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Evaluating a Standardized Measure of Healthcare Personnel Influenza Vaccination

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Abstract

Background—Methods of measuring influenza vaccination of healthcare personnel (HCP) vary substantially, including which groups of HCP are included in measurements. Thus, comparison of vaccination rates across healthcare facilities is difficult.

Purpose—The goal of the study was to determine the feasibility of implementing a standardized measure for reporting HCP influenza vaccination data in various types of healthcare facilities.

Methods—A total of 318 facilities recruited in four U.S. jurisdictions agreed to participate in the evaluation, including hospitals, long-term care facilities, dialysis clinics, ambulatory surgery centers, and physician practices. HCP in participating facilities were categorized as employees, credentialed non-employees, or other non-employees using standard definitions. Data were gathered using cross-sectional web-based surveys completed at three intervals between October 2010 and May 2011 and analyzed in February 2012.

Results—234 facilities (74%) completed all three surveys. Most facilities could report on-site employee vaccination; almost one third could not provide complete data on HCP vaccinated outside the facility, contraindications, or declinations, primarily due to missing non-employee data. Inability to determine vaccination status of credentialed and other non-employees was cited as a major barrier to measure implementation by 24% and 27% of respondents, respectively.

Conclusions—Using the measure to report employee vaccination status was feasible for most facilities; tracking non-employee HCP was more challenging. Based on evaluation findings, the

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measure was revised to limit the types of non-employees included. Although the revised measure is less comprehensive, it is more likely to produce valid vaccination coverage estimates. Use of this standardized measure can inform quality improvement efforts and facilitate comparison of HCP influenza vaccination among facilities.

Introduction

Influenza is a leading cause of mortality in the U.S., contributing to an estimated average of 23,607 deaths annually from 1976 to 2007.[1] Influenza outbreaks can have substantial consequences for healthcare facilities, including prolonged hospital stays, increased patient mortality, and disruption of care provision.[2–6] Influenza vaccination prevents influenza-related illness and work absence among healthcare personnel (HCP)[2,7–12] and is associated with reduced influenza illness[6,9,10,13–16] and death[10,13,14,17,18] in their patients.

Measurement of HCP influenza vaccination coverage is an important healthcare quality indicator. The Joint Commission, National Foundation for Infectious Diseases, Society for Healthcare Epidemiology of America (SHEA); and the Advisory Committee on Immunization Practices (ACIP) and Healthcare Infection Control Practices Advisory Committee (HICPAC) of the CDC recommend including such measurement as a component of healthcare facility influenza vaccination programs.[19–22] SHEA and ACIP/HICPAC further recommend regularly reporting HCP influenza vaccination coverage to facility administrators and staff.[21,22]

The Joint Commission recently revised its influenza vaccination standard to require a variety of healthcare organizations to measure and report influenza vaccination coverage among staff and licensed independent practitioners as a condition of accreditation.[23] The Task Force on Community Preventive Services recommends provider assessment and feedback as a strategy to improve vaccination coverage in various populations and settings.[24] Even voluntary reporting can improve vaccination coverage levels: median employee influenza vaccination coverage at hospitals participating in a voluntary statewide reporting program increased by 20 percentage points over 4 years.[25]

The National Quality Forum (NQF), a voluntary consensus standards-setting organization dedicated to healthcare quality improvement, gave provisional endorsement to a CDC-sponsored standardized measure of HCP influenza vaccination in 2008 (Measure 0431). The measure's intent was to ensure that reported HCP influenza vaccination was comprehensive within a single facility and comparable across facilities. Measures considered for full endorsement by NQF must undergo pilot testing to evaluate four major criteria: importance of measurement and reporting; scientific acceptability (i.e., validity and reliability); usability; and feasibility.[26] The objectives of the current report are to describe results of a pilot test to determine the feasibility of implementing the provisional measure, to outline revisions made to the measure as a result of the pilot, and to explain how the revised measure will be used nationally. (Validity and reliability of the measure are described elsewhere.[27])

Methods

The CDC, in conjunction with four jurisdictions, recruited 318 healthcare facilities to participate in the pilot. Facilities were recruited by project staff in each of the jurisdictions via telephone, mail, fax, and e-mail. Some facilities were recruited from existing networks involved in healthcare surveillance, state/local professional associations and umbrella organizations, and connections from prior collaborations. Eligible facilities included acute care hospitals; long-term care facilities (LTCFs); dialysis clinics; ambulatory surgery centers (ASCs); and physician practices. Recruitment goals and specific inclusion and exclusion criteria for each facility type were defined in a written protocol. The pilot testing took place during the 2010–2011 influenza season (defined as October 1, 2010–March 31, 2011). The pilot was determined to be public health nonresearch by CDC and by participating jurisdictions, as required.

Measure Specifications

Participating facilities reported counts for vaccination status (numerator) and total number of HCP (denominator), which were used to calculate facility-level vaccination coverage. The numerator consisted of four mutually exclusive categories of HCP: vaccinated at the healthcare facility, vaccinated elsewhere, had a medical contraindication to influenza vaccination, and declined vaccination. The total for the denominator consisted of all HCP who worked at the facility full- or part-time for ≥1 day during influenza season, reported in three mutually exclusive groups: employees, credentialed non-employees, and other non-employees.

Employees were defined as those who received a paycheck directly from the healthcare facility. Credentialed non-employees (CNE) were defined as licensed practitioners affiliated with the facility who did not receive a paycheck from the facility; these included physicians or mid-level providers with clinical or admitting privileges and technicians or therapists with professional credentialing. Other non-employees (ONE) were defined as those who did not receive a paycheck from the facility and did not count as CNE, including, but not limited to, contractors; students and trainees; resident physicians and fellows (if not paid by the facility); and volunteers. Level of patient contact was not assessed for any HCP.

Facilities were asked to report numerator data separately for each of the three HCP groups. Vaccination coverage for each denominator group was calculated by dividing the sum of HCP vaccinated at the facility and HCP vaccinated elsewhere by the denominator total for that group and multiplying by 100.

Data Collection and Analysis

Participating facilities completed surveys via a secure, web-based data collection tool hosted by CDC. Primary outcomes were numerator and denominator data as described above, perceived ease of reporting, and barriers to reporting HCP vaccination using the measure. Survey items about ease of use and reporting barriers were developed based on semi-structured interviews conducted among a volunteer subset of 31 participating facilities.[28]

Participants also reported facility characteristics, data sources, and characteristics of their HCP influenza vaccination programs.

Healthcare facilities were asked to report numerator and denominator data at three time points: (1) denominator data by October 31, 2010; (2) numerator and denominator data as of December 31, 2010; and (3) numerator and denominator data as of March 31, 2011. Reports were cumulative, so data reported at the end of the season represented the total vaccination coverage level achieved by the facility. Influenza vaccinations received by HCP since August 2010 were included in the numerator. Facilities were instructed to include in their reports HCP who began work at the facility after October 1 or who ceased working before March 31. Descriptive statistics were calculated using SAS 9.2. Analyses were completed in February 2012.

Results

Sample

Of 318 facilities recruited, 88% (*n*=281) completed the first survey; 91% of those (*n*=257) completed the second survey. Of the remaining facilities, 91% (*n*=234) completed the final survey for a cumulative response rate of 74%. Response rates ranged from 53% among ASCs to 85% among hospitals. Facilities completing all three surveys did not differ from facilities completing only the first survey by size, ownership, urban location, or years offering influenza vaccine to HCP. However, facilities with less experience measuring HCP influenza vaccination were less likely to complete all surveys. Characteristics of facilities that completed the pilot are described in Table 1.

Ability to Report Using National Quality Forum Measure

Generally, facilities perceived the measure favorably, with over 70% reporting that the measure was comprehensive and easy to use and that measure instructions were easy to understand (Table 2). More than 80% of respondents reported that it was “easy” or “very easy” to assign employees to the correct denominator group; a much lower proportion reported that it was “easy” or “very easy” to assign CNE and ONE to the correct group.

Although all participating facilities were able to report denominator data for employees, about 10% of facilities could not provide denominator data for CNE or ONE (see Appendix). For numerator data, most facilities provided information on vaccinations at the facility; other numerator categories were more challenging. One third or more of facilities could not report data on vaccinations outside the facility, medical contraindications, or declinations for non-employees. Ability to report data for non-employees varied by facility type.

Barriers to Using National Quality Forum Measure

Barriers to using the provisional measure to report HCP influenza vaccination were assessed in the second and third surveys, in order to capture changes resulting from increased familiarity with the measure. Results were similar in the two surveys, so proportions from the third survey are reported (Table 3). The primary barriers reported by respondents

pertained to non-employees: inability to determine vaccination status of CNE and ONE was identified as a major barrier by 24% and 27% of facilities, respectively. Inability to determine which HCP were vaccinated outside the facility was identified as a major barrier by 21% of all facilities. A little more than 20% of all facilities reported that the time required to collect data on CNE and ONE was a major barrier to using the measure, and 21% identified the number of ONE at the facility as a major barrier. Barriers varied by facility type; in general, dialysis clinics and physician practices reported barriers less frequently than other facilities.

Discussion

Reporting employee vaccination status using the standardized measure was feasible for various inpatient and outpatient healthcare facilities, whereas tracking vaccination status among non-employee HCP was more challenging. Although most pilot facilities stated that the provisional measure was easy to use, about one third could not fully report non-employee vaccination data. The most commonly reported barrier to measure use was inability to determine vaccination status of non-employee HCP. Perceived barriers and ability to report vaccination data varied by facility type.

Implementing standardized measurement processes for HCP influenza vaccination can confer multiple benefits to healthcare facilities. Increases in HCP influenza vaccination coverage following initiation of measurement programs have been repeatedly observed, although the effect of measurement cannot be separated from other policies or activities implemented in conjunction with vaccination measurement.[25,29,30] Observed coverage increases may be partially attributable to improved tracking of vaccinations received outside the healthcare facility.[31] In addition, use of standardized HCP definitions increases the accuracy and comparability of vaccination coverage estimates; definitions that are not standardized can produce substantially different estimates of influenza vaccination coverage in the same population.[32]

An increased ability to generate accurate estimates of HCP influenza vaccination may help facilities reach vaccination coverage goals set either internally or externally. Another potential benefit is greater ease in complying with institutional, state, and national reporting requirements. These are becoming increasingly common now that HCP influenza vaccination has been identified as a recommended measure for healthcare quality reporting.[33,34]

It is not surprising that facilities reported greater difficulty measuring influenza vaccination coverage among non-employee HCP than among employees. A substantial proportion of U.S. hospitals do not include non-employee HCP in their coverage measurements.[35] Although employee counts can easily be determined using payroll records, numerous data sources may be necessary for tracking non-employees, particularly in larger healthcare facilities.

In the current study, acute care hospitals were particularly likely to report number of non-employees and time required to collect non-employee vaccination data as major barriers to

using the measure. This is likely because hospitals in this study had the highest median number and the largest proportion of non-employee HCP. (Less difficulty reporting numerator data was reported by dialysis clinics and physician practices, which had few CNE or ONE.) Electronic tracking systems, often linked to existing databases or networks, have allowed hospitals to successfully track vaccination among both employees[29,30,36–38] and various types of non-employee HCP[29,37,38].

To ensure that the measure was feasible for use, CDC submitted for NQF endorsement a revised measure that limited the types of non-employees included. The CNE category, now called "licensed independent practitioners", was restricted to non-employee physicians, advanced practice nurses, and physician assistants working at the healthcare facility. The ONE category, now called "adult students/trainees and volunteers," was restricted to non-employee students; trainees (including interns and residents); and volunteers aged ≥18 years working at the facility.

Only personnel working ≥30 days during the influenza season were included in the revised measure, in order to mitigate the difficulty of tracking temporary non-employee HCP with limited potential exposure. The revised measure is less comprehensive but is more likely to produce valid and reliable estimates of HCP vaccination coverage. The revised measure was fully endorsed by NQF in May 2012. The Centers for Medicare and Medicaid Services has added the NQF-endorsed measure to its quality reporting programs for acute care hospitals and ASCs, which will affect annual payment updates for these facilities.[39,40]

Limitations

These results are subject to certain limitations. Participating jurisdictions were selected on the basis of prior experience with or interest in reporting HCP influenza vaccination coverage, and facilities were not randomly recruited. Therefore, results may not be generalizable to all healthcare facilities nationally. Facilities with less experience in such measurement were less likely to complete the evaluation; these facilities may have experienced greater barriers to using the measure than those who completed the current study. However, respondents represented a variety of facility types: public and private, urban and non-urban, with various levels of prior experience measuring influenza vaccination (Table 1).

Conclusion

This study demonstrated that reporting HCP employee vaccination status using a standardized measure was feasible for most healthcare facilities. Measuring vaccination status among non-employee HCP, particularly those working in a facility for a limited time, remains difficult. Annual influenza vaccination is recommended for all paid and unpaid HCP with potential exposure to patients or infectious materials, in order to reduce risk of transmitting and acquiring influenza.[22]

As healthcare facilities gain experience using the NQF-endorsed measure, it can be adapted to include additional non-employee HCP. Continued implementation and expansion of the measure to additional HCP populations and settings will inform quality improvement efforts in healthcare facilities and facilitate national comparisons of HCP influenza vaccination

estimates. Despite efforts by numerous professional organizations, increasing HCP influenza vaccination coverage has been challenging. Enhancing measurement of HCP influenza vaccination using this standardized measure should lead to increased vaccination uptake, resulting in healthier patients and providers.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Sample characteristics overall and by facility type

	All Facilities % (n)	Acute Care Hospitals % (n)	ASC % (n)	Dialysis % (n)	LTCF % (n)	Physician Practice % (n)
Total	100.0 (234)	100.0 (78)	100.0 (16)	100.0 (43)	100.0 (59)	100.0 (38)
Ownership						
For-profit, private	41.9 (98)	19.2 (15)	100.0 (16)	58.1 (25)	44.1 (26)	42.1 (16)
Not-for-profit, private	40.2 (94)	55.1 (43)	0.0	39.5 (17)	35.6 (21)	34.2 (13)
Public, federal or state/local	18.0 (42)	25.6 (20)	0.0	2.3 (1)	20.3 (12)	23.7 (9)
Area						
Urban	55.1 (129)	57.7 (45)	62.5 (10)	48.1 (21)	52.5 (31)	57.9 (22)
Suburban	22.7 (53)	21.8 (17)	31.3 (5)	27.9 (12)	27.1 (16)	7.9 (3)
Rural	22.2 (52)	20.5 (16)	6.3 (1)	23.3 (10)	20.3 (12)	34.2 (13)
Previous experience offering HCP influenza vaccine						
Never offered	0.9 (2)	0.0	12.5 (2)	0.0	0.0	0.0
Offered 1–4 years	9.8 (22)	5.1 (4)	12.5 (2)	16.3 (7)	13.6 (8)	5.3 (2)
Offered 5 or more years	89.3 (209)	94.9 (74)	75.0 (12)	83.7 (36)	86.4 (51)	94.7 (36)
Previous experience measuring HCP vaccination						
Never measured	28.2 (66)	0.0	93.8 (15)	23.3 (10)	28.8 (17)	63.2 (24)
Measured during 2009–2010 only	8.1 (19)	2.6 (2)	0.0	16.3 (7)	11.9 (7)	7.9 (3)
Measured 2–4 years	23.5 (55)	44.9 (35)	6.3 (1)	11.6 (5)	15.3 (9)	13.2 (5)
Measured 5 or more years	40.2 (94)	52.6 (41)	0.0	48.8 (21)	44.1 (26)	15.8 (6)
Formally share vaccination rates with HCP [a]	79.8 (134)	82.1 (64)	100.0 (1)	81.8 (27)	71.4 (30)	85.7 (12)
Facility policy on HCP vaccination [b]						
Recommended but not required	39.9 (91)	24.7 (19)	50.0 (8)	57.1 (24)	26.3 (15)	69.4 (25)
Declination required with no consequences	54.4 (124)	66.2 (51)	37.5 (6)	40.5 (17)	68.4 (39)	30.6 (11)
Declination required with consequences	3.1 (7)	7.8 (6)	0.0	0.0	1.8 (1)	0.0
No policy	2.6 (6)	1.3 (1)	12.5 (2)	2.4 (1)	3.5 (2)	0.0

ASC: Ambulatory Surgery Center; LTCF: Long-Term Care Facility; HCP: healthcare personnel.

[a] Restricted to those who have previously measured influenza vaccination rates among healthcare personnel.

[b] Does not include "other" responses that could not be otherwise categorized.

Table 2

Results for selected survey elements on ease of using measure, overall and by facility type

	All Facilities % (n)	Acute Care Hospitals % (n)	ASC % (n)	Dialysis % (n)	LTCF % (n)	Physician Practice % (n)
Agreement for CDC tool elements						
Easy to use	74.4 (174)	74.4 (58)	68.8 (11)	72.1 (31)	81.4 (48)	68.4 (26)
Comprehensive	76.1 (178)	71.8 (56)	75.0 (12)	76.7 (33)	81.4 (48)	76.3 (29)
Relevant to my healthcare facility	68.0 (159)	73.1 (57)	50.0 (8)	69.8 (30)	76.3 (45)	50.0 (19)
Instructions were easy to understand	70.1 (164)	73.1 (57)	50.0 (8)	67.4 (29)	76.3 (45)	65.8 (25)
Definitions were easy to understand	68.4 (160)	70.5 (55)	68.8 (11)	65.1 (28)	81.4 (48)	47.4 (18)
Would recommend to other healthcare facilities	63.7 (149)	70.5 (55)	43.8 (7)	58.1 (25)	69.5 (41)	55.3 (21)
Agreement for ease of assigning HCP to correct denominator category [a]						
Employees	82.1 (192)	83.3 (65)	87.5 (14)	83.7 (36)	83.1 (49)	73.7 (28)
Credentialed non-employees	51.7 (121)	41.0 (32)	87.5 (14)	72.1 (31)	47.5 (28)	42.1 (16)
Other non-employees	44.4 (104)	39.7 (31)	50.0 (8)	55.8 (24)	49.2 (29)	31.6 (12)
Agreement for ease of counting HCP [a]						
Employees	83.3 (195)	80.8 (63)	93.8 (15)	83.7 (36)	84.8 (50)	81.6 (31)
Credentialed non-employees	47.9 (112)	32.1 (25)	81.3 (13)	69.8 (30)	39.0 (23)	55.3 (21)
Other non-employees	37.6 (88)	24.4 (19)	43.8 (7)	51.2 (22)	35.6 (21)	50.0 (19)

ASC: Ambulatory Surgery Center; LTCF: Long-Term Care Facility; HCP: healthcare personnel.

[a] Proportion responding “easy” or “very easy”

Table 3

Major barriers to reporting HCP influenza vaccination using measure, overall and by facility type [a]

	All Facilities % (n)	Acute Care Hospitals % (n)	ASC % (n)	Dialysis % (n)	LTCF % (n)	Physician Practice % (n)
Ability to determine vaccination status of other non-employees	27.4 (64)	29.5 (23)	37.5 (6)	25.6 (11)	32.2 (19)	13.2 (5)
Ability to determine vaccination status of credentialed non-employees	23.5 (55)	38.5 (30)	31.3 (5)	9.3 (4)	25.4 (15)	2.6 (1)
Determining vaccination status of HCP vaccinated outside the facility	21.4 (50)	29.5 (23)	18.8 (3)	7.0 (3)	27.1 (16)	13.2 (5)
Number of other non-employees working at facility	20.9 (49)	24.5 (23)	12.5 (2)	16.3 (7)	23.7 (14)	7.9 (3)
Time required to collect data on vaccination status of credentialed non-employees	20.5 (48)	37.2 (29)	31.3 (5)	14.0 (6)	13.6 (8)	0.0
Time required to collect data on vaccination status of other non-employees	20.1 (47)	26.9 (21)	37.5 (6)	16.3 (7)	18.6 (11)	5.3 (2)
Number of credentialed non-employees working at facility	13.7 (32)	28.2 (22)	12.5 (2)	4.7 (2)	10.2 (6)	0.0
Inadequate existing process or system in place to track HCP vaccination	10.7 (25)	9.0 (7)	18.8 (3)	4.7 (2)	13.6 (8)	13.2 (5)
Definitions of HCP groups did not match those used at facility	7.7 (18)	14.1 (11)	6.3 (1)	2.3 (1)	1.7 (1)	10.5 (4)
Time required to collect data on vaccination status of employees	7.7 (18)	10.3 (8)	6.3 (1)	4.7 (2)	8.5 (5)	5.3 (2)
Time required to enter data on vaccination status of HCP	7.7 (18)	11.5 (9)	18.8 (3)	2.3 (1)	5.1 (3)	5.3 (2)
Ability to determine vaccination status of employees	7.3 (17)	5.1 (4)	6.3 (1)	4.7 (2)	11.9 (7)	7.9 (3)
Distinguishing between medical & non-medical reasons for declination	6.8 (16)	10.3 (8)	6.3 (1)	4.7 (2)	5.1 (3)	5.3 (2)
Lack of time to prepare prior to reporting period	6.8 (16)	9.0 (7)	6.3 (1)	2.3 (1)	8.5 (5)	5.3 (2)
Privacy concerns reported by individual HCP	5.1 (12)	6.4 (5)	6.3 (1)	2.3 (1)	5.1 (3)	5.3 (2)

ASC: Ambulatory Surgery Center; LTCF: Long-Term Care Facility; HCP: healthcare personnel. Facilities could report multiple barriers, so responses may sum to greater than 100%.

[a] Items reported as "major barriers" (vs. "somewhat of a barrier" or "not a barrier at all") to using the NQF measure for reporting HCP influenza vaccination by <5% of facilities overall were: lack of previous experience measuring HCP influenza vaccination, the number of employees working at the healthcare facility, lack of support from administration or leadership for using the measure, lack of support or assistance from other staff members in tracking vaccination, understanding the definitions for different types of HCP, privacy concerns reported by unions, and other.