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Preventing infections in nursing homes: A survey of infection control practices in southeast Michigan

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Abstract

Background—Studies on adherence to infection control policies in nursing homes (NHs) are limited. This pilot study explores the use of various infection control practices and the role of infection control practitioners in southeast Michigan NHs.

Methods—A 43-item self-administered questionnaire and explanatory cover letter were mailed to 105 licensed NHs in southeast Michigan. A second mailing was sent to the nonresponders 4 weeks later.

Results—Significant variability existed in adoption of various infection control measures with respect to time spent in infection control activities (50% of facilities having a full-time infection control practitioner), definitions used in monitoring infections, and immunization rates (influenza: range, 0%–100%; mean, 73.2%; pneumococcal: range, 0%–100%; mean, 38.5%).

Conclusion—Although strides have been made in infection control research in NHs, significant variations exist in implementation of infection control methods and guidelines. Future research should focus on identifying barriers to infection control in NHs.

Infections are the most common cause of acute care hospitalization among nursing home (NH) residents, accounting for 27% to 63% of hospitalizations from these facilities.^{1–3} Complications of hospitalization in older adults include death, functional decline, delirium, and pressure ulcers. To reduce the incidence of infections, NHs must have an individualized infection control program as mandated by the 1987 Omnibus Reconciliation Act.

No studies have critically evaluated the efficacy of these infection control programs in NHs, and few studies have prospectively evaluated specific infection control practices in this setting.^{4,5} Most data on interventions and outcomes of infection control measures are derived from acute care facilities, at which efforts directed toward prevention of infections have led to significant reductions in infection rates. A landmark study found that intensive

infection control surveillance and control programs were strongly associated with reductions in the rates of urinary tract infection, surgical wound infection, pneumonia, and bacteremia in hospitals.⁶

In NHs, adherence to individual, proven infection control measures, including hand hygiene and vaccination, have been less than optimal.^{5,7,8} In one study of compliance with hand hygiene in a nursing facility, hands were washed only 27% of the time before patient interactions and 63% of the time after interactions.⁵ More worrisome, gloves were changed only 16% of the time between care of patients. Despite proven effectiveness, current vaccination levels in NH residents are also well below national targets (80% in 2000) for both influenza vaccination (60%–65%) and pneumococcal vaccination (38%–40%).^{9,10}

We sought to (1) identify infection control practices that were adopted in NHs in southeast Michigan, (2) identify immunization practices used for residents and staff, and (3) understand the role of the infection control practitioner (ICP) and time allocated to infection control activities. We also compared characteristics of facilities with part-time versus full-time ICPs.

METHODS

A 43-item self-administered questionnaire was mailed to each director of nursing at 105 licensed NHs in southeast Michigan. These facilities were identified from a list published in a semiannual directory, the Senior Alternatives (Residential Marketing Concepts). A cover letter providing details on the research program and assurance of confidentiality accompanied the questionnaire. To increase the response rate, a second mailing was sent to the nonresponders 4 weeks later. We did not provide any financial incentives to responders. This study was approved by our institutional review board.

The questionnaire included both open- and close-ended questions. Demographic questions included (1) number of beds; (2) number of subacute care beds (subacute care was defined as goal oriented, comprehensive, inpatient care for an individual with an acute illness, injury, or exacerbation of a disease rendered immediately after, or instead of, acute hospitalization¹¹); (3) presence of an ICP; (4) hours spent in infection control activities; (5) presence of indwelling devices (ie, urinary catheters, feeding tubes, and central intravenous lines); (6) incontinence management practices; (7) immunization rates among the residents; (8) occurrence of infection outbreaks; (9) type of outbreaks; and (10) interest in targeted interventions focused on reducing infections. Questions were also asked to determine (1) definitions used for infection surveillance; (2) use of screening cultures for antibiotic-resistant pathogens in residents and the environment; (3) presence of infection control guidelines for indwelling devices, antimicrobial resistant pathogens, diarrhea, and pressure ulcers; (4) presence of an employee health program (whether a facility required a preemployment health evaluation, offered influenza vaccination to their employees, and had a policy for employee sickness); and (5) employee education regarding infection control.

All data were analyzed using SPSS (version 10.1; SPSS Inc., Chicago, IL). Comparisons of the responses between different categories of NHs (with or without full-time ICP and with or without skilled nursing beds) were performed using Fisher exact test and Mantel-Haenszel χ^2 test. Student *t* test was used to compare mean hours spent in infection control activities between NHs with and without subacute care beds.

RESULTS

From the mailing of 105 questionnaires, 10 envelopes were undeliverable, and the facilities were found to have closed. Completed questionnaires were received from 35 of the

remaining 95 facilities, for an adjusted response rate of 37%. There were no statistically significant differences between responders and nonresponders in mean number of beds (124 vs 136, respectively, $P = .38$) and nonprofit status (14/35 responders vs 14/60 nonresponders, $P = .07$).

Thirty (85.7%) facilities reported having written guidelines on the control of resistant pathogens including vancomycin-resistant enterococci (VRE) and methicillin-resistant *Staphylococcus aureus* (MRSA). Thirteen facilities (37%) reported screening patients routinely for MRSA and 12 (34%) for VRE colonization (Table 1). Three facilities reported that they conducted environmental cultures to detect MRSA and VRE on a routine basis. Twenty of 35 (57%) facilities reported having used the Centers for Disease Control and Prevention (CDC) definitions to conduct infection surveillance.¹² A vast majority (34/35, 97%) of the responding facilities conducted routine surveillance by wards; a significant proportion also reported conducting surveillance by clinical infections by site (27/35, 77%; such as urinary tract infection, respiratory infection) and by pathogen (27/35, 77%). Six facilities reported an outbreak in the previous 12 months. Three facilities reported a gastrointestinal outbreak, 2 facilities reported an influenza outbreak, and 1 facility reported an MRSA outbreak.

Influenza (range, 0%–100%; mean, 73.2%) as well as pneumococcal vaccination rates (range, 0%–100%; mean, 38.5%) varied widely, with 6 (17%) facilities not reporting their vaccination rates. One facility reported that none of their residents were vaccinated for influenza, and 6 facilities reported that none of their residents received pneumococcal vaccine (Table 1). Thirty-three (94%) NHs offered preemployment history and physical examinations to their nursing staff. Additionally, a majority (31/35, 89%) also restricted their employees with gastroenteritis or respiratory illness from working.

Table 2 describes the NH characteristics in the sample based on time spent in infection control activities. Thirty-four of the 35 (97%) facilities had a designated ICP; 17 were full-time (40 h/wk in IC activities) and 17 were part-time (mean, 15.4 h/wk; range, 3 to 32 hours). In facilities with subacute care, on average, a full-time ICP spent 0.43 h/bed and a part-time ICP spent 0.14 h/bed conducting infection control activities. In facilities without subacute care, a full-time ICP spent 0.42 h/bed and a part-time ICP spent 0.22 h/bed in infection control activities. There were no statistically significant differences in ICP time between facilities with and without subacute care. Use of indwelling catheters/100 beds was higher in NHs with a full-time ICP compared with NHs with a part-time ICP ($P = .03$). However, there were no differences in number of in-services offered to the staff, immunization rates, or feeding tube usage between facilities having a part-time versus a full-time ICP. Twenty-two facilities expressed interest in research projects targeted toward reducing infections, 11 facilities declined participation, and 2 chose not to answer this question.

DISCUSSION

Infections and antimicrobial resistance are major concerns for NHs, but data are limited on how these facilities are working to control infections. Infection control in NHs faces unique challenges. Rapid turnover is common among health care workers; infection control responsibilities are often carried out on a part-time basis.^{13,14} Residents cannot easily be placed into isolation precautions and still participate in appropriate social interactions. We performed this survey to assess how NHs in southeast Michigan identify, survey, and control infections.

We found considerable variations in adoption of infection control measures. A number of facilities had no guidelines or policies in place to control resistant pathogens, whereas a number of facilities not only followed specific guidelines to control resistant pathogens but also performed routine surveillance and environmental cultures for resistant pathogens. In addition, facilities used differing definitions of infections, with some facilities using the laboratory-based CDC definitions and others using definitions modified for NHs.¹⁵

Similar variations were also seen in resident vaccination compliance. Adults over the age of 65 years should receive influenza vaccination every year and pneumococcal vaccination at least once. In a recent study, investigators showed that influenza and pneumococcal immunizations prevented hospitalization during influenza seasons.¹⁰ In another study describing invasive pneumococcal infection in an NH outbreak, the attack rate was 16% in the unvaccinated group and 0% in the vaccinated group.¹⁶ The investigators also found that 28 of 361 (7.8%) facilities that responded to their questionnaire did not offer pneumococcal vaccination to their residents. Average influenza and pneumococcal vaccination rates among NH residents are 60% and 40%, respectively.^{9,10} Our study confirmed that a significant proportion of NHs in our geographic area (17%) did not offer pneumococcal vaccination to their residents. These rates were independent of the mean hours of time spent in infection control activities by an ICP. In addition to poor documentation, some of the reasons for lower immunization rates cited in the literature include lack of physician emphasis, patient concerns about the adverse effects of vaccinations, and inability to obtain consent.¹⁶ Further identification and characterization of these barriers are crucial to implement a successful immunization campaign.

An ICP, usually a staff nurse, is integral to any infection control program and is responsible for implementing, monitoring, and evaluating various infection control practices. Because of financial constraints, an ICP usually also functions as an assistant director of nursing or is involved in staff recruitment and education. To address the role and time commitment of an ICP in the NHs, a panel of infection control experts developed a minimum resource model for infection prevention and control programs in various health care settings, including NHs. The panel estimated that 341 full-time equivalent ICP days would be required for a facility with 150 to 250 beds.¹⁷ In our study, half of the facilities with more than 150 beds had a part-time ICP. Although our study did not evaluate and thereby did not adjust for acuity level or case mix at each facility, mean number of beds and presence of subacute care did not differ between facilities with a part-time ICP and a full-time ICP. Further investigations should focus on the factors leading to employment of a full-time ICP and whether hours spent in infection control actually lead to improved outcomes in terms of rates of infections, prevalence of resistant pathogens, and antibiotic utilization.

Several limitations of this study should be noted. There could be a systematic bias between the responders and nonresponders with a risk of even lower compliance with infection control policies among the nonresponders. However, size of these homes and their profit status did not differ significantly between the responders and nonresponders. Our descriptive study was confined to NHs in southeast Michigan, which is a predominantly urban area. This pilot study will be extended to a more systematic evaluation of infection control policies and identification of practices and organizational barriers that hinder adoption of infection control practices in Michigan as well as nationwide.

In summary, although progress has been made in infection control research in NHs, significant variations exist in implementation of infection control methods and guidelines. Research identifying current barriers to infection control in NHs is essential to the design and implementation of targeted and cost-effective infection control practices that can be successfully adopted by all NHs.

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Table 1

Surveillance for infections, antimicrobial resistance, and employee health practices in 35 southeast Michigan nursing homes

Infection control practice	N (%) [*]
Definitions used to monitor infections (n = 34)	
CDC	20 (58.8)
McGeer	5 (14.7)
Either/both	7 (20.6)
None	2 (5.9)
Surveillance by (n = 35)	
Ward	34 (97.1)
Infection site	27 (77.1)
Pathogen	27 (77.1)
Presence of guidelines	
MRSA (n = 34)	30 (88.2)
VRE (n = 34)	29 (85.3)
Indwelling catheter care (n = 35)	29 (82.9)
Feeding tube care (n = 34)	26 (76.5)
Central lines (n = 33)	22 (66.7)
Pressure ulcers (n = 35)	30 (85.7)
Infectious diarrhea (n = 34)	26 (76.5)
Offer preemployment history and physical to staff (n = 35)	33 (94.3)
Restrict employees with gastric and respiratory illness from work (n = 35)	31 (88.6)
Require a physician statement to return to work after a communicable disease (n = 35)	31 (88.6)
Mean number of infection control in-services/year (n = 35)	5.9 (range 0–20)

MRSA, Methicillin-resistant *Staphylococcus aureus*; VRE, vancomycin-resistant enterococci.

* Denominator varies with nonresponse.

Table 2

Characteristics of nursing homes with a part-time versus full-time infection control practitioner

Facility characteristics	Full-time ICP, mean \pm SD N = 17	Part-time ICP, mean \pm SD N = 17	P values
Facility size			
No. of beds	127.9 \pm 60.0	122.6 \pm 16.0	.8
No. of subacute care beds	18.0 \pm 32.3	23.8 \pm 9.11	.65
Time spent in IC activities			
Hours/wk	40.0 \pm 0	15.4 \pm 8.9	<.001*
Hours/bed	0.43 \pm 0.36	0.18 \pm 0.24	.03*
Indwelling urinary catheter use			
Per facility	5.8 \pm 4.9	3.1 \pm 0.7	.08
Per 100 beds	4.6 \pm 2.9	2.7 \pm 0.5	.03*
Per males/100 beds	2.3 \pm 0.2	1.0 \pm 0.3	.03*
Feeding tubes			
Per facility	5.9 \pm 3.8	5.5 \pm 1.8	.8
Per 100 beds	5.0 \pm 3.3	3.4 \pm 0.8	.18
Vaccination rates (%)			
Influenza	75.7 \pm 20.7	74.7 \pm 28.7	.53
Pneumococcal	36.5 \pm 36.8	38.3 \pm 38.8	.9
Infection control in-services	5.8 \pm 4.2	6.4 \pm 5.4	.7

SD, Standard deviation.

* $P < .05$.