Institutional Requirements for Influenza Vaccination of Healthcare Personnel: Results From a Nationally Representative Survey of Acute Care Hospitals—United States, 2011

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Background. Many health professional organizations now endorse influenza vaccination as a condition of employment in healthcare settings. Our objective was to describe institutional requirements for influenza vaccination of healthcare personnel (HCP) among US hospitals during the 2010–2011 influenza season.

Methods. A survey was mailed in 2011 to a nationally representative sample of 998 acute care hospitals. An institutional requirement was defined as “a policy that requires HCP to receive or decline influenza vaccination, with or without consequences for vaccine refusal.” A weighted analysis included univariate analyses and logistic regression.

Results. Of responding hospitals (n = 808; 81.0%), 440 (55.6%) reported institutional requirements for influenza vaccination. Although employees were uniformly subject to requirements, nonemployees often were not. The proportion of requirements with consequences for vaccine refusal was 44.4% (n = 194); where consequences were imposed, nonmedical exemptions were often granted (69.3%). Wearing a mask was the most common consequence (74.2% of 194 requirements); by contrast, 29 hospitals (14.4%) terminated unvaccinated HCP. After adjustment for demographic factors, the following characteristics remained significantly associated with requirements: location in a state requiring HCP to receive or decline influenza vaccine, caring for inpatients that are potentially vulnerable to influenza, use of ≥9 Advisory Committee on Immunization Practices–recommended, evidence-based influenza vaccination campaign strategies, and for-profit ownership.

Conclusions. Influenza vaccination requirements were prevalent among hospitals of varying size and location. However, few policies were as stringent or as comprehensive as those endorsed by health professional organizations. Because influenza vaccination requirements are a viable alternative for hospitals unable to achieve high coverage through voluntary policies, there is still substantial room for improvement.

Each year, on average, influenza results in 226,000 hospitalizations and 24,000 deaths in the United States [1, 2]. To reduce transmission of influenza viruses within healthcare settings and to reduce employee absenteeism resulting from influenza illness, the Advisory Committee on Immunization Practices (ACIP) has recommended annual influenza vaccination for healthcare personnel (HCP) since 1984 [3, 4]. Influenza vaccination of HCP can reduce HCP-to-patient influenza transmission [5]. Influenza outbreaks are particularly problematic in hospitals, long-term care facilities, and dialysis centers, where many inpatients have serious underlying conditions [6]. Although the benefits of HCP vaccination include well-documented reductions in patient morbidity and mortality from influenza [7–10], healthcare institutions have largely been unsuccessful in achieving high influenza vaccination coverage when vaccination is optional; annual vaccination coverage among US HCP had never exceeded 50% before the 2009–2010 influenza season.
season [11–13]. Historically, patient protection is not a primary reason for influenza vaccine acceptance among HCP [14].

Citing years of suboptimal vaccination coverage as a threat to patient safety, many health professional organizations and societies have recently endorsed (since 2010) influenza vaccination as a condition of employment in the healthcare setting, including the American Academy of Pediatrics, the American College of Physicians, the Association for Professionals in Infection Control and Epidemiology (APIC), the Infectious Disease Society of America, the National Foundation for Infectious Diseases, the National Patient Safety Foundation, and the Society for Healthcare Epidemiology of America [15]. Several large hospitals and health systems have demonstrated that mandatory policies can achieve influenza vaccination coverage >95% [16–19]. Although anecdotal reports indicate that mandatory influenza vaccination of HCP may be increasingly used by US hospitals to increase vaccine uptake [15], the prevalence and characteristics of such institutional policies are unknown. Our objectives in the current study were to determine (1) the extent to which mandatory influenza vaccination policies were used during the 2010–2011 influenza season and (2) policy characteristics, including factors leading to policy implementation.

METHODS

Sample Selection

Nonfederal, US acute-care hospitals providing general medical and surgical services were identified using the 2008 American Hospital Association (AHA) Annual Survey Database (n = 4512). Based on similarly designed studies [20], we anticipated that infection preventionists were most likely to complete the questionnaire. Contact information for infection preventionists was purchased from 2 external vendors (Billians HealthData and APIC) and matched to hospitals in the sampling frame. Contact information of hospital administrators, available through the AHA database, was used for hospitals unable to be matched with an infection preventionist.

To ensure that sampled hospitals were sufficiently diverse, we stratified on bed size (<100, 100–300, >300) and US Census Bureau region (Northeast, Midwest, South, West). Because we hypothesized that hospitals matched with affiliated infection preventionists (80.1%) would be more likely to respond than unmatched hospitals (19.9%), we stratified further based on matching status. A random sample was drawn with selection probability proportional to stratum size and without replacement. The final sample consisted of 998 hospitals.

Survey

Surveys were mailed 1 week after a prenotification letter, during the first week of January 2011. A mailed reminder was sent after 4 weeks to nonresponders, and telephone follow-up continued thereafter for 6 additional weeks. Mailings included a cover letter that described the study, invited participation, and instructed that materials be forwarded to the most knowledgeable person on the subject matter, if not the designated addressee. The survey could be completed online via a secured website or returned by mail in an enclosed, prepaid envelope. The study was deemed to be exempt from review by the institutional review board of the Centers for Disease Control and Prevention.

Questionnaire development was informed by detailed pre- and postdevelopment interviews with 8 infection preventionists, each of whom represented a unique US hospital with a mandatory influenza vaccination policy. The final, 23-item questionnaire that included standardized definitions of commonly used terms was pilot tested with an additional 5 infection preventionists affiliated with hospitals with mandatory vaccination policies.

Because the definition of “mandatory” can vary [21], an inclusive definition of “vaccination requirement” was used for this study: any institutional provisions that require HCP to either receive or decline influenza vaccination, with or without consequences for refusing vaccination. All participants were asked about current use of ACIP-recommended, evidence-based strategies to increase influenza vaccination coverage among HCP (eg, provision of free vaccine, education, tracking vaccination uptake) [22] and whether the hospital had a current influenza vaccination requirement for HCP. If applicable, respondents were asked about consequences that applied to HCP who refused vaccination, which HCP were subject to the requirement, and exemptions permitted. Lastly, participants were asked the first influenza season the institutional requirement was implemented, as well as factors leading to implementation.

Outcome Measures and Independent Variables

The primary outcomes of interest were (1) prevalence of influenza vaccination requirements among US hospitals during the 2010–2011 influenza season and (2) among hospitals with requirements, the proportion that imposed consequences for vaccine refusal. The following characteristics were obtained from the AHA database: region, number of beds, teaching status (ie, membership in the Council of Teaching Hospitals of the American Medical Association or the Council for Graduate Medical Education), hospital ownership (public, for profit, or not for profit), urban (Core-Based Statistical Area [CBSA] codes: division, metropolitan) or rural (CBSA codes: micropolitan, rural) location, accreditation by the Joint Commission, provision of care to inpatient populations who may be immunocompromised (eg, transplant recipients, therapeutic oncology patients) or too young to receive influenza vaccine (eg, infants in obstetrical or neonatal intensive care units), and network or system affiliation. Location in a state with laws requiring hospital-based HCP to receive or decline influenza vaccination was also considered [23].
Data Analysis

Associations between outcome measures and independent variables were assessed using the Rao-Scott $\chi^2$ test for independence, at a significance level of $\alpha = 0.05$ (2-tailed $P$ value). Variables whose univariate associations with outcome measures resulted in $P$ values $<.25$ were included in logistic regression models. Final models were assessed for collinearity using tolerance and variance inflation as regression diagnostic markers. All analyses were conducted using SAS software (version 9.2; SAS Institute), and were weighted to account for sampling design and nonresponse using the procedures SURVEYFREQ and SURVEYLOGISTIC. Unweighted sample sizes and weighted proportions are reported and exclude noninformative responses (eg, missing, don’t know).

RESULTS

Characteristics of Responding Hospitals

Of 998 sampled hospitals, 808 (81.0%) responded. Response rates did not differ significantly between hospitals depending on whether infection preventionists were or were not identified. Nonresponding hospitals were more likely than respondents to be located in the West ($P < .001$), located in an urban location ($P < .001$), or have $>300$ beds ($P = .02$). Table 1 shows weighted characteristics of responding hospitals, which did not significantly differ from nonsampled hospitals eligible for study inclusion (data not shown).

Outcome Measures: Univariate Analyses

Among responding hospitals, 440 (55.6%) reported having an institutional requirement for influenza vaccination during the 2010–2011 influenza season (Table 2). Hospitals with the following characteristics were more likely to have requirements: location in the West, $>300$ beds, private ownership, urban location, and Joint Commission accreditation. Requirements were also more prevalent in states with a law requiring HCP influenza vaccination or declination (73.2% vs 51.2%; $P < .001$), and among hospitals that provided care to $\geq$1 potentially vulnerable inpatient population (59.7% vs 39.5%; $P < .001$). Among 440 hospitals with requirements for influenza vaccination of HCP, 194 (44.4%) reported that consequences applied to HCP who refused vaccination; this proportion was lower among hospitals located in the Northeast ($P = .02$).

Use of Advisory Committee on Immunization Practices–Recommended Strategies to Increase Healthcare Personnel Influenza Vaccination

ACIP-recommended vaccination campaign strategies related to vaccine accessibility, as well as provision of education and free vaccine, were widely used by responding institutions (Table 3). Hospitals without institutional requirements for influenza vaccination were less likely to use $\geq$9 strategies (ie, 75th percentile) (22.4%) than hospitals with requirements, with or without consequences for vaccine refusal (42.5% and 35.7%, respectively). Hospitals without requirements were also less likely to use strategies related to tracking vaccination or involving hospital administration or key personnel. Most hospitals with requirements reported that no additional strategies were concurrently introduced with the requirement ($n = 286, 69.7%$; data not shown).

Features of Institutional Requirements for Influenza Vaccination

Employees were most likely to be subject to influenza vaccination requirements (Table 4). Institutions that imposed consequences for vaccine refusal were more likely than other institutions to require nonemployee vaccination; few hospitals required all HCP to be vaccinated. Where consequences were applied, nonmedical exemptions were commonly allowed. Requiring HCP to wear a mask was the most common consequence for vaccine refusal (74.2%); by contrast, 29 hospitals (14.4%) terminated unvaccinated HCP. Nearly all hospitals with requirements used declination forms (93.4%). The content of the declination forms was highly uniform between institutions. Forms often requested a signature (93.1%), prompted the reason for declination (90.1%), and informed HCP of the risks of not being vaccinated, including both personal risk (79.8%) and risk of transmission to patients (79.8%) (data not shown).

<table>
<thead>
<tr>
<th>Table 1. Characteristics of Responding Hospitals ($n = 808$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
</tr>
<tr>
<td>Region</td>
</tr>
<tr>
<td>Northeast</td>
</tr>
<tr>
<td>Midwest</td>
</tr>
<tr>
<td>South</td>
</tr>
<tr>
<td>West</td>
</tr>
<tr>
<td>No. of beds</td>
</tr>
<tr>
<td>0–99</td>
</tr>
<tr>
<td>100–299</td>
</tr>
<tr>
<td>$&gt;300$</td>
</tr>
<tr>
<td>Ownership</td>
</tr>
<tr>
<td>Not for profit</td>
</tr>
<tr>
<td>Private, for profit</td>
</tr>
<tr>
<td>Public</td>
</tr>
<tr>
<td>Locationb</td>
</tr>
<tr>
<td>Urban</td>
</tr>
<tr>
<td>Rural</td>
</tr>
<tr>
<td>Teaching hospital</td>
</tr>
<tr>
<td>Accredited by Joint Commission</td>
</tr>
<tr>
<td>Network or system affiliated</td>
</tr>
</tbody>
</table>

a Data include unweighted sample sizes (no.) and weighted proportions (%).

b Locations were defined according to Core-Based Statistical Area codes (urban: division, metropolitan; rural: micropolitan, rural).
## Factors Leading to Implementation of Institutional Requirements for Influenza Vaccination

The cumulative number of institutional requirements with consequences for vaccine refusal rose from 37 (5.0% of total sample) during the 2007–2008 influenza season to 183 (24.8%) during the 2010–2011 season (Table 5). Suboptimal influenza vaccination coverage of HCP during previous seasons was most commonly cited as leading to implementation of any requirement (52.4%) and was more commonly cited by hospitals with consequences than by those without consequences (51.4% vs 36.8%; \( P < .002 \)). State laws or statutes were cited less commonly (16.3%), and less frequently by hospitals with consequences than

### Table 2. Prevalence of Institutional Requirements for Influenza Vaccination of Healthcare Personnel, and Proportion With Consequences for Refusing Vaccination, by Hospital Characteristic—United States, 2011

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Prevalence of requirements</th>
<th>Proportion of requirements with consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hospitals, no. (%)</td>
<td>Consequences, no. (%)</td>
</tr>
<tr>
<td></td>
<td>( P^b )</td>
<td>( P^b )</td>
</tr>
<tr>
<td>Total</td>
<td>440 (55.6)</td>
<td>194 (44.4)</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>49 (49.8)</td>
<td>14 (27.5)</td>
</tr>
<tr>
<td>Midwest</td>
<td>146 (55.1)</td>
<td>63 (43.6)</td>
</tr>
<tr>
<td>South</td>
<td>151 (51.9)</td>
<td>67 (44.7)</td>
</tr>
<tr>
<td>West</td>
<td>94 (67.4)</td>
<td>50 (53.1)</td>
</tr>
<tr>
<td>No. of beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–99</td>
<td>203 (49.1)</td>
<td>85 (42.3)</td>
</tr>
<tr>
<td>100–299</td>
<td>158 (59.9)</td>
<td>73 (47.1)</td>
</tr>
<tr>
<td>&gt;300</td>
<td>79 (66.5)</td>
<td>36 (43.9)</td>
</tr>
<tr>
<td>Ownership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not for profit</td>
<td>264 (55.6)</td>
<td>105 (39.7)</td>
</tr>
<tr>
<td>Private, for profit</td>
<td>84 (71.9)</td>
<td>42 (51.4)</td>
</tr>
<tr>
<td>Public</td>
<td>92 (45.9)</td>
<td>47 (51.3)</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>257 (61.2)</td>
<td>111 (43.0)</td>
</tr>
<tr>
<td>Rural</td>
<td>183 (49.0)</td>
<td>83 (46.5)</td>
</tr>
<tr>
<td>Teaching hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>73 (58.9)</td>
<td>31 (40.7)</td>
</tr>
<tr>
<td>No</td>
<td>367 (55.0)</td>
<td>163 (45.1)</td>
</tr>
<tr>
<td>Accredited by Joint Commission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>294 (61.0)</td>
<td>135 (45.9)</td>
</tr>
<tr>
<td>No</td>
<td>146 (46.6)</td>
<td>59 (41.0)</td>
</tr>
<tr>
<td>Network or system affiliated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>289 (58.5)</td>
<td>135 (46.9)</td>
</tr>
<tr>
<td>No</td>
<td>151 (50.8)</td>
<td>59 (39.5)</td>
</tr>
<tr>
<td>Hospital in state requiring vaccination of hospital-based HCP ( d )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>115 (73.2)</td>
<td>48 (40.8)</td>
</tr>
<tr>
<td>No</td>
<td>325 (51.2)</td>
<td>146 (45.7)</td>
</tr>
<tr>
<td>Hospital serving immunocompromised patients or patients too young to receive vaccine ( e )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>344 (59.7)</td>
<td>155 (45.2)</td>
</tr>
<tr>
<td>No</td>
<td>49 (39.5)</td>
<td>18 (36.4)</td>
</tr>
</tbody>
</table>

Abbreviation: HCP, healthcare personnel.

\( ^a \) Data include unweighted sample sizes (No.) and weighted proportions (%). The influenza vaccination requirement status could not be determined for 9 of 808 hospitals; therefore, data from 799 hospitals are shown.

\( ^b \) Rao-Scott \( \chi^2 \) test, 2-tailed.

\( ^c \) Locations were defined according to Core-Based Statistical Area codes (urban: division, metropolitan; rural: micropolitan, rural).

\( ^d \) The following states required hospital-based HCP to receive or decline influenza vaccinations: Alabama, New Hampshire, California, Tennessee, Oklahoma, Illinois, Massachusetts [23].

\( ^e \) Hospitals in this category were defined as those having or providing any of the following: neonatal intensive care unit, obstetrical services, any transplant unit, or therapeutic oncology services (eg, chemotherapy, radiation).
by those without them (10.7% vs 20.8%; \(P = .002\)). H1N1 pandemic influenza also led to policy implementation (46.4% of institutional requirements implemented since 2009) but was cited with similar frequency by hospitals with consequences and those without consequences (data not shown).

### Outcome Measures: Multivariate Analyses

In an adjusted model including all responding hospitals, location in a state requiring HCP influenza vaccination or declination (odds ratio [OR], 2.5; 95% confidence interval [CI], 1.7–3.9), providing care to potentially vulnerable inpatient populations (OR, 1.7; 95% CI, 1.1–2.8), use of ≥9 ACIP-recommended campaign strategies (OR, 1.9; 95% CI, 1.3–2.7), and for-profit ownership (OR, 2.1; 95% CI, 1.2–3.7) remained significantly associated with institutional requirements for influenza vaccination.

In an adjusted model including only hospitals with institutional requirements, characteristics significantly associated with imposing consequences for vaccine refusal were providing care to potentially vulnerable inpatients (OR, 3.7; 95% CI, 1.1–13.7) and location in the Midwest, South or West (OR, 5.0; 95% CI, 2.0–12.1). Indicating that state laws were the impetus for the requirement (OR, 0.2; 95% CI, 1.0–6) was inversely associated with imposing consequences (data not shown).

### CONCLUSIONS

To our knowledge, this is the first nationally representative study to describe influenza vaccination requirements for HCP among US hospitals. High HCP influenza vaccination coverage can improve patient safety, promote employee health, and reduce employee absenteeism during the influenza season [4]. In recent years, escalating support for institutional requirements, as opposed to voluntary vaccination strategies, has foreshadowed a rise in prevalence of such requirements [21, 24]. According to our data, H1N1 pandemic influenza was a common impetus for requirements at institutions implementing such policies since the 2009–2010 influenza season. H1N1 pandemic influenza may have also indirectly influenced institutional vaccination strategies by drawing increased attention to influenza infection control measures.

Our results show that during the 2010–2011 influenza season, 55.6% of hospitals required HCP to receive or decline influenza vaccination. In light of the recent support by major healthcare professional organizations for mandatory influenza vaccination, it was surprising to find that only 29 (3.6%) of the responding hospitals required influenza vaccination as a condition of employment or work duty. Although most institutional requirements do not impose consequences for vaccination refusal, the
cumulative number of requirements with consequences in our sample rose precipitously in recent years. Working at a healthcare institution with an influenza vaccination requirement is associated with increased vaccine uptake among HCP [25]. Not surprisingly, suboptimal vaccination coverage of HCP during previous influenza seasons was commonly cited as a reason for implementation of requirements in our sample, particularly requirements with consequences for vaccine refusal. This finding probably reflects the inadequacy of strictly voluntary influenza vaccination at achieving optimal coverage of HCP at many hospitals [26–28].

Table 4. Features of Institutional Requirements for Influenza Vaccination of Healthcare Personnel

<table>
<thead>
<tr>
<th>Feature</th>
<th>Vaccination required, no consequences for refusal (n = 246)</th>
<th>Vaccination required, consequences for refusal (n = 194)</th>
<th>P&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consequences for refusal&lt;sup&gt;c&lt;/sup&gt;</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Termination</td>
<td>Not applicable</td>
<td>29 (14.4)</td>
<td>...</td>
</tr>
<tr>
<td>Mask required</td>
<td>Not applicable</td>
<td>143 (74.2)</td>
<td>...</td>
</tr>
<tr>
<td>Other&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Not applicable</td>
<td>64 (32.6)</td>
<td>...</td>
</tr>
<tr>
<td><strong>HCP required to receive vaccination</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees&lt;sup&gt;e&lt;/sup&gt;</td>
<td>246 (100.0)</td>
<td>194 (100.0)</td>
<td>...</td>
</tr>
<tr>
<td>Nonemployed medical staff</td>
<td>100 (41.9)</td>
<td>107 (55.2)</td>
<td>.01</td>
</tr>
<tr>
<td>Nonemployed, other&lt;sup&gt;f&lt;/sup&gt;</td>
<td>64 (26.8)</td>
<td>98 (50.7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Volunteers</td>
<td>76 (31.8)</td>
<td>141 (73.1)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Students</td>
<td>128 (53.0)</td>
<td>118 (61.4)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>All personnel at institution</td>
<td>36 (15.3)</td>
<td>63 (32.8)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Exemptions allowed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical</td>
<td>235 (95.4)</td>
<td>186 (95.4)</td>
<td>.85</td>
</tr>
<tr>
<td>Religious</td>
<td>198 (80.8)</td>
<td>136 (69.3)</td>
<td>.01</td>
</tr>
<tr>
<td>Personal belief</td>
<td>201 (82.0)</td>
<td>106 (54.6)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Abbreviation: HCP, healthcare personnel.

<sup>a</sup> Data include unweighted sample sizes (no.) and weighted proportions (%).

<sup>b</sup> Rao-Scott χ² test (2-tailed).

<sup>c</sup> Sum of proportions exceed 100% because some hospitals noted ≥1 consequence.

<sup>d</sup> Other consequences included restriction from patient care duties (n = 14), appearance before committee (n = 3), required absence during influenza outbreak (n = 21), leave or vacation time deduction for influenzalike illness (n = 21), and additional education or training required (n = 15).

<sup>e</sup> The “employees” category includes all personnel on hospital payroll.

<sup>f</sup> The “nonemployed, other” category includes contracted personnel, etc.

The use of ACIP-recommended vaccination campaign strategies by US hospitals provides an interesting perspective into the evolution of voluntary policy to institutional requirement. Although providing access to vaccination was common, strategies that are key to a requirement’s success, such as those related to vaccination measurement and tracking, as well as leadership involvement [15, 29], were more common at hospitals with requirements. More often than not, however, requirements were implemented without concurrent introduction of additional strategies, suggesting that strategies shown in Table 2 often preceded rather than accompanied requirements. Although low vaccination coverage was reportedly an impetus for requirements, our data suggest that many hospitals elect to progressively increase the number of strategies used to increase vaccine uptake, rather than abruptly implementing a mandate, which some have called for [15]. It is unlikely, however, that institutions without requirements or robust influenza vaccination campaigns are able to consistently achieve high vaccination coverage [22].

In general, institutional requirements during the 2010–2011 influenza season were less stringent and less comprehensive than those now endorsed by healthcare professional organizations [15, 29]. Few institutions required vaccination as a condition of employment or work duty, and permitting nonmedical exemptions—a practice recommended by some but not all
hospitals with consequences for vaccine refusal has more than
for influenza vaccination but also that the cumulative number of
2009–2010 was
among HCP not required or recommended to receive vaccine
however, coverage ranged from 98% among HCP for whom
based HCP during the 2009–2010 season was 68.5% nationally;
interested, and, to date, unimplemented legislative requirement in
laws in 2011. A perceived threat of labor union pushback, al-
though difficult to quantify by region, may explain why re-
quirements in the Northeast were less likely than others to entail
consequences. Union challenges to institutional vaccine man-
dates have been successful [33]. A controversial, highly publi-
cized, and, to date, unimplemented legislative requirement in
New York State would have mandated influenza vaccination for
HCP in 2009. This legislation was opposed by the New York
State Nurses Association, among others [33, 34]. Furthermore,
states in the Northeast had the highest percentage of unionized
workers in 2010 [35]. Characterization of barriers to im-
plementing requirements with consequences, such as union
challenges and HCP resistance, is needed [19].

The findings of this report have implications for both national
and institutional-level influenza vaccination coverage. The
Healthy People 2020 objective for HCP influenza vaccination is
90% [36]. Seasonal influenza vaccination coverage for hospital-
based HCP during the 2009–2010 season was 68.5% nationally;
however, coverage ranged from 98% among HCP for whom
consequences for vaccine refusal were applied to just 35.2%
among HCP not required or recommended to receive vaccine
[25]. Coverage among hospital-based HCP during seasons before
2009–2010 was ~45%–55% [20, 26]. Our study showed not only
that more than half of hospitals have institutional requirements
for influenza vaccination but also that the cumulative number of
hospitals with consequences for vaccine refusal has more than
tripled over several seasons, particularly in larger hospitals. Be-
cause >70% of hospital-based HCP are employed at institutions
with >1000 workers [37], it is plausible that the reported rise
in national vaccination coverage during the 2009–2010 in-
fluenza season was partially attributable to the number of
HCP working at institutions with requirements. Indeed, in-
term data for the 2010–2011 season, compiled through an
Internet panel survey, seems consistent with this hypothesis;
influenza vaccination coverage among hospital-based HCP
was already 68.3% in November 2010 [38]. However, because
vaccination coverage reported at the institutional level is
rarely comprehensive of all HCP, and often calculated using
a variety of methods [20], our study was unable to provide
additional insight on this matter.

This study has possible limitations. First, although the survey
achieved an excellent response rate, response differed signifi-
cantly by region, bed size, and urban location. After weighting,
respondents did not significantly differ from nonresponding
hospitals; however, unmeasured characteristics may have dif-
fered. Second, we did not ask whether requirements applied only
to those with direct patient contact. Some organizations have
recommended that only HCP with direct patient contact be
mandated to receive influenza vaccination [15]. Finally, although
our study described the cumulative number of requirements with
consequences for vaccine refusal over the course of several in-
fluenza seasons, we were unable to confidently estimate the
number of new institutional requirements each year.

In a nationally representative sample, more than half of US
hospitals have implemented requirements for influenza vaccina-
tion of HCP. Although application of consequences for vaccine
refusal is becoming more prevalent, requirements to date are less
stringent and less comprehensive than those endorsed by
healthcare professional organizations. Our data suggest that
influenza vaccination requirements remain a viable option for
hospitals unable to achieve high vaccination coverage of HCP
using other strategies and that hospitals of various size and lo-
cation have implemented such policies and will probably continue
to do so. Therefore, this study can serve as a baseline for future
assessment of institutional influenza vaccination requirements.
Future research is needed on influenza vaccination requirements,
as well as other strategies to promote HCP vaccination, in a di-
verse selection of healthcare settings. Priorities should include
characterization of institutional policy effectiveness and sustain-
ability in achieving high vaccination coverage, decreasing HCP
work absence, and reducing influenza transmission.

Notes

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