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## Employee influenza vaccination in residential care facilities

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## Key Words:

Vaccination policies  
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**Background:** The organizational literature on infection control in residential care facilities is limited. Using a nationally representative dataset, we examined the organizational factors associated with implementing at least 1 influenza-related employee vaccination policy/program, as well as the effect of vaccination policies on health care worker (HCW) influenza vaccine uptake in residential care facilities.

**Methods:** The study was a cross-sectional study using data from the 2010 National Survey of Residential Care Facilities. Multivariate logistic regression analysis was used to address the study's objectives.

**Results:** Facility size, director's educational attainment, and having a written influenza pandemic preparedness plan were significantly associated with the implementation of at least 1 influenza-related employee vaccination policy/program, after controlling for other facility-level factors. Recommending vaccination to employees, providing vaccination on site, providing vaccinations to employees at no cost, and requiring vaccination as a condition of employment were associated with higher employee influenza vaccination rates.

**Conclusion:** Residential care facilities can improve vaccination rates among employees by adopting effective employee vaccination policies.

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Influenza is the leading cause of vaccine-preventable deaths in the United States, and more than 200,000 people each year are hospitalized for influenza.<sup>1,2</sup> Elderly persons, children, and immunocompromised individuals are particularly vulnerable to complications of influenza.<sup>2</sup> Vaccination is the most effective way to prevent infection associated with the disease.<sup>3</sup>

Influenza vaccination is recommended for all health care workers (HCWs), including long-term care workers because of their close interaction with the sick and elderly. Despite widespread advocacy for HCW influenza vaccination, vaccination rates remain well below the Centers for Disease Control and Prevention (CDC) Healthy People 2020 goal of 90%.<sup>4</sup> In 2006, US HCW vaccination rates were between 23% and 37%.<sup>5</sup> After the H1N1 pandemic, the CDC estimates that in 2010, 64% of HCWs received either the seasonal influenza vaccine or the vaccine targeting the H1N1 strain.<sup>3</sup>

HCW do not get vaccinated for influenza for a number of reasons, including fear of side effects, allergic responses to the vaccine, lack of faith in the vaccine's efficacy, religious beliefs against vaccination, lack of time, and low assessment of individual risk.<sup>6-13</sup> There is

evidence suggesting that prioritizing the implementation of HCW vaccination policies can yield significant societal and organizational cost savings.<sup>3,14</sup> In a study examining the cost-effectiveness of vaccination of working adults, Nichol et al<sup>15</sup> reported an association between vaccination and decreased likelihood of illness, fewer sick days, and fewer doctor visits, all culminating in an average cost savings of \$46.85 (in 1994 dollars) per vaccinated individual. Other studies have found an association between vaccination and reduced workplace absenteeism and use of sick days.<sup>16,17</sup>

Studies exploring organizational efforts to boost HCW vaccination rates suggest that health care organizations can improve vaccination rates among HCWs by removing administrative barriers to vaccination.<sup>7</sup> Such efforts could include providing education on the importance of vaccination, providing vaccines for free or at reduced cost, providing vaccinations at accessible locations and convenient times, as well as providing incentives to HCWs to encourage vaccination.<sup>7,18,19</sup> In 1 study, institution of a policy of mandatory vaccination with consequences resulted in improved compliance, compared with a mandate without consequences.<sup>20</sup> However, others have expressed concern regarding the ethical implications of mandates and instead suggested the use of incentives and sanctions to improve HCW vaccination compliance.<sup>21</sup>

HCW vaccination is particularly important for organizations that provide health care to the elderly. Although it has not been

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conclusively established that HCW vaccination prevents influenza among seniors residing in long-term facilities, there is evidence suggesting that HCW vaccination in long-term care facilities reduces morbidity and mortality in the elderly.<sup>22-26</sup> Historically, vaccination rates among long-term care workers have been low, however.<sup>27</sup> During the 2009-2010 influenza season, the vaccination rate for seasonal influenza among long-term care staff was 54%, compared with 62% in all HCWs.<sup>28</sup> Long-term care organizations have been encouraged to institute influenza preparedness and vaccination programs and policies for their staff.<sup>29</sup>

Although several organizational studies have characterized and examined the effectiveness of vaccination programs in long-term care facilities,<sup>19,23,30,31</sup> these studies focused primarily on nursing homes and long-term care hospitals; research focusing on residential care facilities is lacking. In the present study, using data from the first-ever National Survey of Residential Care Facilities (NSRCF), we sought to examine the organizational factors associated with implementing an employee influenza vaccination policy/program and to evaluate the effect of vaccination policies/programs on HCW influenza vaccine uptake rates in US residential care facilities.

## METHODS

### *Study design, sample, and data*

Data for this study were obtained from the 2010 NSRCF, the first nationally representative survey of US residential care facilities. Until this survey, nationally representative data on residential care facilities were lacking.<sup>32</sup> Facilities surveyed in the NSRCF included licensed, registered, or certified assisted-living residences; board and care homes; congregate care; enriched housing programs; homes for the aged; personal care homes; and shared housing establishments.<sup>32,33</sup> The survey was further restricted to those facilities with 4 or more beds that provided room and board with 2 or more meals a day, provided help with personal care needs and health-related services, and provided round-the-clock supervision.<sup>32,33</sup> A total of 2,302 facilities were surveyed, the majority of which served the elderly. Facilities exclusively serving the mentally ill or the developmentally disabled were excluded.<sup>33</sup> Only facility directors or their designated staff were interviewed for this survey.

The NSRCF used a stratified 2-stage probability sample design. The first and second stages involved sampling of facilities and residents, respectively. The weighted response rate for the survey was 81%. A detailed discussion of the methodology for this survey is available at <http://www.cdc.gov/nchs/nsrcf.htm>. In the present study, we used only publicly available data from the facility-level survey.

### *Measures*

#### *Dependent variables*

The dependent variables in this study were a binary variable indicating whether or not a facility had at least 1 influenza-related employee vaccination policy/program in place and another binary variable indicating whether a facility had achieved a high influenza employee vaccination uptake rate in the last year. The Joint Commission recommends a vaccination rate of at least 80% to achieve the herd immunity necessary to reduce influenza-related nosocomial infections in health care facilities.<sup>34</sup> Following Joint Commission recommendations, facilities with high employee influenza vaccination uptakes were defined as those reporting an employee influenza vaccination rate of >80%. The cutpoint was set at 81% rather than 80% because of data constraints; the NSRCF reported data on employee vaccination rates in categories, and facilities reporting 80% vaccination rates were placed in the 61%-80% category.

#### *Covariates*

The study defined organizational characteristics, including structural characteristics, staffing-related characteristics, patient/resident composition, and organizational commitment to preparedness. The following factors were examined as potential covariates: ownership type; facility size; type of care provided (ie, respite care, adult day services, or care for mental health and developmental disabilities); whether or not the facility accepted Medicaid; certification and educational attainment of the director; total personal care aide, licensed practical/vocational nurse (LPN/LVNs), and registered nurse (RN) hours; and the proportions of females and white residents, as well as the proportion of adults age >84 years served by the facility. Also included was a variable indicating whether or not an organization had a written influenza pandemic preparedness plan. For both multivariate models, only factors that were statistically associated with the dependent variable on bivariate analysis ( $P < .05$ ) were included in the final model as covariates.

The primary independent variables in the model assessing the factors influencing high HCW vaccination uptake rates were binary indicators for 7 employee vaccination policies related to influenza: recommending vaccination to employees; providing vaccinations on site; providing vaccinations to employees at no cost; requiring vaccination (or contraindication) as a condition of employment; providing vaccines at reduced cost; providing incentives for employee vaccination; and having a patient restriction policy for sick employees. The NSRCF collected data on the use of these 7 vaccination policies only.

#### *Analyses*

In model 1, logistic regression was used to assess the organizational factors influencing the implementation of at least 1 employee vaccination policy/program. In model 2, an ordinal logistic regression model was initially chosen to examine the effect of various vaccination policies on employee vaccination uptake rates. However, the results from the Brant test for proportional odds assumption indicated that the proportional odds assumption was violated. Thus, a logistic regression was fit instead, and results from that model are presented here. As indicated earlier, this second model was used to examine the policies associated with high employee vaccination rates, defined as vaccination uptake rates of >80%.

The variable indicating whether or not a facility was located in a metropolitan statistical area was dropped from all analyses because of a significant number of missing data. Statistical significance was defined at the  $P < .05$  level.

A correlation analysis was conducted for both models. The correlation coefficient of all paired variables was lower than the standard cutoff point of 0.65, indicating the absence of multicollinearity in the data.

The regression models were weighted to account for the complex sampling design of the NSRCF and to obtain nationally representative parameter estimates. Analyses were performed using Stata 13.0 (StataCorp, College Station, TX).

## RESULTS

### *Facility characteristics*

Table 1 provides a descriptive summary of the characteristics of the facilities in the study sample. The majority of facilities (82.4%) were for-profit owned. Approximately one-third (37.7%) were part of a chain. The majority (49.6%) had 4-10 beds; only 6.7% facilities had more than 100 beds. The facilities were located mostly in metropolitan statistical areas (80.5%), and almost one-half (49.8%) accepted Medicaid patients.

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