Achieving and Sustaining High Rates of Influenza Immunization Among Long-Term Care Staff

David A. Nace, MD, MPH, Erika L. Hoffman, MD, Neil M. Resnick, MD, and Steven M. Handler, MD, MS

Background: Influenza causes significant morbidity and mortality in long-term care facilities. Immunization of health care workers has been shown to reduce the impact of influenza in this setting, yet few studies address improvement efforts aimed at long-term care staff immunization.

Objective: To determine the feasibility of achieving and sustaining high rates of staff influenza immunization for a community-based long-term care facility.

Methods: A needs analysis was conducted to determine the organizational and individual level barriers to influenza vaccination of staff. Systems changes, educational interventions, and reminders were implemented based on the barriers assessment. Staff immunization rates were calculated over a 10-year period from 1996 to 2006.

Results: Organizational and individual barriers were identified and targeted. Using data from 1996 and 1997 as a baseline, staff immunization rates improved from 54% to 55% to between 74% and 95% over the past 4 years.

Conclusions: Achieving and sustaining high staff influenza immunization rates is possible in a community-based long-term care facility with an involved quality improvement team and medical director. (J Am Med Dir Assoc 2007; 8: 128–133)

Keywords: Nursing homes; immunization programs; influenza; health care workers

Influenza remains a major source of morbidity and mortality in the United States, with approximately 114,000 hospitalizations and more than 36,000 deaths each year. Older adults are particularly at risk given that 90% of influenza deaths occur in those aged 65 years and older. Long-term care (LTC) facilities, which generally have older and frailer resident populations, can experience attack rates of up to 60% and case fatality rates as high as 55%. Given the seriousness of such outcomes, prevention of influenza in LTC facilities is of paramount importance.

While resident immunization is the cornerstone of primary prevention efforts, influenza outbreaks may still occur despite optimal resident immunization rates. Health care worker vaccination is an overlooked primary prevention strategy in LTC settings. Healthcare worker vaccination is thought to reduce the risk of residents getting influenza in at least 2 different ways. First, by reducing the likelihood of the employee introducing influenza into the facility (ie, acting as the source vector), and second, by reducing the likelihood of transmission of influenza from resident-to-resident once influenza has been established in the facility.

Results of 2 recent studies have shown that staff immunization in LTC facilities reduced mortality by 40%. The effective health care worker vaccination rates associated with decreased mortality in these 2 studies were 60% and 50.9%. Despite these 2 successful immunization interventions, health care worker influenza vaccination in the United States remains suboptimal with current national estimates ranging from 34% to 40%. Published immunization improvement efforts show modest improvements in vaccination rates among staff, most do not involve LTC facilities, and rarely do rates reach 60%. One older LTC facility intervention study that used an annual educational intervention, a “vaccination fair,” was able to improve rates from 8% to 54% over 2 years. The only randomized intervention study to date, which compared ed-
ucation and access to free vaccine with placebo in LTC facilities, increased rates 2-fold to 53%. To our knowledge, no studies have reported sustained LTC staff vaccination rates greater than 60%, which has been shown to reduce mortality. There is a need for novel, comprehensive approaches to improving staff vaccination rates and this has been echoed by others. The purpose of this paper is to address the following questions: (1) can any nonacademic, community-based, LTC facility achieve staff vaccination rates in excess of 60%, and if so (2) can these rates be sustained over time? To this end, we report on our clinical experience over the past 10 years in reaching and sustaining staff vaccination rates above 60%.

METHODS

Study Population/Setting

The Baptist Homes of Western Pennsylvania is a 300-bed nonprofit multilevel campus providing independent living, assisted living, and nursing facility services. The facility is nonacademic and community based, with more than 200 nonunionized employees. The physical structure consists of 3 interconnected buildings spanning a 12-acre campus in the urban Pittsburgh region. The medical director oversees the immunization program and works collaboratively with the entire leadership team, which is comprised of all department managers. A nurse, whose primary responsibilities are for quality improvement, is charged with overseeing administration of staff immunizations.

Needs Analysis and Barriers Assessment

In 1996, members of the quality improvement (QI) team decided that immunization rates should be a target for process improvement. Members of the QI team performed a current condition assessment in which they clarified the current staff immunization process using observation and semi-structured interviews. Next, under the direction of the medical director, a formal needs analysis was conducted. The goal of the needs analysis was to determine the barriers to, and drivers of, staff immunization. Barriers were categorized as either organizational or individual factors, and subsequent interventions were designed to overcome these barriers. The process followed by the QI team over the study period is consistent with that of the Veterans Administration Quality Enhancement Research Initiative (VA QUERI) and uses interventions associated with successful adult immunization programs identified by Stone and colleagues.

Staff immunization rates (SIR) are reported from 1996, when staff immunization rates were first targeted for improvement, to 2006. Staff immunization rates are defined as the number of facility employees receiving the flu shot divided by the total number of facility employees multiplied by 100 to give a percentage. Facility employees include all paid employees hired by the facility, including part-time and dietary staff. Volunteer staff, agency staff, physician staff, and contracted rehabilitation, laboratory, and radiology personnel are not included in this definition, although they were offered vaccine. SIR were calculated based on information available for

### Table 1. Characteristics of Current Facility Staff

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Position</strong></td>
<td></td>
</tr>
<tr>
<td>Nursing</td>
<td>59</td>
</tr>
<tr>
<td>Dietary</td>
<td>15</td>
</tr>
<tr>
<td>Housekeeping</td>
<td>4</td>
</tr>
<tr>
<td>Laundry</td>
<td>2</td>
</tr>
<tr>
<td>Maintenance</td>
<td>6</td>
</tr>
<tr>
<td>Activities, social work, wellness</td>
<td>7</td>
</tr>
<tr>
<td>Administration</td>
<td>7</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>81</td>
</tr>
<tr>
<td>African American</td>
<td>18</td>
</tr>
<tr>
<td>Other</td>
<td>&lt;1</td>
</tr>
<tr>
<td><strong>Age, y</strong></td>
<td></td>
</tr>
<tr>
<td>20–29</td>
<td>12</td>
</tr>
<tr>
<td>30–39</td>
<td>15</td>
</tr>
<tr>
<td>40–49</td>
<td>29</td>
</tr>
<tr>
<td>50–59</td>
<td>28</td>
</tr>
<tr>
<td>60–69</td>
<td>12</td>
</tr>
<tr>
<td>70–79</td>
<td>1</td>
</tr>
</tbody>
</table>

December 31 of each year. This date was chosen based on our observations of this and other immunization programs over the past decade: most staff electing immunization do so by December.

Institutional review board approval was not solicited because this immunization program was deemed a QI project based on the University of Pittsburgh’s QI criteria.

RESULTS

Study Population

Demographic information describing the facility’s current staff is presented in Table 1. Ages of the staff range from 16 to 75 years. Staff turnover rates for the study period ranged between 21% and 44%, with an average of 34%. The specific nurse directly responsible for staff immunizations has changed 3 times over the time period, while the medical director remained the same for the first 9 years of the study period.

Initial Immunization Process

At baseline, the immunization program included 4 primary tasks: (1) vaccine ordering, (2) staff notification, (3) vaccine administration, and (4) record keeping. In the vaccine-ordering stage, vaccine supplies were negotiated with various suppliers who delivered the vaccine in September of each year. Staff was notified about vaccination availability by department managers and by flyers posted at various sites in the facility. No information on the benefits of immunization was included in the flyers. Vaccine was administered at no charge during limited daytime hours. Facility policy required the vaccine to be administered only with a physician onsite at the facility. Vaccine was offered through December, or until supplies were exhausted. Records were kept for those consenting to the vaccine, but were not reported back to the QI or infection control team.
Barriers Identified

Organizational barriers included inadequate vaccine supplies; general vaccine inaccessibility; lack of positive incentives for immunization; requirement of written consent to receive the vaccine; limited record keeping; and lack of any feedback or shared learning. Individual barriers included limited leadership knowledge and support; poor staff knowledge about influenza; negative staff attitudes about the vaccine and injections (Table 2).

Systems Changes Made Based on Barriers Assessment

The process developed and followed by the leadership team over the study period is shown in Figure 1. Interventions included system changes, educational interventions, and reminders. System changes were actions taken to alter the way vaccines were obtained, delivered, and tracked at the facility. Educational interventions included verbal or written informational flyers and informal (point of contact communication) and formal in format. Reminders made facility staff aware of the start of the flu season, availability of the vaccine, and the need to be immunized. As changes were made, immunization rates were monitored and feedback provided to the QI team, facility leadership, and all staff.

Organizational barriers were addressed through system changes and education. Individual barriers were addressed through educational efforts and reminders. Our current program addressed these barriers and is divided into the following tasks:

A. Vaccine Planning: To accurately estimate vaccine supply, the team reviews prior year usage, sets target immunization goals, and considers potential staff turnover rates. The facility has committed to a regular supplier and routinely orders the vaccine in the spring quarter of the year.

B. Staff Education: Staff and department managers are provided ongoing education about the impact of influenza on LTC residents, the ability of the vaccine to reduce resident mortality, and vaccine safety. Education is provided through both formal (in-services and informational flyers) and informal (point of contact conversations with individual staff by the medical director or any leadership team member) processes. Also, general information about the vaccine, including risks and benefits are provided to the staff at time of administration.

C. Leadership Commitment: Department managers are accountable to the QI leadership team for discussing influenza immunization in one of their staff meetings and following up with nonresponders. Department performance is reviewed at QI meetings.

D. Staff Notification: Each September, paycheck notices and leadership personnel remind staff how to get the vaccine.

E. Vaccine Administration: Each October, the QI coordinator begins vaccinations directly at employee work units, during all shifts, and throughout the entire flu season. The requirements for an onsite physician and written consent were removed. Starting in 2002, all staff who refuse the vaccine must sign a written refusal stating they have been offered the immunization. This form is referred to as the refusal consent. A copy is provided in Appendix.

F. Nonresponder Notification: Those staff failing to receive the vaccine, regardless of reason, are contacted and must either elect the vaccine or sign the refusal consent.

G. Data Tracking: Nursing staff maintain accurate administration records including date administered, site, lot number, and expiration date for the vaccine administered. Potential adverse reactions are referred to the medical director and reported according to established recommendations.25

H. Continual Performance Feedback and Shared Learning: Feedback on facility performance is provided to all staff by the medical director through QI reporting, paycheck mailings, and flyers. The medical director also monitors and reports to the facility outbreak information posted on the Centers for Disease Control and Prevention (CDC) (www.cdc.gov/flu) or local public health department Web sites.

Impact on Immunization Rates Over Time

SIR are presented in Figure 2. SIR increased over the study period from a low of 54.0% in 1996, to a high of 95.5% in
2003. Rates remained high, even during the 2004–2005 season when a severe national vaccine shortage occurred. As noted, nonemployee staff including volunteer staff; agency staff; physician staff; and contracted rehabilitation, laboratory, and radiology personnel were not included in the SIR calculations. The nonemployee staff population is relatively small and includes approximately 20 volunteers, 5 rehabilitation staff, 3 to 5 laboratory and radiology staff, and 10 physicians at the facility. Of the physicians, 3 provide care to 90% of the facility residents and all received vaccine.

**DISCUSSION**

Our experience demonstrates that it is possible for a nonacademic community-based LTC care facility to both achieve and sustain high influenza immunization rates. To the best of our knowledge, the staff immunization rates achieved in this study are the highest reported in the literature and also represent the longest follow-up period for any LTC facility to date. Further, this paper provides practical observations on the steps taken to reach these goals.

One potential explanation of our high rates of staff immunization could be attributed to the facility leadership committing resources each year to the immunization process. We have shown elsewhere that leadership support in the LTC environment is critical to the success of QI projects and failure of this support is highly probable given the unique, tightly regulated structure and nature of the LTC industry.26

Another potential explanation could be attributed to staff turnover rates that are slightly lower than the national average.27 The relationship between staff turnover rates and SIR is not known; however, lower staff turnover has been shown to be associated with better patient outcomes.28 One could postulate that facilities with lower turnover rates have greater “institutional memory,” which may increase the chance that a particular care process is maintained from year to year. A study of factors affecting influenza vaccine uptake in German LTC facilities supports this concept. This study showed a carryover effect in which interventions done to improve vaccine uptake during one year seemed to have positive effects in subsequent years.29

Another potential explanation for the continued and sustained increase in immunization rates, especially over the past 4 years, could be the use of refusal consent forms started in 2002. Refusal consents have been recommended by several organizations, including The Society for Healthcare Epidemiology of America, and the Occupational Safety and Health Administration’s (OSHA) Bloodborne Pathogens and Needlestick Prevention program.30,31 Refusal consent forms should be particularly effective since they are both a systems change (effective for organizational barriers) and an educational reminder (targeting individual barriers), consistent with recommendations of other authors.32 Also, as an educational reminder, a simple refusal consent represents a targeted communication. Targeted communication has been shown to increase vaccine uptake 2-fold.33

---

<table>
<thead>
<tr>
<th>Flu Season</th>
<th>Pecentage of Staff Vaccinated (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996-1997</td>
<td>54.03</td>
</tr>
<tr>
<td>1997-1998</td>
<td>55.32</td>
</tr>
<tr>
<td>1998-1999</td>
<td>77.52</td>
</tr>
<tr>
<td>1999-2000</td>
<td>62.79</td>
</tr>
<tr>
<td>2000-2001</td>
<td>63.03</td>
</tr>
<tr>
<td>2001-2002</td>
<td>64.09</td>
</tr>
<tr>
<td>2002-2003</td>
<td>93.67</td>
</tr>
<tr>
<td>2003-2004</td>
<td>95.45</td>
</tr>
<tr>
<td>2004-2005</td>
<td>73.71</td>
</tr>
<tr>
<td>2005-2006</td>
<td>86.02</td>
</tr>
</tbody>
</table>

**Fig 2. Staff immunization rates: 1996–2006.**
Limitations

Although we provide a description of the processes taken and barriers addressed to improve our performance, this information is only observational. The impact of each individual intervention addressed by our group cannot be quantified, since multiple changes were often made at once. Because the results are from a single facility, we do not know their generalizability to other facilities. Other facilities will need to consider the specific barriers they face. However, the specific steps used in our QI efforts are consistent with other published studies showing improvements in immunizations and preventive services when health care organizations employ the use of organization changes, reminder systems, and education.18,24

There is no consensus in the literature that defines which staff should be included when reporting SIR; however, our definition is similar to or more inclusive than that used in other studies.10,11,15–17 Consistent with the majority of these studies, we did not include volunteer staff, physician staff, and outside rehabilitation, laboratory, and radiology personnel in the staff immunization rate calculations. These staff represent a small portion of the total staff, and accurate vaccination records were not available for our analysis. Agency nursing staff were also excluded in the calculation of SIR since they rarely worked in this particular facility. This may reduce the generalizability of our results to other facilities that regularly use agency staff.

We used a single point prevalence estimate in December of each year to report the SIR. This method is consistent with other published studies, although it could lead to an erroneously high or low estimate for the SIR rates each year owing to staff turnover occurring after this date.16 However, following our cutoff, only 3 months remain during the influenza season making the number of potential new staff members hired low, especially considering the turnover rate of this facility. More importantly, given the lag of several weeks between the actual immunization and the generation of an immune response in an individual, it is important to measure staff rates just before the height of flu season, which typically occurs after December of each year.

A potential confounder is that the Pennsylvania state legislature enacted legislation in 2003 requiring facilities to offer vaccine to their staff (Long-Term Care Resident and Employee Immunization Act 95, 2003). However, we do not believe this has had an impact on our findings for 2 reasons. First, a published analysis of the impact of similar legislation in Tennessee nursing facilities found no difference in immunization rates.34 Second, Pennsylvania has incorporated mandatory reporting of facility staff immunization rates, but this change has not improved immunization rate uptake. In fact, rates actually declined from 32% to 21% during the first 3 years of reporting (B. Showalter, Personal communication, June 7, 2006).

Strengths

This study covers a LTC facility’s immunization improvement efforts spanning a 10-year period. Even during the national vaccine shortage of 2004–2005, this facility was able to reach a staff immunization rate of 72%. National data from this same time period demonstrated a significant decrease in LTC staff immunization rates.35 Unlike many other studies, we calculate SIR using the actual vaccination rosters that can be verified, rather than relying on self-reported survey data, which is subject to recall and ascertainment bias. Staff turnover is lower than the national average, which contributes to organizational stability, institutional memory, and organizational change efforts. These collectively support the role of a proactive, supportive interdisciplinary LTC QI team that includes an involved medical director consistent with Institute of Medicine recommendations on physician involvement.36

Implications and Further Research

Further research is needed to determine if these immunization rates could be achieved and sustained in facilities with differing characteristics such as unionization status, profit status, and turnover rates. Future studies should also be conducted to determine the impact of individual components of our multicomponent intervention such as the use of refusal consent forms on staff immunization rates. This information may help guide other facilities to improve their SIR by selecting changes that are most likely to improve the SIR.

CONCLUSION

In summary, it is possible for nonacademic, community-based LTC facilities to achieve and sustain high SIR with a supportive QI and leadership team. Our experience can provide suggestions and tools that can be used by other health care organizations to improve staff immunization programs.

ACKNOWLEDGMENTS

The authors acknowledge the Baptist Homes of Western Pennsylvania and Dina Miller for their strong support of this work.

REFERENCES


APPENDIX 1.

Refusal consent form

VACCINATION FORM

2005-2006  Flu Season

RECEIVED FLU VACCINE

I previously received the influenza vaccine and therefore decline the immunization at this time.

Date received __________________________

Signature __________________________

Printed Name __________________________

Date __________________________

(Resident, Responsible Person or Employee)

DECLINED FLU VACCINE

I have been offered the flu vaccine, however, decline at this time. I realize that:

• the flu shot does not give me the flu
• the flu shot may help me from getting sick with the flu
• the flu shot may help prevent me from giving the flu to someone else
• the flu can cause serious illness in residents
• Reason for refusal __________________________

Date __________________________

(Resident, Responsible Person or Employee)