

Feasibility and Patient Acceptance of Emergency Department-Based Influenza Vaccination in a Military Medical Center

LCDR Keren Arkin Hilger, USPHS*; James R. Hilger, PhD†; CDR Shannon D. Putnam, MSC USN (Ret.)‡; CDR Shaun D. Carstairs, MC USN*; CDR Ryan C. Maves, MC USN§||

ABSTRACT Influenza vaccination rates in the United States remain low. Many emergency department (ED) patients may not routinely seek care elsewhere. In a survey of ED visitors, 36.8% of unvaccinated respondents were willing to consider influenza vaccination during their visit. Participants at high risk for influenza complications were more likely to have been previously vaccinated, but unvaccinated participants at high risk were not significantly more likely to consider ED-based vaccination compared with other participants. ED-based influenza vaccination may be an effective method to expand vaccine coverage.

BACKGROUND

Since the 2010–2011 influenza season, the Centers for Disease Control and Prevention have recommended that all persons age >6 months in the United States should receive influenza vaccination, in the absence of a clear contraindication.¹ Despite this, fewer than half of adult U.S. residents receive influenza vaccination.²

The U.S. Military Health System (MHS) provides health care to active duty service members, their dependents, and retirees from active duty. The Naval Medical Center San Diego (NMCS D) Emergency Department (ED) serves approximately 66,000 patients per year. Many MHS patients are relatively young individuals who may not routinely seek medical care. In this population, the ED may be the only place a beneficiary comes in contact with the health care system. The ED may therefore be an opportunity to vaccinate those individuals who might otherwise not receive the annual influenza vaccine.

Although higher-acuity patients within the ED may not be suitable for vaccination in this setting, a large proportion of ED patients may present with nonemergent complaints. Availability of the vaccine within the ED would address accessibility impediments to obtaining the vaccine, as patients are already in a medical setting and may already be waiting to see ED staff. Prior authors have described ED-based influenza vaccine programs on a pilot basis, generally in urban centers serving a large population of uninsured persons.^{3,4} The feasibility of this approach in a fully insured population, however, has not been assessed. In this study, we sought to evaluate the willingness of MHS beneficiaries to consider ED-based influenza vaccination.

OBJECTIVES

In this study, we aimed to determine rates of prior influenza vaccination among ED visitors, risk factors for severe influenza among ED visitors, reasons for vaccine avoidance, whether unvaccinated persons would consider vaccination in the ED, and what patients perceived as potential barriers to vaccination in the ED.

METHODS

This was a prospective, observational pilot study conducted by distribution of surveys to individuals visiting the NMCS D ED between March and July 2011. NMCS D is a military tertiary referral center with a local catchment area of approximately 500,000 eligible beneficiaries within San Diego County and an annual ED census of 66,000 patients during the survey period. The surveys were distributed between 8:00 a.m. and 6:00 p.m., 7 days per week. A total of 1,039 surveys were returned. Inclusion criteria was any adult 18 years of age or more who was eligible for care in MHS. Survey questions were directed at the willingness of the individual participant to receive the vaccine; as such, children under the age of 18 years were excluded from analysis because of their inability to provide individual consent

*Department of Emergency Medicine, Naval Medical Center San Diego, 34800 Bob Wilson Drive, San Diego CA 92134.

†National Oceanic and Atmospheric Administration, 8901 La Jolla Shores Drive, La Jolla, CA 92037-1508.

‡Operational Infectious Diseases Department, Naval Health Research Center, 140 Sylvester Road, San Diego, CA 92106-3521.

§Division of Infectious Diseases, Department of Internal Medicine, Naval Medical Center San Diego, 34800 Bob Wilson Drive, San Diego CA 92134.

||Department of Pulmonary and Critical Care Medicine, Naval Medical Center San Diego, 34800 Bob Wilson Drive, San Diego CA 92134.

The authors are employees of the U.S. Government. This work was prepared as part of their duties. Title 17 U.S.C. §105 provides that "Copyright protection under this title is not available for any work of the United States Government." Title 17 U.S.C. §101 defines a U.S. Government work as a work prepared by a military service member or official employee of the U.S. Government as part of that person's official duties. The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, nor the U.S. Government.

doi: 10.7205/MILMED-D-15-00074

for vaccination. This anonymous survey was handed out to ED patients and accompanying adult visitors while in the waiting area during ED visits. Respondents returned their surveys voluntarily. The survey was continued until a planned target of 1,000 responses was received. The NMCS D Institutional Review Board approved this protocol as less than minimal risk research, with a waiver of signed informed consent. Statistical analysis was performed using Stata 12 Software (StataCorp LP, College Station, Texas).

RESULTS

We collected a total of 1,039 survey responses. Eighty-nine of these surveys indicated an age less than 18 years for respondents or were missing responses on primary outcomes (specifically past vaccination status) and were removed from analysis, leaving 950 surveys available for review. During the study months, the NMCS D ED cared for 26,897 patients, assuming that approximately one-half of these patients were present in the waiting area during the hours that the study was conducted, we estimate a response rate of 7.7%.

Select respondent characteristics were collected through the survey instrument. In addition to basic demographic and military data, participants were asked about risk factors for severe influenza, to include a history of cardiac, pulmonary, or chronic kidney disease; tobacco use; abnormal immune function; a history of stroke or other chronic neurologic disease; or current pregnancy. In addition, participants were asked about exposure to individuals at high risk for severe influenza, to include exposure to children in day care settings, residence in an assisted living facility or regular contact with such as a person, or employment in a health care setting. This demographic information and risk factors are reported in Table I.

Of the 950 eligible respondents, 660 (69.5%) reported vaccination for the prior influenza season. Vaccinated participants were evenly divided between men and women, while a majority of unvaccinated participants were female. This may be a function of the military setting of the study; male participants were more likely to be active duty personnel and thus mandated to receive vaccination by military policy. Participants who had previously received influenza vaccination were more likely to seek vaccination for the current year. A slightly higher proportion of high-risk individuals and contacts of high-risk individuals had received influenza vaccination in the past year, but this difference did not meet statistical significance (Table II).

Participants were then asked if they would be willing to consider or accept influenza vaccination in the ED. 55% of vaccinated participants reported such willingness, while 36.9% of unvaccinated participants also reported willingness. 456 participants were unwilling to consider ED-based vaccination. The most common reasons cited for refusal was a preference for receiving the vaccine in a primary care setting (151/456, 35.3%). Other common reasons for refusal

TABLE I. Demographics and Risk Factors of Survey Respondents

	Number	%
Age (Years)		
18–25	310	29.8
26–40	523	50.3
41–60	139	13.4
No Response	67	6.4
Total	1,039	100
Gender		
Male	468	45.0
Female	559	53.8
No Response	12	1.2
Total	1,039	100
Sponsor Status		
Enlisted	789	75.9
Officer	96	9.2
Civilian	4	0.3
Retired	28	2.7
No Response	122	11.7
Total	1,039	100
Risk Factors for Severe Influenza or Contact with High-risk Persons	No. of Positive/No. of Respondents	%
Heart Disease	57/1,027	5.5
Pulmonary Disease	104/1,027	10.1
Current Tobacco Use	147/1,022	14.5
Former Smoker with History of Tobacco Use	161/798	20.2
Immunocompromised State	39/1,024	3.8
Neurologic Disease	15/1,024	1.5
Chronic Kidney Disease	14/1,010	1.4
Diabetes Mellitus	103/1,028	10.0
Health Care Worker	82/1,021	8.0
Currently Pregnant	59/996	5.9
Works in a Day Care or Has Frequent Contact with Children in a Day Care Setting	56/1,026	5.5
Lives in a Skilled Nursing Facility or Assisted Living Facility	5/1,021	0.5
Has Regular Contact with Someone Who Lives in a Nursing Home or Assisted Living Facility	33/1,026	3.2

included the beliefs that influenza vaccination might exacerbate an underlying acute condition (33/456, 7.2%), that vaccination detracts from the primary mission of the ED or is otherwise inappropriate in that setting (32/456, 7.0%), or that influenza vaccination is harmful and/or unnecessary (74/456, 16.2%). A small number of these participants (9/456, 2.0%) reported current or recent pregnancy as a perceived contraindication to influenza vaccination.

Differing risk groups were then evaluated separately for their vaccine history and, if previously unvaccinated, for their willingness to consider ED vaccination (Table III). As noted, women had an odds ratio (OR) of only 0.49 (95% confidence interval [CI]: 0.37–0.64) for prior vaccination compared with male participants, but also had a nonsignificant trend toward greater acceptance of ED-based vaccination. Among specific risk groups, current smokers and persons with diabetes were more likely to have been

TABLE II. Demographics and Responses of Emergency Department Visitors and Willingness to Consider ED-Based Influenza Vaccination

	Vaccinated in 2010–2011 Season?		p Value
	Yes (n = 660)	No (n = 290)	
Age (Years)	38.3	36.7	0.19
Gender	49.5% Female	68.4% Female	<0.01
Planning on 2011–2012 Vaccine	524/660 (79.3%)	62/290 (21.4%)	<0.01
Not Planning on 2011–2012 Vaccine	77/660 (11.7%)	219/290 (75.5%)	
Undecided/No Response	59/660 (8.9%)	10/290 (3.4%)	
Risk Factors for Severe Influenza?	212/660 (32%)	79/290 (27.2%)	0.15
Exposure to Vulnerable Populations?	144/660 (21.8%)	50/290 (17.2%)	0.12
Willing to Accept Emergency Department-Based Vaccination?			
Yes	363/660 (55.0%)	107/290 (36.9%)	<0.01
No	280/660 (42.4%)	176/290 (60.7%)	
Undecided/No Response	17/660 (2.6%)	7/290 (2.4%)	

TABLE III. Influenza Risk Factors and Willingness to Consider Emergency Department Vaccination

	Received Influenza Vaccination in the Past Year		Willingness for Emergency Department Vaccination If Unvaccinated in the Past Year	
	OR	95% CI	OR	95% CI
	Female Gender	0.49	0.37–0.64	1.20
Heart Disease	1.55	0.82–2.91	0.75	0.23–2.51
Pulmonary Disease	1.00	0.64–1.55	1.16	0.54–2.51
Current Tobacco Use	1.39	1.02–1.90	0.65	0.36–1.17
Former Smoker with History of Tobacco Use	2.10	0.92–4.81	0.70	0.13–3.66
Immunocompromised State	0.51	0.18–1.41	0.70	0.13–3.66
Neurologic Disease	0.91	0.27–3.06	1.71	0.24–12.32
Chronic Kidney Disease	1.52	0.95–2.46	0.90	0.37–2.120
Diabetes Mellitus	4.51	2.15–9.47	2.28	0.50–10.37
Health Care Worker	0.75	0.43–1.29	0.79	0.31–2.00
Currently Pregnant	0.78	0.44–1.37	1.26	0.49–3.22
Works in a Day Care or Has Frequent Contact with Children in Day Care	0.30	0.05–1.78	0.84	0.08–9.33
Lives in a Skilled Nursing Facility or Assisted Living Facility	1.21	0.56–2.64	0.28	0.03–2.33
Presence of Any Risk Factors	1.45	1.11–1.88	0.66	0.42–1.06

previously vaccinated than other groups. Other risk groups did not differ significantly in their prior vaccination rates from the overall cohort. When participants with any identified risk factor were aggregated, they showed an overall greater likelihood of prior vaccination (OR: 1.45, 95% CI: 1.11–1.88). However, unvaccinated persons with those same risk factors were less likely to support ED-based vaccination, although this finding did not meet statistical significance (OR: 0.66, 95% CI: 0.42–1.06).

DISCUSSION

The MHS provides largely unrestricted access to influenza vaccination to its beneficiaries, as well as medical care at its hospitals and clinics free of charge to eligible persons. In addition, the U.S. military requires all uniformed personnel and civilian health care staff to receive annual influenza vaccination. As such, influenza vaccination rates among active duty military personnel are typically greater than 90% per

year.⁵ Vaccination is not mandatory for their families or for retirees; however, as a majority of active duty personnel are male, this may account for the high proportion of women among the unvaccinated respondents.

Among our cohort, certain groups reported higher rates of prior vaccination, including diabetics and smokers, in keeping with current guidelines. It is interesting to note relatively low reported rates of vaccination among participants describing themselves as immunocompromised, although this rate may be influenced by a small sample size. Similarly, pregnant women reported a low rate of prior vaccination; however, it may be that these women are referring to a period before their current pregnancies, when they could be considered to be at a lower risk due to relatively young age and potentially good health status. Participants with exposure to children in day care also reported a nonsignificantly low rate of vaccination; if these participants were the parents or primary caretakers of young children, they may similarly

perceive themselves to be at low risk due to their individual relative youth and thus not seek vaccination.

Patients with a high risk for influenza complications present to EDs at a greater frequency than the general U.S. population.⁶ Expanding access to immunization among low-risk persons may further reduce high-risk individuals' probability of influenza infection. A recent study further determined that influenza vaccination for ED patients aged 65 years and greater may be cost-effective.⁷ The largest reported barrier to vaccination was the belief that the vaccine was unnecessary, although influenza vaccination is associated with decreases in severe febrile illness and fewer lost workdays among healthy adults aged 18 to 64 years.⁸

Our study is limited by a relatively low response rate and by differences between the MHS and other health systems. It is also unclear how these results would apply in other health systems. In relatively "closed" health systems such as the MHS, the Veterans Affairs systems, or large health maintenance organizations such as Kaiser Permanente, our findings may be generalizable. The availability of the influenza vaccination in the ED may be an effective method to expand vaccine coverage in uninsured and indigent populations in particular, given their decreased access to care in other settings.^{3,4}

In conclusion, a significant proportion of unvaccinated persons in our sample expressed interest in receiving influenza vaccination in the ED. Availability of influenza vacci-

nation in the ED may be an effective method to increase overall influenza vaccination rates.

REFERENCES

1. 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. *Morb Mortal Wkly Rep* 2014; 63(32): 691–7.
2. Johnson NB, Hayes LD, Brown K, Hoo EC, Ethier KA; Centers for Disease Control and Prevention: CDC National Health Report: leading causes of morbidity and mortality and associated behavioral risk and protective factors—United States, 2005–2013. *MMWR Surveill Summ* 2014; 63(Suppl 4): S3–S27.
3. Greenberg MR, Barr GC Jr, Mackenzie RS, Rosenau AM, Weaver KR, Ortiz M: Building an effective ED influenza vaccine program. *Am J Emerg Med* 2009; 27(9): 1154–7.
4. Slobodkin D, Kitlas J, Zielske P: Opportunities not missed—systematic influenza and pneumococcal immunization in a public inner-city emergency department. *Vaccine* 1998; 16(19): 1795–802.
5. Eick-Cost AA, Tastad KJ, Guerrero AC, et al: Effectiveness of seasonal influenza vaccines against influenza-associated illnesses among US military personnel in 2010–11: a case-control approach. *PLoS One* 2012; 7(7): e41435.
6. Hiller KM, Sullivan D: Influenza vaccination in the emergency department: are our patients at risk? *J Emerg Med* 2009; 37(4): 439–43.
7. Patterson BW, Khare RK, Courtney DM, Lee TA, Kyriacou DN: Cost-effectiveness of influenza vaccination of older adults in the ED setting. *Am J Emerg Med* 2012; 30(7): 1072–9.
8. Nichol KL, Lind A, Margolis KL, et al: The effectiveness of vaccination against influenza in healthy, working adults. *N Engl J Med* 1995; 333(14): 889–93.

Copyright of Military Medicine is the property of AMSUS and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.