

Frequency and Predictors of Seasonal Influenza Vaccination and Reasons for Refusal Among Patients at a Large Tertiary Referral Hospital

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We assessed frequency and predictors of seasonal influenza vaccination acceptance among inpatients at a large tertiary referral hospital, as well as reasons for vaccination refusal. Over 5 seasons, >60% of patients unvaccinated on admission refused influenza vaccination while hospitalized; “believes not at risk” was the reason most commonly given.

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Seasonal influenza vaccination rates among US adults remain far below desired levels at ~40%, despite the Healthy People 2020 goal of 70% coverage among adults ≥ 18 years of age¹ and the current recommendation for all people ≥ 6 months of age to receive the vaccination.² Vaccination of hospitalized patients remains an underutilized opportunity to increase influenza vaccination coverage, especially in populations vulnerable to the disease.³ Influenza vaccination of inpatients is a Joint Commission Accountability Measure,⁴ but it does not include patients who refuse the vaccination.⁵ Few data have been published on influenza vaccination refusal among hospitalized patients. We assessed frequency and predictors of vaccination acceptance as well as reasons for refusal in an inpatient population over 5 influenza seasons.

METHODS

This study was approved by the University of Maryland Institutional Review Board. We obtained data from electronic medical records for all inpatients ≥ 18 years of age admitted to a 760-bed tertiary referral hospital during 5 influenza seasons (October 1 to March 31, each year from 2008 to 2013). On admission, self-reported influenza vaccination status, influenza vaccination contraindications, vaccination refusal, and reasons for refusal were documented. All eligible patients were offered the influenza vaccination as part of routine clinical practice through a hospital-wide and physician-approved nursing protocol.

We describe the influenza vaccination rate prior to admission by season. Among the first admissions of vaccination-eligible patients per influenza season, we describe the frequency of vaccination acceptance (ie, agreeing to receive the influenza vaccination) and self-reported reasons for vaccination refusal.

We explored predictors of vaccination acceptance in this population using a multivariable model built with stepwise logistic regression. Statistical significance of $P < .15$ for covariate entry into the model and $P > .2$ for covariate elimination were used in our analysis. Covariates included patient age, sex, insurance, and employment status, smoking status, primary language, Charlson comorbidity index, weekend vs weekday admission, admitting hospital service, and admission to an intensive care unit (ICU). Data analysis was conducted using SAS 9.3 (SAS Institute, Inc., Cary, NC).

RESULTS

A total of 52,141 first admissions were assessed for vaccination status over 5 influenza seasons.

Self-reported influenza vaccination prior to admission ranged from 39% in 2008–2009 to 48% in 2012–2013 (Figure 1). Of the 29,113 patients unvaccinated on admission, 3% ($n = 742$) had contraindications. Thus, a total of 28,371 patients were eligible for influenza vaccination on first admission during a given influenza season, with approximately 5,500 vaccination-eligible admissions per season.

For the 2008–2009 influenza season, vaccination acceptance among eligible, unvaccinated patients was 31%. During the next 4 seasons, acceptance rates were 40%, 36%, 33%, and 29% (Figure 1). The total percentage of patients who either self-reported vaccination prior to admission or accepted the vaccine during admission were 59%, 67%, 66%, 64%, and 63%, respectively, over the 5 influenza seasons studied. Reasons for vaccination refusal included “believes not at risk” (49%; $n = 9,243$), “wants further advice” (16%; $n = 2,950$), “fear of adverse events” (13%; $n = 2,416$), and “other” (22%; $n = 4,102$). Distributions of reasons for vaccination refusal were similar across influenza seasons (data not shown).

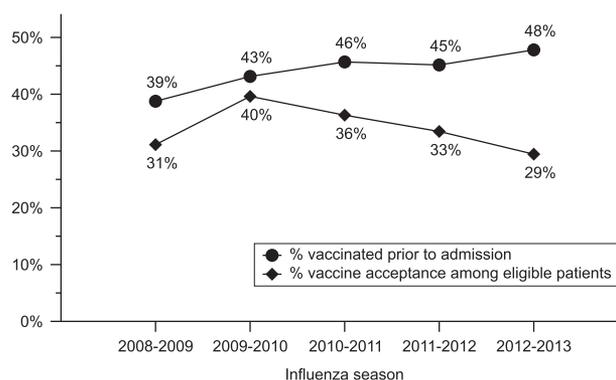


FIGURE 1. Self-reported seasonal influenza vaccination prior to first hospital admission and acceptance rates of seasonal influenza vaccine among patients unvaccinated on admission in a given influenza season.

In our exploratory analysis of factors associated with influenza vaccination acceptance (Table 1), ICU admission had the strongest association (adjusted odds ratio [adj. OR], 2.56; 95% CI, 2.40–2.74). Admitting hospital service was also significantly associated with vaccination acceptance. Using the medicine service as a reference, the trauma service was associated with greater odds of vaccination acceptance (adj. OR, 1.09; 95% CI, 1.02–1.17), whereas surgery (adj. OR, 0.55; 95% CI, 0.51–0.60), women's health services (adj. OR, 0.60; 95% CI, 0.55–0.65), and other services (adj. OR, 0.67; 95% CI, 0.60–0.74) were associated with decreased odds of acceptance. Each additional 7 days of hospital stay was associated with increased acceptance (adj. OR, 1.02; 95% CI, 1.01–1.04). Admission dates later in the influenza season were associated with decreased acceptance: adj. OR was 0.97 for each of 7 days following October 1 (95% CI, 0.97–0.97).

Compared to the 2008–2009 influenza season, the 2009–2010 season (adj. OR, 1.48; 95% CI, 1.36–1.60) and the

2010–2011 season (adj. OR, 1.27; 95% CI, 1.17–1.37) were associated with increased odds of vaccination acceptance, and the 2012–2013 season was associated with decreased odds (adj. OR, 0.86; 95% CI, 0.79–0.94). The association with the 2011–2012 influenza season was not significant.

Each 10-year increase in patient age was associated with increased odds of vaccination acceptance (adj. OR, 1.05; 95% CI, 1.03–1.07). Female sex was associated with decreased acceptance (adj. OR, 0.85; 95% CI, 0.81–0.90). No statistically significant association was observed between vaccination acceptance and white race compared to black race, but there was a statistically significant association for other races (adj. OR, 1.23; 95% CI, 1.10–1.37). Compared to single patients, married patients had decreased odds of vaccination acceptance (adj. OR, 0.92; 95% CI, 0.86–0.98), whereas divorced, separated, or widowed patients (adj. OR, 0.99; 95% CI, 0.91–1.07) and patients with unknown marital status (adj. OR, 0.87;

TABLE 1. Characteristics of Inpatients Eligible for Influenza Vaccination at the Time of Their First Admission During a Given Influenza Season and Odds Ratios for Vaccination Acceptance from Multivariable Logistic Regression

Variable	No. (%) or Mean (SD)		OR for Agreeing to Receive Vaccine (95% CI)	
	Agreed to Receive Vaccine	Refused Vaccine	Unadjusted	Adjusted
Total vaccine-eligible first admissions	9,660 (34.0)	18,711 (66.0)	N/A	N/A
Influenza season				
2008–2009	1,834 (19.0)	4,059 (21.7)	Reference	Reference
2009–2010	2,244 (23.2)	3,420 (18.3)	1.45 (1.35–1.57)	1.48 (1.36–1.60)
2010–2011	2,132 (22.1)	3,740 (20.0)	1.26 (1.17–1.36)	1.27 (1.17–1.37)
2011–2012	1,910 (19.8)	3,801 (20.3)	1.11 (1.03–1.20)	1.08 (0.99–1.17)
2012–2013	1,540 (15.9)	3,691 (19.7)	0.92 (0.85–1.00)	0.86 (0.79–0.94)
Patient-Specific Characteristic				
Age ^a	50.0 (17.8)	47.7 (17.3)	1.01 (1.01–1.01)	1.05 (1.03–1.07)
Female gender	4,193 (43.4)	9,423 (50.4)	0.76 (0.72–0.79)	0.85 (0.81–0.90)
Race				
Black	4,448 (46.0)	8,689 (46.4)	Reference	Reference
White	4,497 (46.6)	8,843 (47.3)	0.99 (0.94–1.05)	0.99 (0.93–1.05)
Other	715 (7.4)	1,179 (6.3)	1.18 (1.07–1.31)	1.23 (1.10–1.37)
Marital status				
Single	4,787 (49.6)	9,152 (48.9)	Reference	Reference
Married	3,070 (31.8)	6,393 (34.2)	0.92 (0.87–0.97)	0.92 (0.86–0.98)
Divorced, separated, widowed	1,644 (17.0)	2,890 (15.4)	1.09 (1.01–1.17)	0.99 (0.91–1.07)
Unknown	159 (1.6)	276 (1.5)	1.10 (0.90–1.34)	0.87 (0.71–1.08)
Currently employed full time	2,409 (24.9)	5,803 (31.0)	0.74 (0.70–0.78)	0.82 (0.77–0.87)
Current smoker	3,231 (33.4)	5,748 (30.7)	1.13 (1.08–1.19)	1.07 (1.01–1.13)
Charlson index ≥ 2	3,106 (32.2)	5,276 (28.2)	1.21 (1.14–1.27)	1.16 (1.09–1.23)
Admission-Specific Characteristic				
Service				
Medicine	3,878 (40.1)	6,485 (34.7)	Reference	Reference
Shock trauma	2,665 (27.6)	3,770 (20.1)	1.18 (1.11–1.26)	1.09 (1.02–1.17)
Surgery	1,249 (12.9)	3,157 (16.9)	0.66 (0.61–0.71)	0.55 (0.51–0.60)
Women's health	1,241 (12.8)	3,474 (18.6)	0.60 (0.55–0.64)	0.60 (0.55–0.65)
Other	627 (6.5)	1,825 (9.8)	0.57 (0.52–0.63)	0.67 (0.60–0.74)
ICU admission	2,834 (29.3)	2,661 (14.2)	2.50 (2.36–2.66)	2.56 (2.40–2.74)
Length of stay ^b	7.8 (13.0)	6.2 (9.4)	1.11 (1.09–1.12)	1.02 (1.01–1.04)
No. days admitted after Oct. 1 ^b	73.7 (53.7)	85.3 (54.4)	0.97 (0.97–0.98)	0.97 (0.97–0.97)

^aOdds ratio is for 10 years of age.

^bOdds ratio is for 7 days.

95% CI, 0.71–1.08) did not. Full-time employment was associated with decreased odds of vaccination acceptance (adj. OR, 0.82; 95% CI, 0.77–0.87). Current smoking (adj. OR, 1.07; 95% CI, 1.01–1.13) and a Charlson index of ≥ 2 (adj. OR, 1.16; 95% CI, 1.09–1.23) were associated with increased odds of vaccination acceptance. Insurance status did not meet the significance criteria for entry into the model.

DISCUSSION

Despite a systems-based approach to ensure routine assessment for and administration of influenza vaccination to hospitalized patients,³ our results indicate that >60% of patients who were unvaccinated on admission and were offered the seasonal influenza vaccination on admission refused; 50% of these patients gave “not at risk” as their reason for refusal. Vaccination acceptance was highest during the 2009–2010 season, coinciding with the H1N1 pandemic; it subsequently dropped to pre-2009–2010 levels.

Our exploratory analysis identified several factors associated with increased vaccination acceptance, including ICU admission, Charlson index ≥ 2 , smoking, longer length of stay, and admission to the trauma service (compared to the medical service). This result is encouraging, as these patients are likely at increased risk for influenza complications. These data also suggest that potentially healthier individuals might opt out of vaccination, which is consistent with perceived lack of risk as the most frequent reason for refusal. This finding is similar to observations in prior studies among the elderly^{6–8} and healthcare workers.^{9,10} However, with the exception of ICU admission, the predictors in our model have relatively weak associations with vaccination acceptance (adj. OR, <2). This finding suggests that influenza vaccination refusal is relatively uniform across hospitalized patients rather than concentrated in a specific subpopulation.

The strengths of this study include a large sample size including all eligible admissions and data for 5 contiguous influenza seasons. The limitations of this study include lack of multicenter data and reliance on data from electronic medical records. Additionally, vaccination status on admission and reason for vaccination refusal were self-reported to the admitting nurse and were thus unverified. Influenza vaccination status in previous years, a predictor of current vaccination acceptance in some studies, was not available as a variable in our model exploring predictors of acceptance. Further research is needed to determine whether other hospitals experience similarly high rates of influenza vaccination refusal.

Despite being a “core” Joint Commission measure for several years that is reportedly met with high frequency by hospitals, the overall vaccination rate of eligible patients who are unvaccinated on admission remains low because of patient refusal. An emphasis on educating patients about influenza vaccination might be necessary to decrease vaccination refusal,

especially considering that a substantial portion of hospitalized patients may be at increased risk for influenza complications.

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REFERENCES

1. Immunization and infectious diseases—objectives. Office of Disease Prevention and Health Promotion website. <http://www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases/objectives>. Published 2014. Accessed December 16, 2014.
2. Grohskopf LA, Olsen SJ, Sokolow LZ, et al. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP)—United States, 2014–15 influenza season. *MMWR Morb Mortal Wkly Rep* 2014;63:691–697.
3. Bratzler DW, Houck PM, Jiang H, et al. Failure to vaccinate Medicare inpatients: a missed opportunity. *Arch Intern Med* 2002;162:2349–2356.
4. Accountability measures. The Joint Commission website. http://www.jointcommission.org/accountability_measures.aspx. Published 2014. Accessed December 16, 2014.
5. Nqf-endorsed voluntary consensus standards for hospital care—measure information form imm-2. The Joint Commission website. http://www.jointcommission.org/specifications_manual_for_national_hospital_inpatient_quality_measures.aspx. Published 2014. Accessed December 16, 2014.
6. van Essen GA, Kuyvenhoven MM, de Melker RA. Why do healthy elderly people fail to comply with influenza vaccination? *Age Ageing* 1997;26:275–279.
7. Canova L, Birchmeier M, D’Acromont V, et al. Prevalence rate and reasons for refusals of influenza vaccine in elderly. *Swiss Med Wkly* 2003;133:598–602.
8. Mangtani P, Breeze E, Stirling S, Hanciles S, Kovats S, Fletcher A. Cross-sectional survey of older peoples’ views related to influenza vaccine uptake. *BMC Public Health* 2006;6:249.
9. Maltezou HC, Maragos A, Katerelos P, et al. Influenza vaccination acceptance among health-care workers: A nationwide survey. *Vaccine* 2008;26:1408–1410.
10. Norton SP, Scheifele DW, Bettinger JA, West RM. I—Influenza vaccination in paediatric nurses: cross-sectional study of coverage, refusal, and factors in acceptance. *Vaccine* 2008;26:2942–2948.