policy | 45.34 | | |
| 5. Condom catheters used instead of indwelling catheters for men | 12.63 | | |
| 6. Catheters replaced and specimens collected before antimicrobial therapy for symptomatic infection of residents with indwelling catheters | 60.90 | | |
| 7. Portable bladder ultrasound scanner for determining post void residual | 29.87 | | |

SE, standard error.

important as national and regional initiatives are attempting to improve PC and IM in NHs.[28–30]

We found wide variation of integration in NHs. Although most NHs involve patients and caregivers in care planning, fewer facilities report having integrated formalized Advance Care Planning and even fewer have integrated Routine Practices for dying patients. The relatively low prevalence of integrating PC and IM in Advance Care Planning at the end of life is surprising given the national focus on advance directives and increased implementation of POLST across the nation; in a recent review of POLST state forms, over 70% ($n = 32$) included antibiotic preferences.[17] However, it is worth mentioning that Oregon, where POLST was first developed, removed the section about antibiotics preferences based on findings that there were little differences in antibiotic usage whether or not a POLST form was available.[31,32] Furthermore, researchers examined NH residents' POLST orders and found the highest discordance with antibiotics.[33] Better understanding is needed on how to integrate PC and IM, including preferences

*Table 4*
**Pearson Correlations Between Measures of Palliative Care and Infection Management With Integration**

| | Integration of Palliative Care and Infection Management | | | | | |
|---|---|---|---|---|---|---|
| | Patient Involvement | | Advance Care Planning | | Routine Practices | |
| Index | r | *P* value | r | *P* value | r | *P* value |
| Palliative Care | 0.23 | <0.01 | 0.18 | <0.01 | 0.12 | <0.01 |
| Antibiotic Stewardship | 0.25 | <0.01 | 0.17 | <0.01 | 0.12 | <0.01 |
| UTI Prevention Policies | 0.17 | <0.01 | 0.15 | <0.01 | 0.11 | <0.01 |

UTI, urinary tract infection.

*Table 5*
**Nursing Home Characteristics and Associations With Integration of Infection Management and Palliative Care**

| | Patient Involvement[a] | | Advance Care Planning[a] | | Routine Practices[a] | |
|---|---|---|---|---|---|---|
| Characteristics | β | *P* value | β | *P* value | β | *P* value |
| CMS five-star overall rating | 0.62 | 0.63 | 1.08 | 0.20 | 2.74 | **0.02** |
| Facility bed size | −0.03 | 0.27 | −0.02 | 0.19 | −0.01 | 0.57 |
| Percent occupancy | 0.11 | 0.28 | −0.02 | 0.79 | −0.18 | 0.06 |
| % Payer | | | | | | |
| Medicare residents | −0.01 | 0.96 | −0.21 | 0.07 | −0.21 | 0.12 |
| Medicaid residents | −0.08 | 0.41 | −0.12 | **0.03** | 0.02 | 0.82 |
| Other residents | Ref | | Ref | | Ref | |
| Resident care hours by staff | | | | | | |
| CNA HRD | −0.44 | 0.73 | 0.67 | 0.48 | 1.62 | 0.12 |
| LPN HRD | −0.46 | 0.90 | 0.47 | 0.82 | −2.26 | 0.42 |
| RN HRD | 0.44 | 0.76 | −1.46 | 0.26 | −1.60 | 0.23 |
| High staffing of social workers | −2.21 | 0.57 | 3.32 | 0.21 | 9.29 | **0.01** |
| Ownership | | | | | | |
| For profit | −4.29 | 0.28 | −1.87 | 0.46 | −2.27 | 0.52 |
| Government | 5.27 | 0.38 | −6.95 | 0.08 | −7.06 | 0.25 |
| Nonprofit | Ref | | Ref | | Ref | |
| Region | | | | | | |
| Midwest | 0.53 | 0.92 | −5.39 | 0.18 | 4.79 | 0.36 |
| Northeast | 3.81 | 0.53 | −1.38 | 0.75 | 12.87 | **0.03** |
| South | 3.90 | 0.47 | −9.61 | **0.02** | −3.89 | 0.46 |
| West | Ref | | Ref | | Ref | |
| Setting | | | | | | |
| Metropolitan | 4.85 | 0.22 | 2.72 | 0.26 | 0.45 | 0.90 |
| Rural Remote | 1.03 | 0.89 | 1.94 | 0.65 | 5.08 | 0.46 |
| Rural Adjacent | Ref | | Ref | | Ref | |
| Multifacility organization | −9.57 | **0.01** | −1.31 | 0.54 | −1.18 | 0.70 |
| Infection control citation in the past year | −2.50 | 0.46 | −0.90 | 0.69 | 0.88 | 0.77 |
| Quality of care citation in the past year | 1.09 | 0.75 | 0.61 | 0.79 | 0.66 | 0.84 |
| IP education | | | | | | |
| LPN | −1.63 | 0.71 | 0.51 | 0.86 | −0.17 | 0.97 |
| RN | −2.01 | 0.92 | −23.20 | **0.01** | −12.61 | 0.25 |
| Other | Ref | | Ref | | Ref | |
| IP Training | | | | | | |
| Certified in Infection Control (CIC) | −0.52 | 0.94 | 6.96 | 0.13 | 7.33 | 0.27 |
| State or local training course with certificate | −4.49 | 0.35 | 1.33 | 0.69 | 1.91 | 0.69 |
| National or local training course offered by a professional society | −4.59 | 0.39 | 1.37 | 0.69 | 3.83 | 0.45 |
| Other | 3.76 | 0.48 | 4.81 | 0.26 | −3.41 | 0.55 |
| No specific infection control training | −8.32 | 0.10 | 0.57 | 0.87 | −5.33 | 0.29 |
| Staff turnover | | | | | | |
| IPs in past 3 years | −1.01 | 0.24 | −0.39 | 0.52 | 2.23 | **<.01** |
| DONs in past 3 years | −0.98 | 0.44 | −0.92 | 0.27 | −1.48 | 0.17 |
| Administrators in past 3 years | 0.89 | 0.30 | −0.39 | 0.59 | −1.16 | 0.13 |

CMS = Centers for Medicare and Medicaid Services; CNA = certified nursing assistant; DON = Director of Nursing; HRD = hours per resident day; IP = infection preventionist; LPN = licensed practical nurse; RN = registered nurse.
Bolded values are statistically significant.
[a]All models include all variables in the table.

about antibiotic usage as well as increasing clinician and public knowledge of appropriate antibiotic utilization.

Relatively few NH characteristics were independently associated with each integration factor, and many characteristics varied across the regression models, suggesting that variation in levels of integration across NHs is idiosyncratic or that we have yet to understand what drives integration of PC and IM. Alternatively, the quality metrics (e.g., CMS five-star rating) may not adequately measure quality of care at the end of life.[27] More research into this area is needed. We did find that higher levels of social workers were associated with higher Routine Practices scores, as was greater turnover of IPs. In previous research, higher levels of staffing have been found to be associated with higher quality of care.[34–36] Specific to infection prevention and control, IP training and lower turnover in leadership positions are associated with increased presence of recommended IM processes.[17,19,37] The association of increased turnover of IPs with Routine Practices may be due to NHs gearing up for the changes in the conditions of participation.[11]

This study has limitations. Although the sample size exceeded or was similar to other surveys of programs in NHs, the respondents differed from nonrespondents in certain characteristics.[17] However, population

weights were developed and used to enable national generalizability. There may be high desirability bias in the responses we did receive as a result of recent regulations.[11] The survey was cross-sectional in design, which did not allow us to determine if there is a temporal association between having more evidence-based PC and IM policies in place and integration. We surveyed the DON, and responses may have differed had we surveyed other NH staff. However, in previous research, clinical staff have identified the DON as the best person to provide an accurate account of a facility's end-of-life care.[38]

Despite these limitations, our findings provide important implications for the integration of PC and IM in NHs. With the recent regulation for NHs to have antibiotic stewardship programs and a focus on improving PC, the results of this study serve as a baseline assessment of the integration of PC and IM in NHs. There is a continued need to monitor this integration and develop strategies to help NHs develop best practices. Furthermore, future research should examine if integration of PC and IM leads to better resident outcomes.

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## *Appendix. Survey Items Used to Measure Integration of PC and IM in NHs*

The next questions are about how infection management is integrated with palliative care at your facility. Your answers will help us to better understand how to support nursing home personnel in providing optimal resident-centered, preference-based care.

Please indicate how often your facility engages in the following activities. *(Please select one response in each row)*

| How often does your facility … | Rarely$_1$ | Sometimes$_2$ | Often$_3$ | Almost Always$_4$ | Don't Know$_5$ |
|---|---|---|---|---|---|
| a. Consider residents' goals of care in managing suspected infections near the end of life? | ☐ | ☐ | ☐ | ☐ | ☐ |
| b. Include residents and resident proxies in treatment decisions for suspected infections near the end of life? | ☐ | ☐ | ☐ | ☐ | ☐ |

Please answer the following questions as they relate to the resident described below.

Ms. Davis has been in your facility for 4 months. On admission, she was ambulatory and needed total assistance with feeding. She was admitted with advanced heart disease, osteoporosis, a right hip fracture, and Alzheimer's. She takes oxycodone 10 mg every 6 hours for pain. In the past month, you notice she is eating less, has lost 10 pounds, and coughs when drinking. Ms. Davis no longer recognizes her family.

*(Please select one response in each row)*

| SCENARIO 1: Over the past 24 hours, Ms. Davis developed a fever, cough, and shortness of breath and the clinical exam suggested aspiration pneumonia. In your facility, how likely is it that | Not at all likely$_1$ | Somewhat likely$_2$ | Very likely$_3$ |
|---|---|---|---|
| a. Ms. Davis would already have a "Do Not Resuscitate" order? | ☐ | ☐ | ☐ |
| b. Ms. Davis would already have a "Do Not Hospitalize" order? | ☐ | ☐ | ☐ |
| c. Ms. Davis would already have a "Do Not Administer Antibiotics" order? | ☐ | ☐ | ☐ |
| d. Ms. Davis would already have orders reflecting "Palliative/Comfort Measures" only? | ☐ | ☐ | ☐ |
| e. The proxy for Ms. Davis would be asked how to manage the suspected infection? | ☐ | ☐ | ☐ |
| SCENARIO 2: Over the past 24 hours, Ms. Davis appears more confused and her family mentions to the nurse that her urine looks dark and asks if she has a urinary tract infection. She has not developed a fever. In your facility, how likely is it that … | Not at all likely$_1$ | Somewhat likely$_2$ | Very likely$_3$ |
| a. A straight catheter would be used to collect a urine sample for Ms. Davis? | ☐ | ☐ | ☐ |
| b. Ms. Davis would be treated with antibiotics? | ☐ | ☐ | ☐ |